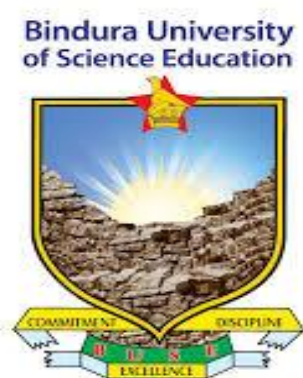


**BINDURA UNIVERSITY OF SCIENCE EDUCATION**

**FACULTY OF SCIENCE EDUCATION**

**BACHELOR OF SCIENCE EDUCATION**

**HONOURS DEGREE IN CHEMISTRY**



**Experiences of girl child in taking up STEM subjects at secondary school level.**

**By Mudzingwa Melody B226481A**

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS OF THE BACHELOR OF SCIENCE HONORS DEGREE IN  
CHEMISTRY EDUCATION**

**NOVEMBER2024**

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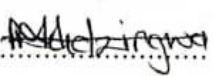
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**Dissertation Title** : Experiences of girl child when taking up STEM subjects at secondary school level a case of Matinunura High School and Mkoba 3 high school in Gweru district.

**Degree Title** : Bachelor of Science Education Honors Degree in Chemistry.

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## **DEDICATIONS**

This research is dedicated to my mother and sisters who always believe in me.

## **ACKNOWLEDGEMENTS**

I would like to thank my Chemistry teachers especially Mr Muzamba, my project supervisor for all the sacrifices that they made for my benefit. Their presence is invaluable.

Lastly but equally important I would like to thank all those who completed the questionnaires who made this study worthwhile and meaningful.

To all of them, God bless.

## **ABSTRACT**

*This qualitative study explores the experiences of girl child in taking up STEM subjects at the secondary school level. In-depth interviews with 30 girl students and 15 teachers from urban and rural secondary schools were conducted to gather data. The findings reveal that girls face a complex array of barriers, including societal expectations, lack of role models, and inadequate resources, which hinder their participation in STEM subjects. Despite these challenges, the study also highlights the resilience and determination of girls who pursue STEM subjects, and the importance of supportive teachers and family members in facilitating their success. The study's findings have implications for policy and practice aimed at promoting girls' participation in STEM education.*



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## **CHAPTER ONE: PROBLEM AND ITS SETTING**

### **1.0 Introduction**

This chapter presents the background information surrounding STEM learning areas and its association with girl Childs experience. Statement of the problem is also made for project. Research objectives followed by research questions and research assumption are discussed in this chapter of the project. Boundaries of the research are availed through the research delimitations. Significance of the study make up chapter one by unraveling research benefits to various stakeholders. Limitations of the study as well as definition of terms are also presented. The chapter folds by painting a picture on how subsequent chapters flow.

### **1.2 Background of the study**

Since the introduction of STEM, study has been focusing on how to introduce it to the current education system. The pedagogies that can be used to successfully implement the STEM subjects were being investigated. How best to implement them and what strategies can be used to implement them. According to the journal, Effective Pedagogical Strategies for STEM Education from Instructors' Perspective, by Zhu (2020), more emphasis have to be put on how to implement it successfully. There are also journals on challenges that are being face by teachers and the learners as the STEM implementation unfolds. Many studies were done and were focusing on different aspects but did not pay attention to the experience of the girl child as they embark on the STEM subjects. This question arises due to the fact that before the world was civilized learning was not for women in African countries. As it goes they might be some experiences that are being experienced by girl child.

Secondary schools in Zimbabwe have a lower enrollment of girl child in their STEM subjects taking classes compared to the enrollment of the boy child. This might be due to some reasons that we are yet to unfold in this project. The number of boy child versus the number of girl child taking STEM subjects is an indication to some experiences being faced by the girl child in taking up those subjects. Due to lower numbers of girl child in secondary school there is also a lower number of women in STEM, this is evidenced by the enrolled below. If the number of girl child in STEM is lower at secondary school it means that at a tertiary level it is going to continue declining hence lower number of women in STEM. According to the bottle neck myth, it is supposed to be like that.

Some enrollment was taken from secondary schools and a tertiary institution around Gweru district.

Due to these differences in enrollment the researcher intends to find out why the numbers of the girl child are lower than those of boys in taking up STEM subjects.

**Table 2.1 Enrollment of form three science class**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Girl          | 15                        | 37.5     |
| Boy           | 25                        | 62.5     |
| Total         | 40                        | 100      |

**Table 2.2 Enrollment of form four sciences class**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Girl          | 13                        | 32       |
| Boy           | 28                        | 68       |
| Total         | 41                        | 100      |

**Table 2.3 Enrollment of lower six sciences class**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Girls         | 07                        | 35       |
| Boys          | 13                        | 65       |
| Total         | 20                        | 100      |

**Table 2.4 Enrollment of upper six sciences class**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Girls         | 06                        | 23       |
| Boys          | 20                        | 77       |
| Total         | 26                        | 100      |

### **Mkoba teachers college enrollment**

**Table 2.5 Physics**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Female        | 04                        | 21       |

|       |    |     |
|-------|----|-----|
| Male  | 15 | 79  |
| Total | 19 | 100 |

**Table 2.6 Chemistry**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Female        | 08                        | 38       |
| Male          | 13                        | 62       |
| Total         | 21                        | 100      |

**Table 2.7 Biology**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Female        | 21                        | 58       |
| Male          | 15                        | 42       |
| Total         | 36                        | 100      |

**Table 2.8 Mathematics**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Female        | 15                        | 24       |
| Male          | 48                        | 76       |
| Total         | 63                        | 100      |

**Table 2.9 Geography**

| <b>Gender</b> | <b>Number of students</b> | <b>%</b> |
|---------------|---------------------------|----------|
| Female        | 28                        | 35       |
| Male          | 52                        | 65       |
| Total         | 80                        | 100      |

From the above statics it shows that there is a lower number of girl child compared to that of boy child in taking up the STEM subjects. According to Maisiri, (2024) Zimbabwean women remain underrepresented in STEM professions and subjects, with a mere 28.79 percent of women holding STEM degrees. The statement can also be used to support that there a fewer women in the STEM subjects. The reason of the less number of women is going to be found at the end of the project since the researcher seeks to find the challenges that women in STEM are facing.

### **1.3 Significance of the study**

STEM subjects are being taken by less number of female students both in secondary schools and tertiary institutions in Gweru district. This might be as a result of experiences of girl child in taking up the STEM subjects. The experiences are yet to be unfold which is going to be unfold in this project. Finding these experiences will be able to shed more light on what women expect in taking up the STEM subjects and this curriculum will try and compromise so as to suite the women in STEMs demands so as to motivate them. Some of the experience of the girl child in taking up STEM subjects is going to act as motivation to other girl children out there. Since experiences of other girls are able motivate others in taking up STEM subjects, it deemed necessary to find out that experience.

### **1.4 Sub-problems/ Research questions**



A research question is a clear, concise, and open-ended question that centers your research for a paper, project, or literature review. It forms the foundation of a research-based assignment and helps guide the entire research process (Dodgson, 2020). The following are the research questions that are going to help the researcher to unfold experiences of the girl children in taking up STEM subjects.

- What factors would influence girl child in taking up STEM subjects?
- What challenges faced by girl children is taking up STEM subjects?
- How is the society contributing to the decision taken by girl child in taking up STEM subjects?
- What have been done so as to motivate the girls towards taking up STEM subjects?
- In what way can the women in STEM motivate the girls in taking up STEM subjects?

## **1.5 Research objectives**

Research objectives act as a compass which determines the overall direction of the research. They define the research providing meaning to it. Fatima (2017) defined research objectives as the descriptions of what is to be achieved by carrying out the study. The objectives of this study are to:

- To explore the factors that influences girl child in taking up STEM subjects.
- To identify challenges faced by girl children in taking up STEM subjects.
- To assess the relationship of the girl child in STEM and the society.
- To find out what have been done to motivate the girl child in taking up STEM subjects.
- To assess how the women in STEM can motivate the girls in taking up STEM subjects.

## **1.6 Hypothesis**

This is a statement of expectation that will be tested by the research. This project seems to test if the following assumptions are true:

- Lack of support from the patriarchal society can be a challenge faced by girl child in taking up STEM.
  - Support from teachers might be minimal since most of the STEM teachers are male, who might be patriarchal biased, who thinks that STEM subjects are not for girl child.
- To support the girl child; the entry points at university were cut off to accommodate the girl child.
  - Some of the successful women in STEM are encouraging the girls to also take STEM subjects.

## **1.7 Significance of the study**

Significance of the study is the proof that the study is really beneficial and worth it for the time and energy (Farrugia, Petrisor & Bhandari, 2011). It determine the stakeholders who benefit from the findings of the research. This research is of great importance to various stakeholders in the country. These include teachers, parents and guardians, learners, school administration and other researchers.

### **1.7.1. Significance to teachers.**

The study will help the teachers to be able to work on how best to motivate the girl child towards taking up STEM subjects. They will also have to know deal with girl child while they are taking

the STEM subjects. Teachers can also play a role of encouraging the parents to motivate their children in taking up STEM subjects. Through this knowledge the teachers will help the learners to realize their talents and how best they can develop them.

#### **1.7.2. Significance to girl child**

Girl child needs to be motivated hence the mandate of this project is to find how best you to motivate them towards taking up STEM subjects. The findings will be able to help motivate the learners and the numbers of girl child in STEM is going to increase. As the challenges faced by girl child in STEM unfolds, the girl child out there are going to benefit as they are already aware of the challenges. This will therefore help them to make informed decision and avoid falling into those challenges. In line with making informed decisions, it will help the girl child to understand some of the behavior of people and how to handle them.

#### **1.7.3. Significance to the parents.**

To the parents study will be of significance because the parents are the one that have a better position to motivate their children. Parents will also support their children on career paths; can act as a pillow of strength.

#### **1.7.4.. Significance to the school administration.**

To the school administration, the research will be of great importance as it will help them to plan effective ways to motivate the girls in taking up STEM subjects. The school administration will also realize the need for their support on STEM issues and they will offer necessary support girl child in taking up STEM subjects. They will organize workshops and offer in- service training

for their teachers so that they will be able to have a good way handling girl child in STEM education and how best to help them.

#### **1.7.5. Significance to the policy makers.**

The research is also valuable to the policy makers as they realize the need to enforce serious inclusion of girl child in schools. Through this research the policy makers will also realize the need to make policies that supports girl child in taking up STEM subjects.

### **1.8 Delimitations of the study**

Study limited to secondary schools and schools in Gweru district of Midlands province. The study is going to focus on girl child from fifteen years to twenty one years who are taking up STEM subjects. Parental influence, teacher support, societal influences are mainly going to be focused on in the study. Populations are going to be taken from the public school and a public tertiary institution.

### **1.9 Limitations of the study**

Limitations are the stumbling block to the research. Simon (2011) defines limitations as potential weaknesses in the study and is out of the researcher's control. Financial constraints acted as a limiting factor to the smooth flow of the research. The costs of producing materials like questionnaires were beyond the researcher's financial budget. Insufficient funds tend to impede the efficiency of the researcher in sourcing the relevant materials and information in the process of data collection. Given the prevailing unfavorable economic conditions, the researcher used the available resources to counter the limitation. Time is another limiting factor which affected the research. The researcher being a teacher grappled with the heavy load of teaching an exam class

requirements and the study as well within the limited time. However the researcher solved the problem by utilizing lunch time.

## **1.10 Definition of terms**

### **1.10.1 STEM**

STEM education is an interdisciplinary approach to learning that's integrates concepts from science, technology, engineering and mathematics to solve real world problems (Honey & Kanter, 2013). Rodriguez (2017) defines STEM as holistic approach to learning that combines the disciplines of science, technology, engineering and mathematics to develop critical thinking, problem solving and collaborating skills. Therefore STEM can be defined as the education that includes the fields of science, technology, engineering and mathematics. These fields are essential for addressing the challenges of the 21<sup>st</sup> century.

### **1.10.2. Girl child:**

According to the United Nations Entity for Gender Equity and the Empowerment for Women (UN Women, 2019) a girl child who is under the age of 18 and is subject to the social, economic, and cultural vulnerabilities that come with being a female. Yousafzai (2013) defines girl child as not just a daughter, sister, or mother, but a future leader, innovator and a change maker. Hence a girl child is a female child who is at an age below eighteen which is subjected to social, economical and cultural vulnerabilities but at the same time is able to become a leader, innovator and can bring change to the world.

### **1.10.3 Secondary School**

UNESCO (2020) defined secondary school as a stage of education that follows primary education and precedes tertiary education. It typically begins at the age of 11 and 12 and last for four to six years. According to the International Standard Classification of Education (2012) secondary school is a school for students between ages of 11 and 18, typically providing a more specialised than primary school. Therefore secondary school can be defined as a school that is intermediate between elementary school and college which offers the subjects specialization and general vocational courses.

### **1.11 Summary**

In this chapter, the researcher highlighted the fact that there is need for finding the experiences of girl child in STEM. The problem stated was that the number of girl child in STEM is very small compared to the number of boy child. This low numbers might be as a result of what the girl child are facing in taking up STEM subjects. The background to the study on the need for finding out the experiences of girl child in taking up STEM subjects has been presented. Despite the researcher's commitment to carry out the research well, time, financial and other constraints contributed to the limited scale of the study. Delimitations, assumptions and definition of key terms used in the study have also been presented in this chapter. The next chapter will focus on the views of different authors and theories on the issues concerning girl child and taking up STEM subjects. Methodology is presented in chapter 3, chapter 4 caters for research findings, presentation and analysis. The research folds in chapter 5 with conclusions, summary and recommendations.

## **CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

### **2.1. Introduction**

This chapter has the mandate of interrogating various literature surrounding STEM and the girl child in secondary and schools. The chapter addresses how STEM subjects are being valued by the society, teachers learners and the parents. Strategies in implementing STEM subjects in secondary schools. Challenges being faced in taking up STEM subjects in secondary schools and strategies that can be implemented so as to increase girl child numbers taking up STEM subjects.

### **2.2 How STEM subjects are being valued by the society, teachers learners and the parents.**

#### **2.2.1 Zimbabwe**

The Zimbabwean society has been suffering from industries closing leading to the demand of opening new industries. One of the fundamental pre-requisites for Industrialisation is its stupendous availability, in a country of skilled-manpower. In this regard, Zimbabwe has sought to leverage human resources, such as these, in order to accelerate the process of socio-economic transformation. In March 2012, for example, the Government of Zimbabwe (GoZ) pronounced the ‘Second Science, Technology and Innovation Policy’ framework, which provided the two Ministries of Primary and Secondary Education and Higher and Tertiary Education, Science and Technology Development with the opportunity to implement the relevant spellings out of that policy document. The former launched an update review of the national curriculum, in 2014, which culminated, in the crafting of the Zimbabwe Education Blueprint (2015-2022). That education-design plan has many facets. Chief among them is a deliberate emphasis on the

teaching of Science, Technology, Engineering and Mathematics, subjects that are now known popularly by the acronym ‘STEM’. Classroom instruction, in those disciplines is meant to empower students with the cutting-edge skills that should see them participate actively, in both the local and global economies. The latter Ministry has rolled out the new STEM curriculum at the Advanced level, in January 2016.

To add on, Trends show that there is a growing recognition of some shortages in STEM teacher quality, with STEM teachers often lacking subject-specific professional credentials compared to teachers in other disciplines. It is critical that secondary school learners should be exposed to scientific education, opportunities, experiences and knowledge that fosters their ability to collectively work towards a better society. As a result, equipping pre-service student teachers with STEM competencies is critical for cultivating STEM-ready teachers at Zimbabwean secondary schools ( Mufanechiya & Makgalwa, 2024). This hence shows how the STEM subjects are being valued by the Zimbabwean society as they encourage the learners to take up STEM subjects. However there is underrepresentation of girl child in STEM. Therefore the researcher seeks to find how to increase the number of girl child taking up STEM subjects.

The introduction of STEM subjects was welcomed by most stakeholders of the the education system for example teachers and the society at large. The teachers who were already in the teaching field by the introduction of STEM subjects were only teaching the content and the theory part of the STEM subjects before the mandate of the STEM subjects wss changed. The mandate now is to produce a student who are critical thinkers and can use the information to start their own companies. As a way of appreciating STEM subject's new mandate the teachers went on and had in-service training so as to better equip themselves and face the giant. The teachers



value the STEM subjects to an extent of streaming learners into different categories and leading to the teacher only taking the above average and good performing learners to take up STEM subjects.

As a way of valuing STEM subjects parents are encouraging their children to have an interest in STEM. They are starting by exposing them to STEM activities and experiences at a young age. For example, they take their children to a hands-on science museum to experience science firsthand, for instance the drone making concert. They also encourage their child to watch educational shows or videos about science and technology. Another way in which Zimbabwean parents are valuing STEM subjects is by providing all the necessary requirements and also support financially. Providing all the requirements such as protective clothing the science kits and financial assistance for STEM programs helps the learners to be motivated in taking up STEM subjects as they know they have a shoulder to lean on( Ahmed & Eldin, 2023). All these are a clear indication of parents valuing STEM subjects, however there is still a shortage in girl child in taking up STEM subjects at secondary school. Therefore this research seeks to find the experiences of girl child in taking up STEM subjects so as to motivate the girls to take up STEM subjects in secondary school.

In Zimbabwe, the traditional emphasis on humanities and social sciences has gradually given way to a growing appreciation for STEM (Science, Technology, Engineering, and Mathematics) subjects. This shift in attitude is evident in the rising number of learners choosing STEM-related careers, particularly in fields like engineering, computer science, and medicine. Chitete in (2016) posits that the driving forces behind this change are manifold. Firstly, the increasing recognition of STEM's importance in propelling economic growth and technological advancement is a major

factor. Zimbabwe, like many developing nations, is striving to create a more diversified and innovative economy, and STEM skills are perceived as crucial for achieving this goal. Secondly, the growing demand for STEM professionals in both local and international markets adds to the attractiveness of these subjects. Furthermore, STEM subjects are often associated with higher earning potential, which further incentivizes learners to pursue them. However, it is important to note that while there is a rising interest in STEM, there is still an underrepresentation of girl child in taking up STEM subjects. Hence there is need to find out how best to increase the number of girl child in taking up STEM subjects by finding the experiences which will motivate the girl child.

### **2.2.2 Africa**

Many African nations are prioritizing STEM education through various initiatives. Governments are investing in infrastructure, building new science labs, and equipping schools with technology (UNESCO, 2019). Curriculum reforms are being implemented to emphasize practical skills, hands-on learning, and real-world applications. This focus on practical learning is crucial for bridging the gap between theoretical knowledge and the practical skills needed to thrive in STEM careers (National Science Foundation, 2017). Additionally, teacher training programs are being expanded to equip educators with the knowledge and skills necessary to inspire a love for STEM among students. Furthermore, initiatives like the African Union's Continental Education Strategy for Africa (CESA) explicitly call for the promotion of STEM education and its integration into national education systems (UN Women, 2019). These efforts, while still needing further development, demonstrate a growing recognition of the vital role STEM plays in shaping Africa's future.

Beyond educational reforms, numerous initiatives are focused on cultivating STEM talent in Africa. STEM competitions, hackathons, and science fairs are creating exciting platforms for young minds to showcase their abilities and foster a competitive spirit. Programs like the African Institute for Mathematical Sciences (AIMS) and the African Academy of Sciences are providing advanced training and mentorship opportunities for students pursuing STEM careers (UNESCO, 2015). These programs focus on developing critical thinking skills, research abilities, and collaborative teamwork, all essential components of a thriving STEM workforce. Furthermore, initiatives like the "Girls in STEM" programs are actively engaging young women in STEM fields, breaking down gender barriers and encouraging female participation in science and technology. These efforts are crucial for creating a more inclusive and diverse STEM ecosystem in Africa, ensuring that talent from all backgrounds can contribute to the continent's future.

Though there is a lot of effort in valuing the STEM subjects, there is still gender gap in those who are taking up STEM subjects. In which the girl child is underrepresented in the STEM careers and subjects. Hence there is need to find how others can be used as role models and motivate the girl child in taking up STEM subjects.

Carpentier, (2020) portrays that as a way of valuing STEM subjects parents are encouraging their children to have an interest in STEM. They are starting by exposing them to STEM activities and experiences at a young age. For example, they take their children to a hands-on science museum to experience science firsthand, for instance the drone making concert. They also encourage their child to watch educational shows or videos about science and technology. Another way in which African parents are valuing STEM subjects is by providing all the necessary requirements and also support financially. Providing all the requirements such as protective clothing the science

kits and financial assistance for STEM programs helps the learners to be motivated in taking up STEM subjects as they know they have a shoulder to lean on( Ahmed & Eldin, 2023). All these are a clear indication of parents valuing STEM subjects, however there is still a shortage in girl child in taking up STEM subjects at secondary school. Therefore this research seeks to find the experiences of girl child in taking up STEM subjects so as to motivate the girls to take up STEM subjects in secondary school.

Chitate (2016) alludes that in Africa, the traditional emphasis on humanities and social sciences has gradually given way to a growing appreciation for STEM (Science, Technology, Engineering, and Mathematics) subjects. This shift in attitude is evident in the rising number of learners choosing STEM-related careers, particularly in fields like engineering, computer science, and medicine. Chitate in (2016) posits that the driving forces behind this change are manifold. Firstly, the increasing recognition of STEM's importance in propelling economic growth and technological advancement is a major factor. Africa, like many developing nations, is striving to create a more diversified and innovative economy, and STEM skills are perceived as crucial for achieving this goal. Secondly, the growing demand for STEM professionals in both local and international markets adds to the attractiveness of these subjects (United Nations 2023). Furthermore, STEM subjects are often associated with higher earning potential, which further incentivizes learners to pursue them. However, it is important to note that while there is a rising interest in STEM, there is still an underrepresentation of girl child in taking up STEM subjects. Hence there is need to find out how best to increase the number of girl child in taking up STEM subjects by finding the experiences which will motivate the girl child.

### **2.2.3 Globally**

Science, technology, engineering and mathematics (STEM) education and research are increasingly recognized globally as fundamental to national development and productivity, economic competitiveness and societal wellbeing. There has been a global turn to STEM that is clearly evident in government efforts worldwide to elaborate STEM policy governing school science and mathematics, and tertiary level education and research in the STEM disciplines (Stone & Vogelstein, 2019). This shift is also reflected in emerging research priorities that are most frequently conceived in STEM terms, underpinned by commitments to internationalization and multi-disciplinarily. This chapter explores STEM policies and programs from an international perspective extending from the Anglosphere, East Asia, Western Europe and Latin America to the Middle East. World Economic Forum, 2023) portray that discernible trends and parallels regarding government STEM policy and structural responses, school and tertiary level STEM education participation, comparative performance measured by international assessments such as PISA and TIMMS, STEM research and innovation, and issues concerning gender and under-represented groups. Concern is still there because there is still underrepresentation of some groups such as the girl child. The study seeks to find out the ways to boost the number of girl child taking up STEM subjects.

## **2.3 What strategies influence girl child to take up STEM subjects**

Due to some external factors girl child will choose to take up STEM subjects. These factors include:

### **2.3.1. Educational policies**

Government and various organisations have made it a priority to increase girls' access to education (The Herald, 2019). More girls are going to school today than before. Government and various organisations have made it a priority to increase girls' access to education. This gave rise to organisations such as Camfed as alluded by The Herald (2019). These organization seeks to increase the number of girl child in education. It helps the girls from those families and societies that believed that girls are meant to be staying at home taking care of the house and the children. Of course there are some organisations who are there to help those under privileged families to send their children to school despite being a girl or boy. The organizations such as Camfed results in girl child only in school as they are able to provide for their school fees, uniforms and stationary. But this does not also increase the number of girl child in STEM, due to the girls being under socialised. Leading to the focus of the study where we find out how best to motivate the girl child in taking up STEM subjects in secondary and tertiary institutions.

According to the research by Mqadi in 2024, policymakers should reverse the waning interest in STEM education among South African secondary school students by creating educationally oriented policies based on an understanding of these causes. Education systems and schools play a central role in determining girls' interest in STEM subjects and in providing equal opportunities to access and benefit from quality STEM education. Others have addressed institutional policies and practices of universities and research funding agencies and the extent to which they have created an enabling environment for women girl child in STEM (The Chronicles, 2021). For example the University Of Zimbabwe have lowered the cut off points for students who are taking up STEM courses for the girl child so that they can be motivated in

taking up STEM courses. There is need to provide policies to encourage the girl child to take up the STEM subjects and carriers.

The study by Stone and Vogelstein (2019) points out that in order to increase the number of girl child in STEM, the U.S. government was urged to take the following four steps; invest an additional \$100 million in girls' STEM education in fiscal year (FY) 2020; improve gender-disaggregated data monitoring; leverage public-private partnerships to translate education into STEM employment; and encourage other nations to invest in girls' STEM. There is also an increased focus on girls' STEM education and training aligns with and expands the Donald J. Trump administration's support for women's economic empowerment and entrepreneurship globally. In the last two years, the Trump administration launched both the Women's Global Development and Prosperity Initiative (W-GDP), which aims to empower fifty million women in developing countries by 2025. All these efforts are to increase the number of girl child in taking up STEM subjects, but is it possible for these developing countries such as Zimbabwe. According to the research done by Oguru and Amie-Ogan in (2024) there is a suggestion of invest in women teachers and women teacher educators, so that they develop STEM knowledge and skills that enable them to inspire girls and facilitate their learning, thereby developing a female teacher pipeline for STEM subjects.

### **2.3.2 Educational environment**

Educational environment has an impact on the performance of girl child in STEM subjects. Educational environment is refers to the conditions and factors that influence the quality and effectiveness of education (UNESCO, 2015). This also denotes how are the girl child treated

and urged to take up STEM subjects in secondary schools. The case study by Makuyana and Mbulayi (2019) claims that in Zimbabwe most of the STEM subject teachers are male, which result in a few being female. This can help the girl child to take up the STEM subjects as they feel pressured by the underrepresentation. According to the feminist point of view the girl child do sometimes feel that they can do what man can do hence they feel the pressure of taking up STEM subjects ( Duncan, 2018). Therefore they will be motivated to take up STEM subjects. However the number of those feeling pressured to take up STEM subjects is still low, leading to the need to find the experiences of girl child in STEM which will lead to correction of some aspects so as to raise the number of girl child in taking up STEM subjects.

In the United States awareness campaigns are launched now and then so as to promote the girl child in taking up STEM subjects. An article by Patrick (2024) affirms that the Ad Council launched She Can STEM – a national campaign to inspire girls to embrace and explore their STEM passions – in September 2018. She Can STEM gives visibility to women in the world of STEM so girls can see they have a future in it, too. Through its website and social media presence, the campaign aims to show girls how fun, cool and unexpected STEM can be, introducing them to women changing the world with STEM and inspiring them to begin their own STEM journeys. There are also awareness campaigns that are being held for the parents and guardians so as to increase the number of people to support the girl child in taking up STEM subjects.

### **2.3.3 Availability of supporting organization.**



Availability of supporting groups such as nongovernmental organizations can help in increasing the number of girl child taking up STEM subjects. Taking STEM subjects can bring a lot of challenges such as financial support. As a girl who comes from a stereotyping society eventually lack of support from the family is minimal in education which demotivates learners to take up STEM subjects at secondary school level as they do not have any support from the family. STEM programs at tertiary level are demanding hence most of the girl child learners will tend to do away with the STEM subjects. With the help of nonprofit organizations who are supporting girl child in STEM, the interest of girl child in taking up STEM subjects have been increased.

## **2.4 What are the challenges faced girl child in taking up STEM subjects?**

### **2.4.1 Lack of female role models**

Lack of female role models contribute to underrepresentation of females in STEM education (Thomas, 2020), which also have in the girl child choosing the STEM subjects at secondary education since they do not see any women who have done STEM. The importance of role models both at school and out of school social groups cannot be overemphasized (Liston, Peterson & Ragan, 2008). Girls need to be introduced to women in STEM careers as a strategy to inspire them and to encourage the formation of connections that will cement their interest in science and technology (Modi, Schoenberg & Salmond, 2012). This helps them to see the real-life application of their studies (Thomas, 2020). The presence of female teachers in STEM provides a real and immediate source of inspiration for girls to persevere in science fields. The power of traditional prejudice, which ascribes males for STEM has caused female science teachers to retain math anxiety which is subsequently transferred to the girls they teach (Boilock,

2010). Providing effective role models and mentors is crucial not only in the learning of girls but throughout their careers in the sciences (Thom, Polly, Hoey & Perlman, 2001).

#### **2.4.2 The cultural stereotype and bias**

A multitude of variables play out in curtailing the performance and achievement of the girl child in education. This is particularly acute in STEM. The cultural stereotype and bias no doubt assume a gate keeping role in censoring the participation of girls in the science and technology field (Modi, Schoenberg & Salmond, 2012; McGreedy & Dierking, 2013). It is common belief from tradition that social roles are defined by gender, making it anomalous for an individual of a set gender to partake in activities parceled out as belonging to a particular group of people. In this conviction, girls are not expected to participate in areas that are understood as for boys and vice versa. This attitude entails even in the choice of subjects to be studied at school in the social-political and economic space. Girls are expected to do subjects that are considered soft as in the form of arts and social sciences while subjects with economic crunch, in the form of hard sciences and technology, are considered the preserve for boys. It is at times at the pre-formal and elementary stages that girls are deemed to perform at par with boys in sciences and then lose this feat as they enter into the intermediate stage of education (McGreedy & Dierking, 2013). The internalisation and entrenchment of gender related social roles should be seen as variously impacting the participation and outcomes of the girl child in STEM education.

#### **2.4.3 Inadequate Science infrastructure**

Many schools lack an emphasis on science(Thomas, 2020). Science focused schools are those whose overall package inclusive of infrastructure, curricula and the kind of staff employed

resonates with the spirit of performance in science education. The existence of specialised buildings and equipment therein sets the tone for the degree of seriousness with which the selected curriculum is implemented. The aptitudes of students in STEM have to be supported by state-of-the-art equipments whose operation matches the universal standard set in the structuring of a particular content in STEM. Many schools however, fall short in providing the desired climate for success in STEM. Thomas (2020) states that the lack of adequate facilities, labs, and textbooks to teach critical math and science courses hinders learner achievement. It is therefore, important for stakeholders to partner and develop the available infrastructure to provide students and the community with the resources needed to maximize STEM education and opportunities (Torres et al., 2014). Liaison with captains of industry, church organisations, student alumni and non-governmental organisations can offset shortages in the teaching and learning of STEM. Highly qualified and effective teachers are a boon in the delivery of STEM experience to girls (Torres et al., 2014). These should be teachers with a rich grasp of the subject knowledge and pedagogies that are attuned to the learning of girls. Assigning of students to teachers who did not major in the field of instruction or unqualified to serve in the profession is a danger to learner participation and attainment.

#### **2.4.4. Societal Beliefs**

Societal beliefs often associate intelligence and aptitude in STEM with masculinity. Gender stereotypes are shared by all and tend to oversimplify reality, creating judgments of people based on perceived rather than actual ability (Ellemers, 2018). Stereotypes lead people to treat men and women differently, hold them to different standards, and perpetuate gender bias in society, including in STEM (Ellemers, 2018). Girls may internalize the notion that they are less capable

in these subjects, leading to decreased self-confidence and motivation. This therefore, is a challenge to girls taking up STEM as they just observe and realise that the STEM is for males and they suffer from lack of support. Hence, this reduces the number of girl child in taking up STEM subjects. This results in the numbers of girl child being less in taking up STEM subjects, which leads to the study of how best to motivate the girl child in taking up STEM subjects, also finding out the how best to do away with the gender stereotyping in media.

Research shows that when girls are exposed to negative stereotypes, they may develop a fixed mindset about their abilities. This can result in decreased participation in STEM courses, as they may believe success is unattainable. According to Peter & Peter (2009), if people are looked down upon they tend to do the worst instead of looking for a way to make them better. This is because of the self fulfilling prophecy says that in self fulfilling prophecy an individuals expectations about another person or entity eventually result in the other person or entity acting in ways that confirm the expectations ( Lee, 2024). This results in girl child being as dull as possible as they will think that nothing good will come up from them and hence causing emotional damage to them. Girls often experience heightened anxiety in competitive settings, particularly in STEM subjects. This anxiety is exacerbated by the fear of confirming negative stereotypes, which can further deter engagement. This follows that the project have to help in finding how to support the girl child and do away with gender stereotyping.

#### **2.4.5. Economic Barriers**

Economic barriers also play a role in reducing the number of girl child in taking up STEM at both secondary and tertiary schools. This is because STEM subjects have some demands which

needs to be provided, for example the need for computers internet, raw materials for learning and protective equipment for the success of taking STEM. Girls from lower socioeconomic backgrounds may have less access to resources and opportunities in STEM as opined by Gonzalez (2019) found that financial constraints can limit participation in STEM-related extracurricular activities. So due to these financial constraints there must be a financial backup like non-governmental organization and nonprofit organizations to foster for the finance.

#### **2.4.6. Cultural practice**

Cultural practice in some countries in Africa, where girls start school at the age of 10 and getting to school is another constrain on the fear of sexual harassment, abduction and also distance of school from home, has accounted as hindrance to education, or early marriage on fear of teenage pregnancy among others (Olatide, 2023). It has also been observed that, girl child education and other discrepancies lie within the tradition, customs and mindset of people generally in our society. All these factors cause hindrance to education. This includes injustices among the people. It was gathered that girls are abducted for marriage at the early age of eight some were recruited for families and domestic workers as alluded by Togunde and Cater (2006). In South Africa, Human Rights Watch (2008) observed that sexual violence and abuse hampers girl access to education and other educational benefits. Guttman (2009) noted that UNESCO courier journalist recalled that 60% of 113 million of children are out of school due to customs, poverty and fear of violence in South Asia and Sub-Saharan Africa. However, Offorma (2009) pointed that socio-cultural factor such as poverty, epidemics of diseases due to over crowdedness in cities where they live as well as warfare has adverse effect on education of girl child because they have no access to education as it

should be. Cultural injustice is also a challenge to the girl child taking up STEM subjects, hence there is need for finding out how to overcome them and motivate the girl child to take up STEM subjects.

## **2.5. Measures taken so as to increase the number of girl child in STEM**

### **2.5.1 Motivating the learners to take up STEM subjects in secondary schools.**

As a way of motivating the learners to take up STEM subjects in secondary and tertiary institutions parents have to play a role in motivating their girl child in taking up STEM subjects in secondary and tertiary institutions. It is believed that if parents start to buy educational science movies for their girl children, this is where they begin to cultivate the science culture in their brains subconsciously (Thomas, 2020). Supporting them with all they need to pursue the STEM subjects, be it moral support, psychological, social and economical. The same thing applies to schools. Early exposure is key to cultivating interest in STEM fields. Lee (20249) affirms that introducing girls to STEM concepts in their formative years through interactive activities, workshops, and educational programs can ignite their curiosity and passion. It will also help the parents to understand what they should do to be able to motivate their girl child to take up STEM subjects. These are just suggestions that are yet to be implemented, there is need for them to be implemented so that girl child will be able to take STEM subjects with enthusiasm.

### **2.5.2 Collaborations between schools, NGOs, tech companies and parents.**

Some independent action steps or suitable collaborations between schools, NGOs, tech companies, and parents can facilitate hands-on experiences from home and kindergarten, fostering the excitement of STEM subjects. In Zimbabwe some organisations such as Camfed

and girls in STEM trust are there to support the girl child in taking up STEM subjects in schools (The Chronicles, 2021). In the European countries a program called STEM4ALL I there to bridge the gender gap in STEM, therefore it created a platform where girl and women in STEM can share information and find some of the answers they seek to understand ( Charpentier, 2020). However the number of girl child taking up STEM subjects in secondary and tertiary institutions is still low hence there is need for some studies to be carried out. This justifies the study that is being carried out, of experiences of girl child in STEM. This is to be able to find out exactly how the road was and how to tackle some challenges along the way so that when the other girl child takes the STEM subjects.

### **2.5.3 Science education should be made to be free from gender bias.**

Science education curriculum should be made to be free from gender bias including the media used during the teaching and learning process (Mqadi, 2024). Going forward, the country's mission should be to provide the best start for every child, especially in rural communities by empowering teachers. According to Ahamadike (2023) states that the South African government is of the opinion that the media used in school is to be changed so that the girl child will see that not only men can do the STEM subjects. In Burundi, the researchers said that there is need to engage the academia to find creative ways to get girls and boys to be excited about STEM ( Mugisha, 2023). These are what to be done and not what is currently happening, hence there is need for finding out how best to implement these policies in the education system. The process is going to be long and will take a lot of processes hence need to find a way to motivate the girl child to take up STEM subjects in school despite all these bits of demotivation.

#### **2.5.4 Empowering girls and young women across Africa by non-profit organisations**

Some organisations like Girls In STEM Trust, a non-profit organization dedicated to empowering girls and young women across Africa. Our mission is to invest in their future by equipping them with essential digital and entrepreneurship skills crucial for successful careers in STEM. In Zimbabwe there is a program called Girls In STEM Trust which is committed to bridging the gender gap in STEM fields through educational opportunities and mentorship programs (Chronicle, 2021). They offer training workshops to enhance digital literacy and entrepreneurship skills, connect participants with experienced mentors, and organize community events to promote STEM education(Chronicle, 2021). STEM education opens doors to innovation and leadership, empowering girls to solve real-world challenges and contribute to global advancements. Join us in building a future where every girl has the opportunity to thrive and succeed in STEM careers. These statements have made it clear that there are efforts to make the girl child feel included in STEM(Chronicle, 2021). An organisation called the SEGA in Tanzania ha an objective of giving form one students hands-on experience and cultural exchange opportunities (International coalition of girls Schools, 2023). This is as a way of motivating the girl child to take up STEM subjects as they already have the exposure to the subjects.

#### **2.5.5 Role models**

Having role models can help girls to take up STEM this idea was explained by social cognitive career theory (Schunk & Usher, 2019), since the presence of role models has an influence on career objectives of individuals who observe the behavior of their role models. These role models can inspire them to set and follow their career goals (Morgenroth et al., 2015).



Furthermore, the presence of women in STEM and those women STEM professors as role models might buffer women's negative expectations about pursuing a career in a men-dominated discipline like STEM. According to this theory having role models to stand out, encourages the girl child to willingly take STEM subjects at secondary and tertiary level, so there is need to make the women in STEM stand out and be at the fore front so that they can be seen and their presence witnessed so that their experience is shared to the outside world. These role models can also share their experiences with the girl Child so that they will motivate them to take up STEM subjects. In Japan the government have created a video that is going to show the public that it is attainable to have women in STEM (World Economic Forum, 2023). However, there is a lower number of these role models for girl child hence there is need to encourage the women in STEM to stand out and encourage their fellow girls in taking up STEM subjects.

#### **2.5.6 Mentorship**

Mentors serve as a support system for students on their academic journey, and help empower them to become autonomous learners. Mentors express understanding and empathy of students' challenges, aspirations, and goals. Every student is different, as some require additional support, while others have the ability to confidently work independently. Mentorship can contribute to student success by motivating them, helping them explore educational and career opportunities, and fostering self-reflection. Mentorship helps students remove limiting beliefs and motivates students to reach their full potential. Whether or not your child needs additional support, mentorship could be beneficial to their learning and development (Malota, 2017). Woman in STEM can also use mentorship so as to motivate the girls to take up STEM subjects. They can take them for a short time for instance during school holidays so to mentor them and they can go

back to schools during the school term. Japan has adopted the mentorship style where the learners are sent by their parents to the responsible women who have made it STEM, there are also television programs in which the women in STEM will be motivating their fellow women (World Economic Forum). As they go back to the school they are in a better chance to make informed decision in choosing to take STEM subjects.

### **2.5.7 Career guidance.**

Career guidance can also act as a motivating tool. Having women in STEM carry on career guidance with learners before making a decision on which subjects to take will motivate the girl child since it is very clear to them that some women are in support of them taking up STEM subjects and careers. These statements are supported by Roy (2020) portrays that career guidance and counselling in secondary schools are crucial for young adolescents as they embark on the initial stages of shaping their post-school studies and career goals. In Tanzania the association of universities is initiating career guidance as early as Grade 9 is imperative to ensure alignment between chosen subjects and future career aspirations (Shuma & Gwajekere, 2023). The methods are just few to increase the number of girls taking up STEM subjects in secondary and tertiary institutions.

## **2.6 Theoretical review**

Social cognitive theory (SCT), proposed by Albert Bandura, offers a valuable lens through which to examine the factors influencing girls' participation in STEM. SCT posits that human behavior is a result of the interplay between personal factors (cognitive abilities, self-efficacy beliefs, goals, expectations), behavioral factors (skills, actions, self-regulation), and environmental

factors (social and physical contexts, opportunities, societal expectations) (Lee, 2024). In the context of girls and STEM, this means considering their beliefs about their capabilities (self-efficacy) in STEM subjects. Low self-efficacy, stemming from negative experiences, societal stereotypes portraying STEM as a masculine domain, or lack of supportive role models, can deter girls from pursuing STEM. Thomas (2020) contributes that environmental factors such as teacher biases, classroom dynamics that privilege certain learning styles (often implicitly favoring boys), and the lack of female representation in STEM professions significantly impact a girl's self-efficacy and, consequently, her choices. Analyzing classroom interactions, teacher feedback, and peer influences through the lens of SCT can reveal the subtle yet powerful ways in which the environment shapes a girl's self-beliefs and her decisions regarding STEM participation. Furthermore, SCT highlights the importance of observational learning girls' exposure to successful female STEM professionals serves as a crucial factor in boosting their self-efficacy and fostering aspirations in these fields (Mqadi, 2024). Therefore, investigating these environmental cues and internal processes is paramount using SCT.

Feminist standpoint theory offers a critical perspective on the power dynamics inherent in societal structures and their influence on girls' experiences in STEM. This theory argues that marginalized groups, such as women, possess unique knowledge and perspectives shaped by their lived experiences within systems of oppression. Aghaiche, and Ekwelundu,(2015) state that applying this framework to the study of girls and STEM helps to expose the systemic barriers that perpetuate gender inequality in these fields. It challenges the notion of objectivity, recognizing that knowledge is produced within specific social contexts influenced by power relations. For instance, feminist standpoint theory would highlight how societal biases

embedded in curricula, assessment methods, and classroom interactions disadvantage girls. It would also scrutinize the ways in which STEM fields are often constructed as meritocratic, neglecting the role of unconscious biases and structural inequalities in shaping access and success. By centering the voices and experiences of girls, this framework allows for a deeper understanding of how systemic sexism manifests in STEM education and careers. This analysis requires qualitative research methods like interviews and focus groups to capture the nuances of girls' lived experiences and reveal how these experiences shape their sense of belonging and confidence within STEM. Furthermore, analyzing institutional policies, teacher training programs, and broader societal discourses through a feminist standpoint allows researchers to identify and challenge the power dynamics perpetuating gender inequality in STEM (Chitate, 2016). The combined use of SCT and Feminist Standpoint Theory offers a robust and nuanced understanding of the complex factors influencing girls' involvement in STEM, providing a solid foundation for developing effective interventions.

## **2.7 Summary**

This chapter focused on giving the literature review of the study. It highlighted the strategies that influence girl child to take up STEM subjects, which includes; educational policies, educational environment and availability of supporting groups. Challenges faced by girl child in taking up STEM subjects were allocated as; lack of female role models, cultural stereotype and bias, inadequate science infrastructure and economical barriers. Some measures were highlighted, these include; use of non-governmental organisations, use of role models, use of gender insensitive media, mentorship and career guidance. This literature review was based on the

theoretical frameworks which are social cognitive theory and feminist stand theory. The next chapter presents the research methodology.

## **CHAPTER 3:RESEARCH DESIGN AND METHODOLOGY**

### **3.1 Introduction**

This chapter is presenting the research methodology followed in the research. The chapter highlights research design, research population, samples as well as sampling procedures. The instruments used in the research, data collection and analysis procedures also make up this chapter. The researcher chose to use a qualitative research approach as the research approach; a case study was used as the research design. Questionnaire and interviews were used as method of collecting data

### **3.2 Research approach**

A qualitative research approach was chosen for this study. Qualitative research is defined as the study of nature of phenomena, which includes their quality, different manifestation, the context in which they appear, or the perspectives from which they can be perceived, but excludes range, frequency, and place in an objectively determined chain of cause and effect by Punch (2013). According to Ugwa and Eze (2023) qualitative research can be defined as a means for exploring and understanding the meaning of individuals or groups ascribe to a social human problem. Therefore quantitative research can be defined as a method of inquiry aiming to gather an in-depth understanding of human behaviour and the reasons that govern such behaviour.

Qualitative research approach was selected for this research since it give the participants chance to express their feeling, opinions and perspectives with regard to girl child taking up STEM subjects at secondary schools level. Through qualitative research design, analysis of complex phenomena like attitudes of most stakeholders was possible. Delicate responsive questioning was employed. The first hand words created vivid meaningful touch (Ritchie, 2003). According to

Moyo (2004) unlike quantitative research that tend to view events from outside and impose empirical concern upon social reality. Qualitative research design also allowed the researcher to probe respondents about how girl child are being treated in the STEM field.

Questionnaires were generated and distributed to the target participants. The participants were given one week to complete the questionnaires and then the researcher had to collect them after the week. Interview guides were generated, interviews were scheduled by the researcher and then the interview was carried out.

### **3.3 Research design**

A research design is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy and procedure (Ahuja 2010). Akhtar, (2016) defined research design as a plan, structure and strategy and investigation concaved so as to obtain ensured to search question and control variance. Therefore research design is a strategy that guides a research project from start to finish, including how data is collected, analyzed, and interpreted. It's a blueprint that ensures the research problem is thoroughly investigated and that the data collected is effective in answering the research question.

The research design is the grant plan for enhancing internal and external validity of a research study. This entails essentially the manner in which one should handle outside variables such that they do not interfere with the internal and external validity of research study. Bostley (2019) defines a research design as the plan and structure of the investigation used to obtain evidence to answer research questions. The purpose of the research design is to answer research questions.

Harish, (2021) describe the research design as a blueprint or outline for conducting the research in such a way that maximum control will be exercised over factors that could interfere with the validity of the research results. Thus the research design is the researchers overall plan for obtaining answers guiding the study. Burns and Grove (2001) states that designing a research helps the researcher to plan and implement the research in a way that will help to obtain intended results. In this research qualitative case study was used.

Coombs (2022) defined a case study as a methodological research approach used to generate an in-depth understanding of a contemporary issue or phenomenon in a bounded system. Case study, detailed description and assessment of a specific situation in the real world created for the purpose of deriving generalizations and other insights from it (Raikar, 2024). Hence a case study can be defined as a detailed examination of a person, group, or event to learn as much as possible about the subject.

Case study approach studies phenomena within its real life context. Moyo (2014) also reported that the case study focuses on the detailed contextual analysis of a limited number of events or conditions and their relationship. A case study approach allows the researcher to make a detailed examination of girl child in STEM issues at Matinunura High School and Mkoba 3 High school.

However, the case study approach is criticized of being narrow in nature. Willis (2014) accused the case study approach for being subjective and giving the researcher too much space to make own interpretations. He also added that it is also difficult to universally conclude issues from a particular case study. However, through a case study approach the researcher was able o deeply



examine and evaluate the experiences of girl child in taking up STEM subjects. Although case study has its own disadvantages the researcher decided to use it as a research design.

Survey research means collecting information about a group of people by asking them questions and analyzing the results (McCombs, 2023). Webster (2024) defined a survey as to query (someone) in order to collect data for the analysis of some aspect of a group or area. Therefore a survey can be defined as a research method used to collect data from a sample of people, typically through a series of questions, to gain insights into their attitudes, opinions, behaviours or characteristics.

### **3.4 Research paradigm**

Research paradigms refer to the beliefs and assumptions that provide the structure for your research (Ulz, 2023). Lim (2023) defined research paradigm as a philosophical framework that your research is based on. It offers a pattern of beliefs and understandings from which the theories and practices of your research project operate. Therefore a research paradigm can be defined as a set of ideas, beliefs, or understandings that guide how research is conducted.

Interpretive research paradigm was used because it is a qualitative research. This will enable the researcher to have an understanding of what the participants are saying and be able to link it to the research answers.

### **3.5. Population**

According to Weeks (2020) a population is a group of individuals of the same species that live in a specific geographical area and share the common gene pool. A population can be defined as a group of individuals that are united by common characteristics such as geographical location and

are subject to the same influences and conditions (Rowland, 2020). Therefore population is a group of people that live in a common geographical location and they are subjected to the same culture and values. So in this case the population consisted of teachers, learners, of Matinunura and Mkoba 3 High School who provide data for analysis by responding to survey questions. The target population of this research was the female teachers from Matinunura and Mkoba 3 High School.

### **3.6 Sampling procedures**

#### **3.6.1 Sample**

A sample is a group of individuals selected from a population, used to provide a basis for making inferences about the population (Groves, Fowler, Couper, Lepkowski & Singer, 2018). Kumar (2020) defines population as a subset of individuals selected from a population, used to estimate population parameters or to test hypotheses. Sampling therefore involves selecting part of the population that is a small group of learners who will provide data for analysis. The sample was chosen due to the inability of the researcher to test all individuals in the target population.

Robinson (2014) defines purposive sampling as intentional selection of informants based on their ability to elucidate a specific theme, concept, or phenomenon. Purposive research sampling is a type of non-probability approach in which the researcher chooses a sample (person, cases, or events) based on their assessment that it would fit the study's objectives. Therefore purposive sampling can be defined as a research technique where participants are chosen intentionally based on specific characteristics, experiences, or knowledge.

The sample was systematically selected according to some specified procedures so that it can be a true representative of the population in question. In this study, two female and one male, teachers from Matinunura and two from Mkoba 3 high school, ten learners from each school in which the seven will be girls and three boys ordinary levels, and all advanced level girls from both schools lastly two members of a non-governmental organisation.

### **3.7 Data collection procedures.**

Before collecting data, the researcher seek permission from the relevant authorities. The researcher was given permission to collect the data by the supervisor. From the supervisor the researcher went to the school heads of Matinunura and Mkoba 3 high school. A letter was written to the head teachers and the data collecting instruments with questions that were going to be asked during data collection were also presented. After obtaining permission to collect data from the school heads the researcher will begin her data collection procedure.

### **3.8 Research instruments**

Data was gathered through several research methods, such as questionnaires and interviews. For the purpose of this study interviews, observations and questionnaires were used.

#### **3.8.1 Interviews.**

Fontana and Frey (2013) define interview as a research method that involves asking questions to gather information about persons experiences, thoughts and feelings with the aim of gaining insight into the persons perspective. An interview is a conversation between two people, where one person, the interviewer, asks questions to the other person, the interviewee, provides answers,

with the aim of gaining insight into the interviewees experiences, thoughts and feelings (Klave, 2019). Interviews entail presenting questions to the informant orally and recording the responses either in written notes, in pocket books or on an audio-recording for later transcription and analysis.

### **Advantages of interviews**

- Can provide in-depth information: the researcher have the chance to probe further some questions for clarity
- It is flexible: The questions may be structured to suite the context of the respondents
- It gave access to personal interactions: The researcher may explain what the research is for and helps the interviewee to be at ease.
- There are non-verbal cues: The researcher will also have to see the non-verbal response of the individual which helps not have biased answers

### **Disadvantages of interviews**

- ❖ time consuming: requires to have each participant at a time
- ❖ requires a lot of resources for setup
- ❖ the researcher may introduce biases to the respondent hence the information is going to be biased
- ❖ it has a lot of ethical concerns such as ensuring participant confidentiality

### **3.6.3. Questionnaires**

Roona and Rani (2012) defined questionnaires as a list of questions that is completed by a respondent to give his opinion. This was also supported by Hayet et al (2011) who stated that a questionnaire is form prepared and distributed to secure response to certain questions. Therefore questionnaires are a list of questions designed to extract certain factors from identified groups of people.

### **Advantages of questionnaires;**

- Not costly: no need for travelling here and there, but rather issues out at the same time and will be returned the same way
- Time efficient: Does not require the researcher to wait for one individual to finish the questionnaire and move to the next person, they can be answered at the same time.
- It maintains standard: It does not change for individuals, it is the same for the same sample used.
- It provides anonymity for participants: does not require names hence the respondent will be anonymous.
- Provides quantifiable data:
- Can be administered to a wider range of participants

### **Disadvantages of questionnaires**

- ❖ Limited depth: Does not give room for further clarification
- ❖ Lack of control: The researcher cannot redirect the question to have the question answered in way they desire

- ❖ Non-Responsive bias: some of the respondents may choose not to answer the questionnaire and some may choose to answer it wrongly.
- ❖ Length and complexity: Which might result in other participants not to finish answering hence lowering the response rate.

### **3.9 Ethical considerations**

Throughout the data collection process, great care was taken to ensure that confidentiality and individual privacy of the respondents were upheld. As Mertens (2005) states, ethics need to be a fundamental part of the complete research package. All the participants were told not to write names on questionnaires. The researcher must also be aware of the sensitive nature of the research, as such, she guaranteed anonymity of the respondents. The researcher is going to give an explanation on the academic nature of the study so that the respondents are going to feel free and provide the necessary information for the research to carry on. Research ethics entails maintaining neutrality in emotionally charged situations (Pottier, 2011). For this reason respondents security and image was valued. The researcher also sought permission from the educational authorities to carry out the research related to the experiences of girl child in taking up STEM at secondary school.

#### **3.9.1 Confidentiality**

All questionnaires were asked not to have names on it so as to ensure confidentiality. The respondents are going to be ensured that the information that they are providing is for research purposes only and hence it is kept confidential.

#### **3.9.2 Privacy**

The interviews were conducted individually so that the respondents have their privacy in answering the questions. The respondents were insured that the information is not going to be exposed for people to see so that they know that their views are going to remain private.

### **3.9.3 Anonymity**

No names were required from the respondents hence they remain anonymous. The respondents were insured that the information they gave is not recoded along with names hence they will remain anonymous.

## **3.8 Triangulation**

Triangulation is a strategy used to increase the validity of a study by combining multiple methods such as qualitative and quantitative approach (Creswell, 2014). Yin (2014) defined triangulation as a technique for increasing the validity of a study by combining multiple data sources, methods or investigators. Therefore triangulation involves using multiple methods to study a single phenomenon, with the goal of increasing the validity and reliability of the findings.

In this study triangulation was used to combine interviews and questionnaires. These two were used because the researcher intended to find the true feelings and reactions of the participants. The questionnaire gives room to answer without the researcher's bias and the interviews helps to find the actual feelings of the respondents.

## **3.9 Data presentation and analysis procedures.**

In this study data will be presented in the form of tables, pie charts and graphs because they summarize datasets in visual form and can be easily understood. This will be followed by

analysis and interpretation of information. Interpretation refers to the task of drawing conclusions from the collected data in order to find findings. The data from the charts was given some meaning and helped it to link with the topic. An interpretive paradigm was used to give data its meaning. Since this is a qualitative research the data has to be interpreted to make meaning.

### **3.9. Summary**

This chapter explained the research methodology used in the study. It has highlighted the research approach to be used is the qualitative approach and the research design that is used by the researcher and the population under study. An interpretive approach is going to be used as the research paradigm. It explains how the researcher came up with the sample size and sampling techniques used in this research. It also looked at the research findings, presentation and the interpretation of figures obtained using various methods of analysing data. Data collection procedures were also examined. The next chapter will deal with data presentation, analysis and interpretation.



## **CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION**

### **4.1. Introduction**

Research methodology as presented in chapter three laid the foundation for data collection. Chapter 4 therefore, developed from chapter three by presenting, analyzing and discussing the data collected with regard to the experiences of girl child in taking up STEM subjects at secondary school level. In this chapter the researcher presented the findings of the study and interpreted results in line with the literature revealed by other researchers. The findings that are presented in this research are based on the data collected from parents, teachers, learners and the counselors from and around Matinunura and Mkoba 3 high school.

### **4.2 Data Presentation, Analysis and interpretation (Discussion of findings)**

#### **4.21 Presentation of Open ended interview questions**

The data obtained through face to face interview with respondents are presented according to the order of the objective of the study.

#### **Question 1: What factors influence girl child to take up STEM subjects?**

The respondents indicated that one must be self motivated when taking up STEM subjects so that they will be able to excel in them and able to overcome some challenges such as stereotyping. They also highlighted that there is parental involvement, career guidance, availability of supporting groups and the classroom environment. When asked of their views the following statements were made:

L1 said: *I know there are opportunities for well-paid jobs when one does sciences. I can secure a scholarship for further studies". I think I will get a good-paying job.*

L2 : *"I think our lives would not be the same if people were not studying physical science because people who invent things are scientists."*

T1 respond that: *"For a girl child to be able to take up STEM subjects there is nothing needed except for their personal determination. If one is determined and have some personal goals it is easy for them to overcome and challenges and have their goals achieved."*

Teacher 1 indicated that: *" availability of supporting groups such as the non governmental organisations and mentorship programs can enhance the taking of STEM subjects of girl child at secondary school. This is because they are able to support them financially and morally, having support is like a motivating agent for the girl child to take up STEM subjects."*

T2 " *The government is making efforts to increase the number of girl child for example there is issue of cutting off points for girls in the universities, at some point women were given preferences in jobs than men. This was a way to motivate the girl child in taking up STEM subjects"*

Though the learners might seem to be unaware of these supporting groups, the groups are there to support these girl child to take up STEM subjects at secondary school. The teachers and the prominent members of the society were able to point that out there are some supporting groups which are supporting girl child to take up STEM subjects.

The teacher participants and prominent members of the society pointed that government have been making efforts to try and increase the number of girl child in taking up STEM subjects. They said they are implementing policies to support the girl child in taking up STEM. From these it shows that the government is making some efforts to increase the number of girl child in taking up STEM subjects.

T3"*The presents of none governmental organization are a clear indication that the government is supporting the girl child to take up STEM subjects*".

It seems that the majority of learners are not aware of the supporting groups supporting them to take up STEM subjects at secondary school level. The groups are supposed to reach the girl child to every girl child so that they are exposed to them and find how they can be supported by them.

The majority of participants indicated that they received continuous support from educators. A learners stated:

L3 "*My teachers encouraged me to choose STEM subjects since I performed well at ZJC level*".

L4 stated : "*Our teacher is friendly and wants us to succeed. He provides extra time to complete our work*".

All the participants appreciated the role of group work in learning STEM subjects.

L1: "*Working as a team helps us to grasp concepts.*"

They also singled out some discouraging classroom experiences.

L1: *"It is discouraging when the teacher concentrates on boy child they are those who are said to understand concepts faster than us as girls, those who are smarter."* This was further highlighted by another L2 stated that: *"If you are a girl the teachers consider you to be a slow learner or less intelligent, they do not give you much time, and sometimes they can insult you with words like...STEM subjects are boys not for girls you are meant to be home and take care of the house or supposed to be doing English Literature... Such words are discouraging."*

**Question 2: what are the challenges faced by girl child when taking up STEM subjects**

L1: *"It is difficult to learn STEM subjects in classes where there is no science equipment. There is no laboratory to do practical work at our school, and it is sometimes difficult to understand concepts. However, I continue learning science because I enjoy it."*

L2: *"But the challenge in my school is learning science without doing experiments."*

The majority of the learners pointed out that there need for laboratories, computer centers and internet connection for them to be able to take up STEM subjects without any challenges.

The teacher and the prominent members of the society pointed that laboratories are not of that importance as they can find a way, but rather there is need for computer centers and internet connection for the girl child to be motivated to take up STEM subjects. T1 said: *" not having laboratories will not affect the learning of STEM subjects but lacking technological gadgets will lead to women drop out STEM. This is because if they did not understand some concepts during the lesson they will use the gadgets to help them understand the concepts."*

The most of the girls highlighted that there is lack of motivation for them to be able to take up STEM subjects. *"They highlighted that most of the STEM people are just men meaning that only a few members are women and those women seems to have suffered a lot for them to become who they are today. "* This point of view is a good demotivating to the girl child. They will end up thinking that it is true that STEM subjects are meant for boys and they are only meant for Arts subjects and staying at home. The parents said their children needs somewhere to look at so that they can be motivated.

L1: *"being a girl is much difficult because we are expected to perform as boys do but we do not have much time as the boys do. Here at school we are asked to clean the classrooms while the boys are already reading and at home we are asked to take care of the house and the kids while the boys are reading. This will lead to us not having enough time to study as our body lack much energy as boys we will eventually need res."*

**Question 4 & 5: Measures taken to increase the number of girl child in taking up STEM subjects.**

T1 said that: *"there is no difference in teaching a girl child and a boy child, hence there is need for in-service training for us as teachers so as to be able to understand what we should do and what we should not do. "*

L1: *"sometimes the teachers treat us as if we do not we do not matter...Some of the teachers usually said STEM is for boys not girls".*

T2 said that: *"dealing with girl child is difficult because in some cases what you think is right is not right. For example the use of technological gadgets to communicate with girl child can sometimes be misinterpreted and termed misconduct therefore there is need for in-service training to prepare the male teachers to help girl child in taking up STEM subjects with a lot of professionalism."*

Mentorship was indicated to have less impact on increasing the number of girl child in taking up STEM subjects. Most of them indicated there is need but to a lesser extent. The majority indicated that: *"where are they going to meet with these young stars because they are always in school and our curriculum does not give space to allow that since it is specifically two years to complete a course of ordinary level.... Of cause it works increasing the number of girl child in STEM but how to do it is what we are not sure of."* 14 participants indicated that there is no need for mentorship since there are teachers who can mentor them and also their own goals and the ambition to improve their own livelihood can push them into taking up STEM subjects.

#### **4.2.2. Data presentation for questionnaires**

##### **Question 1: Which factors influencing the girl child to take up STEM subjects?**

##### **Self determination**

**Table 4.1: Careers for Learners**

| Future career | Number | %  |
|---------------|--------|----|
| Engineer      | 2      | 20 |

|                 |    |     |
|-----------------|----|-----|
| Doctor          | 2  | 20  |
| Pilot           | 1  | 10  |
| Pharmacist      | 1  | 10  |
| Optometrist     | 1  | 10  |
| Biotechnologist | 2  | 20  |
| Nurse           | 1  | 10  |
| Total           | 10 | 100 |

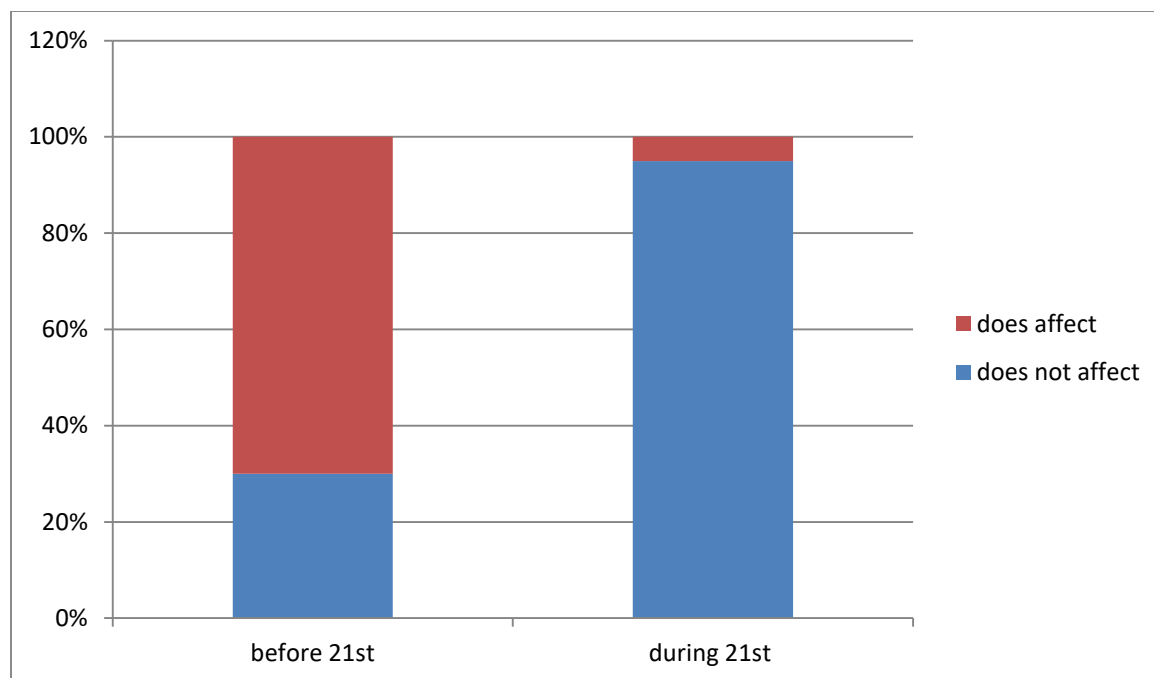
20% of the learners indicated that they want to be engineers, doctors and biotechnologist. The following occupations have 10% each; pilot, pharmacist, optometrist and nurse. This shows that learners are interested in taking up STEM subjects so as to have STEM related careers.

From these it shows that the learners are self motivated to take up the STEM subjects, hence all the challenges might be easy to overcome. This might also help to solve the societal challenges and help in the attainment of vision 2030.

#### **4.2.2.2 Parental support**

According to the data gathered, the level of education of parents has some effects on the girl child in taking up STEM subjects. The graph below shows how the parent's educational level affects the learners view in terms of science education.

#### **4.2.2.2 Chart 1: How parental level of education affects the girl child in taking STEM subjects**



***Fig 4.1: parental level of education effects on girl child taking up STEM subjects***

The graph shows that the parental level of education does affects the girl child in taking up STEM subjects. 30% of the respondents indicated that it does not affect but 70% indicated that it does affects that was before the 21<sup>st</sup> century. During the 21<sup>st</sup> era 95% said that the level of education does not affect while 5% said it does affect.

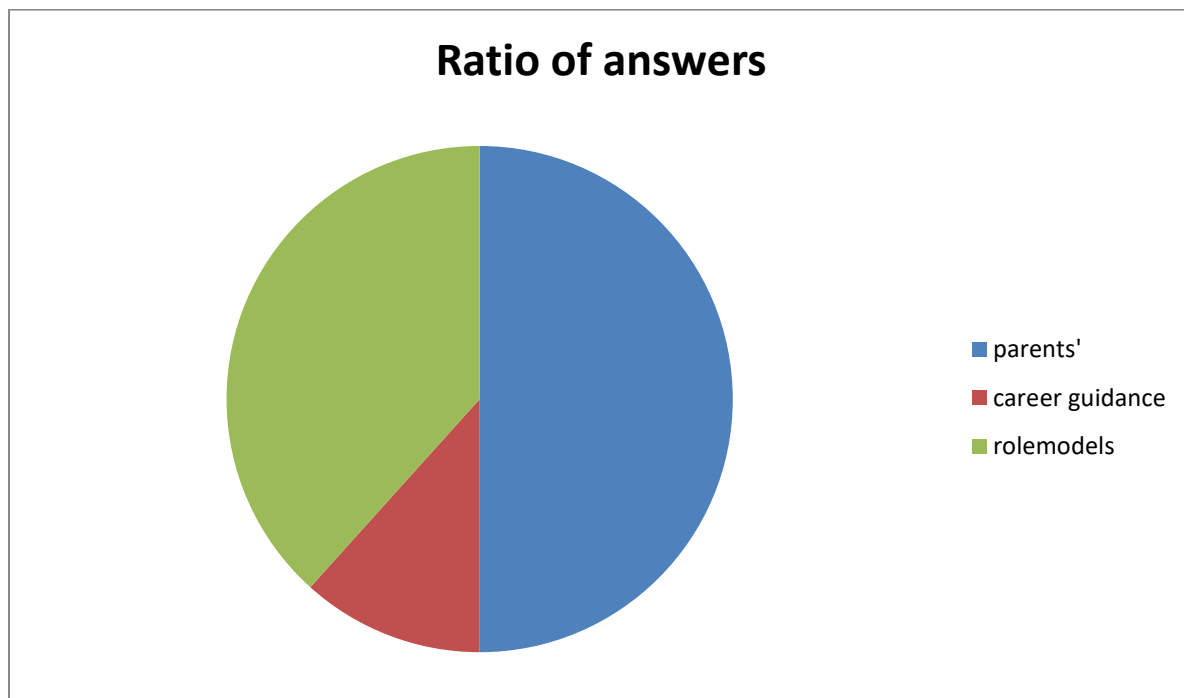
The graph shows that as the level of education affects how the learners are going to choose to take up STEM subjects in secondary schools. This might be because of lack of exposure of the parents to the outside world hence their opinion is narrow. Their opinions will be guided by the societal values only which violate the right of girl child of having equal opportunities as the boy child.



70% of the teacher participants and the learners participants highlighted that, parents level of education have an impact on their girl child taking up STEM subjects at secondary level. Only 30% of the participants highlighted that parents level of education does not affect the ability of girl child to pick STEM subjects at secondary level.

### **Support from the parents, career guidance and role models**

#### **4.2.2.3Chart: Ratio of answers chosen by the respondents**



***Fig 4.2: Ratio of factors that affect influence girl child in taking up STEM subjects***

Most of the answers indicated that parental support is the one that is needed followed by role modeling and lastly by career guidance. 50% of the answers said that the girl child needs their parent's guidance most. 38% of the answers said that they need career guidance most and 12%

indicated that there must be use of role models to motivate the girl child to take up STEM subjects at secondary school level.

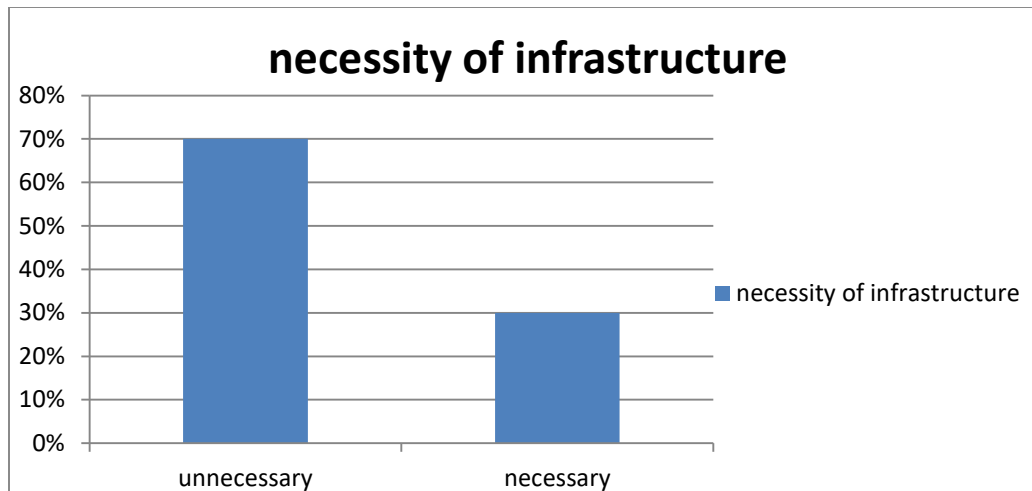
The data points out that the girl child needs their parents' support more than the role models for them to be able to take up STEM subjects. Parents have a direct relationship with their children hence it is expected for them to be able to have a greater impact. To a lesser extent does role modeling influence and to the least extent we have career guidance.

Although some data indicates that there must be adjustment in the Educational policies, environment and having supporting organization the greater influence comes from the parents hence there is need to make the parents understand that the girl can also take up STEM subjects despite their gender.

**Question 2 What are the challenges faced by girl child when taking up STEM subjects at secondary school?**

**Inadequate infrastructure**

**4.2.2.4 Chart showing the necessity of infrastructure**



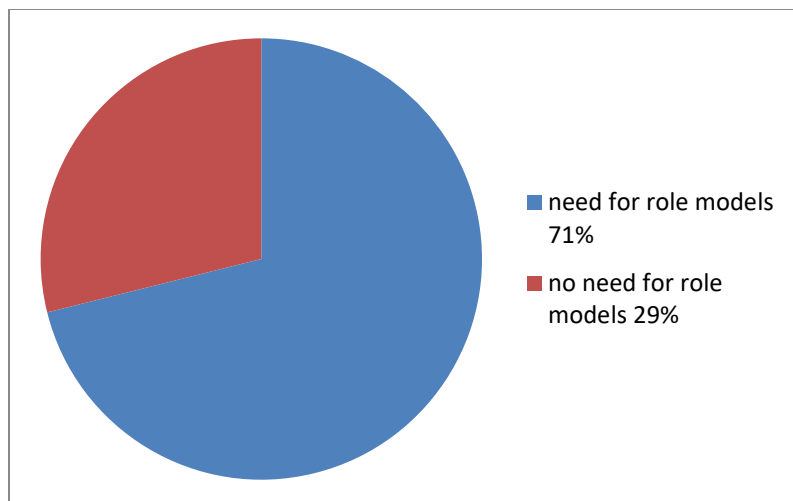
***Fig 4.3: Necessity of infrastructure on girl child in taking up STEM subjects***

70% of the participants highlighted that infrastructure is not necessary for girls when taking up STEM subjects, 30% indicated that it is necessary to have adequate infrastructure for girl child to be able to take up STEM subjects.

This shows that the majority of the participants are saying that infrastructure does not affect the girl child in taking up STEM subjects at secondary school level. This might be because every learner be it a girl or boy they face the same predicaments in terms of infrastructure.

### **Lack of role models**

#### **4.2.2.5 Chart showing data on the need for role models**



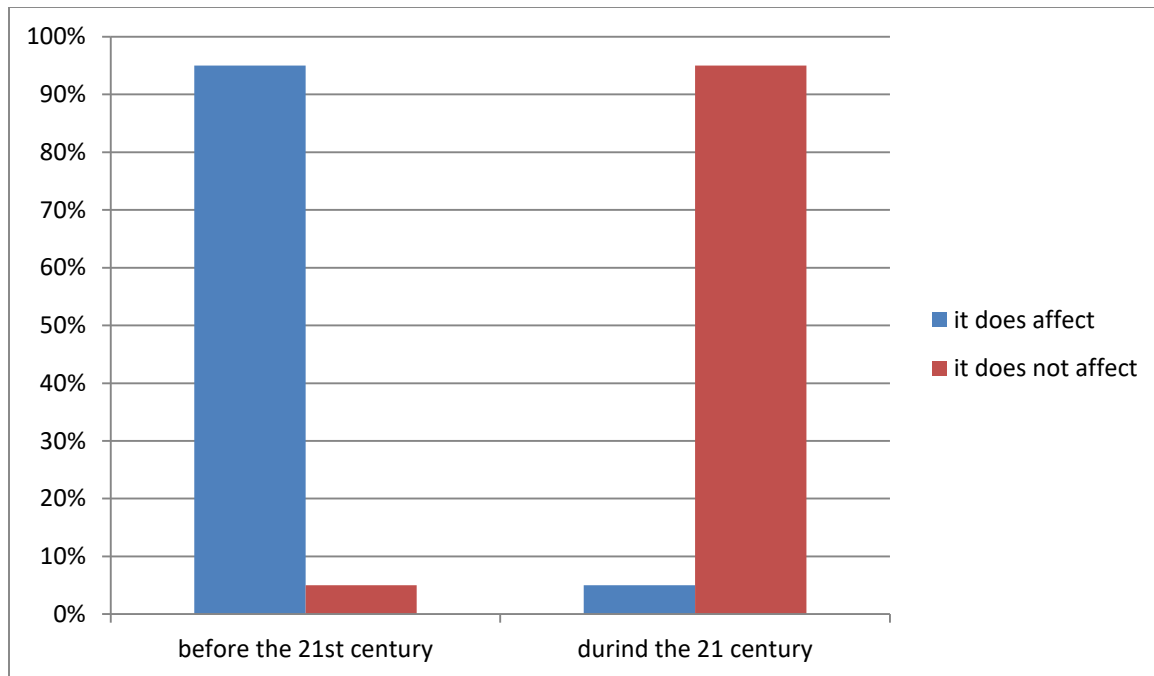
***Fig 4.4: Chart justifying the need for role models for girls to take up STEM subjects***

71% of the participants highlighted that the shortage of role models affects the girl child in picking up STEM subjects while 29% indicated that they are not necessary.

This larger percentage might be because they understand the impacts of extrinsic motivation in decision making towards what is to be learnt. The lower number is because that some of the people only believe in intrinsic motivation.

## **Cultural and social values**

### **4.2.2.6 Chart showing how cultural and social values affects the girl child**



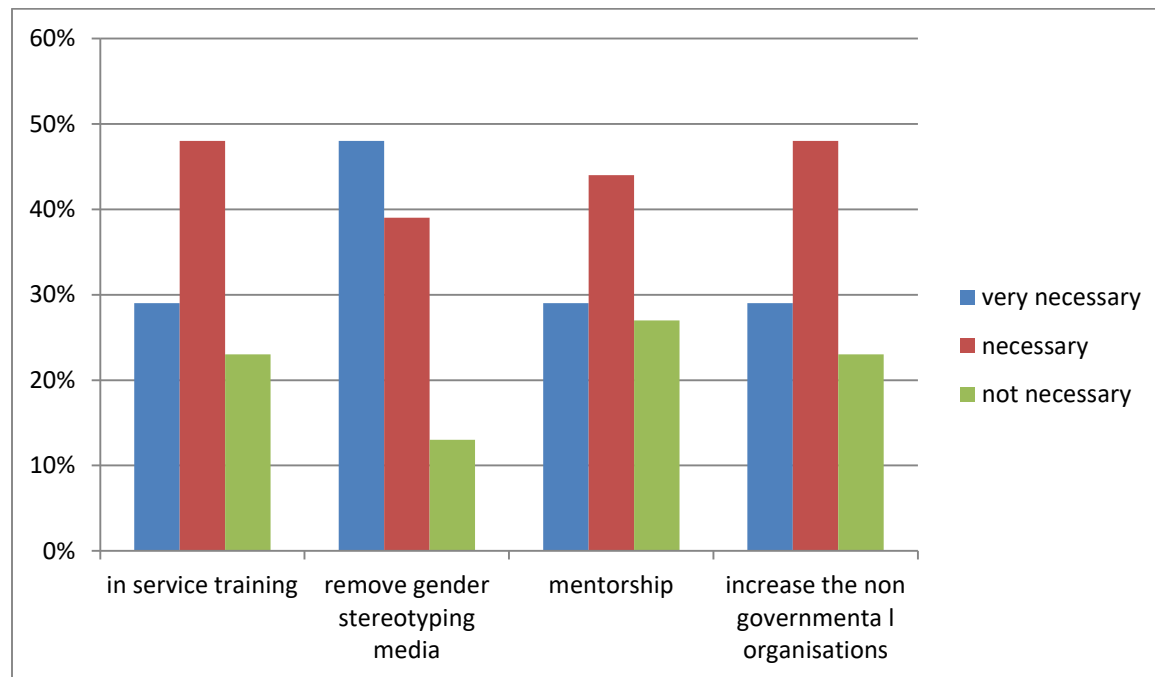
***Fig 4.5: cultural and social values and how it affect the girl child in taking up STEM subjects***

Before the 21<sup>st</sup> century it was believed that 95% of girl child decision in subjects to learn was affected by the culture and social beliefs and only 5% was their own thinking. During the 21<sup>st</sup> century only 5% of the girl children are still affected by the cultural and social beliefs in taking up subjects to study and 95% are of other factors such as parental involvement, role models and the evolving world.

This is because before the 21<sup>st</sup> century girls were not exposed to a variety of things such as internet which helps them to conquer cultural belief. Therefore their decisions were guided by their societal beliefs. In the 21<sup>st</sup> century the society itself is the one which is encouraging for girl child to take up STEM subjects because they now believe that the girl children have the power to change the world.

## Question 4 & 5: Measures to be taken so as to increase the number of girl child in STEM

### 4.2.2.6 Chart showing the measures to be taken



**Fig 4.6: Measures to be taken so as to increase the number of girl child taking up STEM subjects.**

29% Of the participants indicated that it is very necessary to have in service training, 48% said it is necessary and 23% participants said that it is not necessary. 48% participants indicated that it is very necessary to remove the media which is gender stereotyping, 39% of the participants indicated that its necessary but not that much while 13% members indicated that it is not necessary to have change the media to a gender stereotyping free. Only 29% participants indicated that the girl child require mentorship for them to able take STEM subjects, 44% participants indicated that it is necessary and only 27% said it is not necessary to have mentor to

improve the number of girl. Increasing the number of non-governmental organisations was supported by the majority of the participants while 29% said it is very necessary and 48% said it is necessary only 23% participants said that it is not necessary to increase the number of nongovernmental organisations.

In-service training is when the teachers are going to have workshops and seminars so that they are taught on a particular concept. For example the teachers must be taught on how to handle the girl child when teaching them the STEM subjects. 77% of the participants indicated that there is need for in-service training for the teachers so as to increase their compatibility with the girl child when teaching them the STEM subjects. 33% indicated that there is no need for in-service training for teachers so as to increase the number of girl child taking up STEM subjects. A greater percentage is saying there is need for the in-service training while the lower is saying there is no need. The 33% was most of the teacher participants which said there is no need for the in-service training.

The majority of the answers indicated that it is necessary to have these measures so as to increase the number of girl child taking up STEM subjects. This is because if they are implemented correctly they will be able to motivate the girl child in taking up STEM subjects.

## **4.3 Discussion**

### **4.3.1. Influencers for girl Child to take up STEM subjects**

In some cases learners are pointing out that their classroom experiences are the best as they are encouraged to take up STEM subjects, however in some cases other teachers will try to demotivate them and say the STEM subjects are meant for boys not for girls. This will therefore

lower the number of girl child taking up STEM subjects at secondary school level. Modi, Schoenberg and Salmond (2012) highlighted that the cultural stereotype and bias no doubt assume a gate keeping role in censoring the participation of girls in the science and technology field. This is because as indicated the teachers are still gender biased when it comes to girl child taking up STEM subjects.

The 30% agreement might be because some of the parents really lack exposure to know better for their girl child. Adequate exposure to the demands of the 21st century will help parents to make diligent response towards their girl child to take up STEM subjects. Some of the girl children are raised by feminist so their views as parents would be indifferent.

#### **4.3.2. Challenges faced by girl child in STEM**

Inadequate infrastructure is a challenge for girl child to take up STEM subjects because, as the teachers and the members of the society pointed out that the girl child will need to have the technological gadgets to support their learning. Nowadays learning does not take place in the classroom only but also using the digital applications, hence there is need for the computer centers. But the teacher participants only highlighted this need to a lesser extent.

#### **4.3.3 Measures taken to increase the number of girl child in STEM**

The change in parental perspectives is because of the exposure to the demands of the world and the Zimbabwean national agenda of achieving vision 2030. Also there are some organisations which are empowering girl child by educating the public that there is no difference between the girl child and the boy child hence they must be given equal opportunities in their studies and they



can also study what you think they can only be for male learners. Dispute the level of education, correct exposure can help the parents to be of positive influence towards girl child taking up STEM subjects in secondary school. This shows that the article by Patrick (2024) which states that there is need of awareness campaigns to improve the societal views on girl child taking up STEM subjects was indeed on point.

To be able to increase the number of girl child taking up STEM subjects at secondary school level, there is need to have role models motivating the fellow girls to take up STEM subjects. According to Thom, Polly, Hoey and Perlman (2001) providing effective role models and mentors is crucial not only in the learning of girls but throughout their careers in the sciences. This will later increase the number of girl child who are taking up STEM subjects at secondary level.

All these are because the culture demands for a girl child to stay at home and learn how to become a mother while the boy child go and learn how to provide for the family. But this affected the choice of girl child during the period where the society did not know much. However, the society is now educated on some aspects of life, such as that the boy child is superior to the girl child is not the truth. According to all participants the social beliefs have some impact on the girl child to take up STEM subjects at secondary school level. This is also supported by Gadner (2010) when he opines that the social values of a society is the one that affects the decision making of the child from that society. Coming from a patriarchal society one will believe that only their job as girls is to stay at home and take care of the house so learning it's just a privilege hence they are already demotivated. But in the advanced era they are saying women can do what men can do hence all girls can learn anything even the STEM subjects. The

teacher participants highlighted that there must be awareness campaigns so that the society itself will loosen towards the girl child. Due to this the boy child is at an advantage than the girl child hence the cultural and social values affect the progress of girl child in taking up STEM subjects.

Removal of gender stereotyping media was said to be the way to go in increasing the number of girl child taking up STEM subjects at secondary school level. Most of the media that is used in schools is gender stereotyping which is said to demotivate the girl child when taking up STEM subjects. This was supported by McGreedy & Dierking (2013) when they said gender stereotype and bias no doubt assume a gate keeping role in censoring the participation of girls in the science and technology field. Therefore there is need for the removal of the gender stereotyping media that is used in STEM subjects. The 40 of the participants indicated that it is necessary although some said it is very necessary. Only 10 indicated that there is no need to change the media to a gender insensitive media so as to increase the number of girl child in taking up STEM subjects.

It is believed that the male teachers are hard when working with the girl child hence there is need for them to be taught how to handle the girl child so as to increase the number of girl child taking up STEM subjects. This is supported by the study by UNESCO (2019) which emphasizes the importance of teacher training in promoting gender equality in education. The report states, "Male teachers, in particular, need training to recognize and challenge their own biases and to develop skills to support girls' learning" (p. 123). A study published in the Journal of Teacher Education (2016) found that male teachers often struggle to connect with female students and may inadvertently perpetuate gender stereotypes. The authors recommend that "male teachers should receive training on feminist pedagogy and critical masculinity studies" (p. 12). In this case it shows that the teachers are already lacking in the way they associate with girl child hence

there is need for them to be taught how to interact with them. Sometimes there is use of technology which might cause some challenges to the teachers when they use them to interact with the girl child, some might name some incidences as sexual harassment. Hence there is need for the teachers to have an in-service training for them to learn how to handle the girl child. This might increase the number of girl child in STEM because the ones who will interact with the changed teachers will be there to inform and encourage other learners to take up STEM subjects.

The majority of the participants indicated that there is need for the removal of gender stereotyping in order to increase the number of girl child taking up STEM subjects. This is because most of the participants believed that if you are continuously subjected to a condition you will end up seeing as if it is what should be done. Hence most of the girl child will end up thinking the STEM subjects are for the boys only since it is what they see every time. This therefore indicates that there is need for revision on the media that is being used in the study of STEM subjects. National Science Foundation (2017) postulated that stereotypes and biases in media can discourage girls from pursuing STEM careers... Removing these stereotypes can help to increase diversity and inclusion in STEM fields this was in support with the responses of the respondents. The 10 people indicated that there is no need for the change; this is because learners must be self motivated for them to take up STEM subjects at secondary schools. If one is self motivated the issue of media cannot draw them back.

Mentorship was said to be difficult to conduct due to some reasons like the curriculum cannot accommodate that hence how to infuse it is difficult. Although most of the members have indicated that it can help in increasing the number of girl child in STEM since they can observe how others are doing it and they can become motivated in studying STEM. However a few

number indicated that the learners need some motivation which comes from within them such as changing their livelihoods so that it will be more of intrinsic motivation. Hence more number of girl child will take up STEM subjects is everyone have the mind to better their lives.

Increasing the number of nongovernmental organisations will increase the coverage of the organisations. The probability to reach to every girl child to every parent and to every school is now greater hence more stakeholders will receive the prospective information hence increasing the number of girl child taking up STEM. If they can reach a wide range it means if it is encouraging the people to understand that STEM is for everyone or for funding more of the stakeholders can receive the information and can benefit from it. This shows that increasing the number of nongovernmental organisations can increase the number of girl child taking up STEM subjects. Other participants indicated that there is need to increase the funds of the organisations such that they will be able to reach most of the stakeholders hence more learners can benefit therefore increasing the number of girl child taking up STEM subjects.

#### **4.4 Summary**

The chapter focused on data presentation, interpretation and analysis. The data from the respondents were presented in form of tables and charts and themes. Some of the data was presented as statements because they are from the interview. The next chapter is going to give a summary of the research project and give some recommendations for further study.

## **CHAPTER FIVE SUMMARY, CONCLUSION AND RECOMMENDATIONS.**

### **5.1 Introduction**

Chapter four has presented, analysed and interpreted data and this data is going to be used to have findings of this research in this chapter five. Chapter five is to give an overview of the research and its conclusions at the same time giving recommendations for further clarification. The researcher is going to use data from the previous chapter to come up with the findings of the research and hence answering the research. A summary of the whole project is going to be made in this chapter.

### **5.2 Summary of findings**

Summary of findings is the brief exposition of the outcomes of the research. Its mandate is to give answers for the research questions and to make sure that the research objectives are met. This will answer all the research questions to prove the validity of the research instruments.

#### **5.2.1 What influences girl child to take up STEM subjects at secondary school?**

To answer the first research question of what influences girl child to take up STEM subjects at secondary school a lot of views were put across. The points which were pointed out were self determination, parental influence, peer involvement, availability of supporting groups, class environment role models and career guidance. These were said to have a positive influence towards the girl child in taking up STEM subjects at secondary school. It was highlighted that the classroom environment can be there to demotivate the girl child in taking up STEM subjects as some of the teachers are gender biased.

### **5.2.2 What challenges are being faced by girl child when taking up STEM subjects?**

The second research question was of the challenges that are faced by girl child when taking up STEM subjects at secondary school. The challenges were; inadequate infrastructure which affects both girls and boys, lack of role models, cultural beliefs and stigma due to gender differences. It was highlighted that the stigma is everywhere in STEM education because the media that is used to convey some meaning is also gender stereotyping. Therefore quite a number of girl child are demotivated to take up STEM subjects as they think that they are only for male learners. Lack of role models was indicated to be of greater impact as the girl child will not have anyone to refer to as their superior hence it will be easy to believe that STEM subjects are for boy child only. Hence lower numbers of girl child taking up STEM subjects.

From the findings it was indicated that the societal views have a greater impact on the girl child division making when it is to take STEM subjects or not. It's is shown that from years back before the technological era has been wide spread, the societal views have a greater impact in influencing girl child not to take up STEM subjects. However during the era of world advancement the societal views are now supporting every child including the girl child to take up STEM subjects at secondary school. This is because every member of the society now wants the livelihoods to change for the better hence they now encourage even girl child to take up STEM subjects.

### **5.2.3 What measures are to be taken so as to increase the number of girl child in taking up STEM subjects.?**

The research questions which asked for what can be done to increase the number of girl child and the other on how women in STEM can encourage the girls to take up STEM subjects, the following answers were obtained in-service training, removal of gender stereotyping media, mentorship and increasing the number of nongovernmental organisations. It was believed that the gender stereotyping media is removed the girl child will have a sense of belonging hence encouraged to take up STEM subjects. Having in-service training for teachers helps the teachers to understand girl child more and to give them the special care they need hence the current girls will encourage the next generation to take up STEM subjects since they are now being treated carefully with a lot of professionalism. Increasing the number of non-governmental organisations increases the area that they cover hence most of the learners are going to hear of them and can benefit from them. Which will therefore, increases the number of girl child taking up STEM subjects. Availability of role models was said to be the most motivating tool, hence there is need to increase the number of role models which will provide mentorship sessions which will help encourage most of the girl child in taking up STEM subjects.

These are the experiences of girl child when taking up STEM subjects at secondary school level, these experiences can be shared to other girl child so that they know what is happening and how best to avoid it and move forward and how it can also motivated them in taking up STEM subjects. Therefore exposing the girl child these experiences will help them make informed decisions and thereby increasing the number of girl taking up STEM subjects at secondary school level.

### **5.3 Conclusions**

This research has examined the experiences of girl child in taking up STEM subjects at secondary school level. Its aim is to help other girls to take up STEM subjects hence increasing the number of girl child in taking up STEM subjects. The study has pointed out some challenges which do demotivate the girl child and some which motivated them. The evidence from the study suggests that if there is no gender stereotyping most of the learners will end up taking the STEM subjects. Having motivating groups such as mentors and non-governmental organisations the number of girl child will then be increased. Although the study is focused on the experiences of girl child in taking up STEM subjects it also points out that there is need in the provision of infrastructure in the schools such as technological gadgets so as to help learners to learn at any given time. Some limitations were encountered during the process of research such as limited time for the researcher to have all the participants interviewed. Financial constraints were also limitations in this study although the researcher used other ways such as the use of questionnaires. The researcher also resort to use only ordinary level girls as the learner participants, the researcher also did group interview so as to save time that interviewing even the boys and some advanced level girls.

### **5.4 Recommendations**

The study pointed that there should be role models to provide mentorship sessions so that the girl child's have been motivated to take up STEM subjects. It can be recommended that there can be use of school holidays to have mentor's sessions.



## 5.5 Recommendation for Further Research

The following recommendations for further study can be made;

- Research on the specific barriers and challenges faced by girl child in taking up STEM subjects in different cultural, social and economic contexts.
- Research on how teachers, parents and peers influence the experiences of girl child in taking up STEM subjects.
- Research on most effective strategies for promoting girl child participation and engagement in STEM subject
- Research on the effectiveness of mentorship programs that pair women in STEM with girl children, and identify best practices for implementation
- Research on the impact of women in STEM careers serving as career coaches for girl children, providing guidance and support in navigating STEM career paths.

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# APPENDICES

# Appendix 1

## CONCERN LETTERS

from the ministry of education and education district office



Concern later from the Ministry of Primary and Secondary Education

All communications should be addressed to the  
Secretary for Primary and  
Secondary Education  
Telephone: +263 242 794 509  
Toll Free: 317



Ministry of Primary and Secondary Education  
83 Kwame Nkrumah Avenue  
Queen Elizabeth House  
P.O. Box 121  
Causeway, Harare

Reference: C/426/3  
Melody Mudzingwa  
Bindura University of Science Education  
P. Bag 1020  
Bindura

05 December 2024

**RE: PERMISSION TO CARRY OUT RESEARCH IN MIDLANDS  
PROVINCE PROVINCES: GWERU DISTRICT: MATINUNURA, MKOBA 3  
HIGH SCHOOLS.**

Reference is made to your application to carry out research from the district  
mentioned above schools on the research title:

**"THE EXPERIENCE OF GIRL CHILD IN TAKING UP STEM SUBJECTS AT  
SECONDARY SCHOOL."**

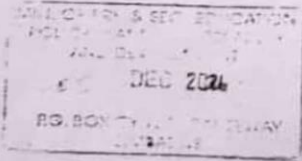
Permission is hereby granted. However, you must liaise with the Provincial Education  
Director of Midlands Central Province, who is responsible for the schools which you  
want to involve in your research. You should ensure that your research work does not  
disrupt the normal operations of the schools. Where students are involved, parental  
consent is required.

You must also provide a copy of your final report to the Secretary for Primary and  
Secondary Education.

.....

Musingarimi H.

**A/Deputy Director: Research, Innovation and Development  
For SECRETARY FOR PRIMARY AND SECONDARY EDUCATION**



 @MoPSEZ  <https://www.facebook.com/MoPSEZ>  <https://www.mopsez.gov.zw>  <https://www.mopsez.gov.zw>

**CS CamScanner**

Concern later from the Midlands Provincial Office of the Ministry of Primary and Secondary Education.

*All communications should be addressed  
to "The Provincial Education Director"  
Telephone: 054-2222460*

Email: mideducation01@gmail.com



ZIMBABWE

Ministry of Primary and Secondary Education  
P.O Box 737  
GWERU

09 December 2024

MELODY MUDZINGWA  
BINDURA UNIVERSITY OF SCIENCE EDUCATION  
P.BAG 1020  
BINDURA

Dear Sir/Madam

**RE: PERMISSION TO CARRY OUT A RESEARCH IN MIDLANDS PROVINCE;  
GWERU DISTRICT ; MKOBA 3 AND MATINUNURA HIGH SCHOOLS.**

Permission to carry out a Research on:

**"THE EXPERIENCE OF GIRL CHILD IN TAKING UP STEM SUBJECTS AT SECONDARY  
SCHOOLS."**

in the Midlands Province has been granted on the conditions that:

1. in carrying out this you do not disturb the learning and teaching programmes in schools.
2. you avail the Ministry of Primary and Secondary Education with a copy of your research findings.
3. this permission can be withdrawn at anytime by the Provincial Education Director or by any higher officer.

The Provincial Education Director wishes you success in your research work and in your Studies.

**MACHIMBIRA J.**  
**PROVINCIAL EDUCATION DIRECTOR: MIDLANDS**



# **Appendix 2**

## **Questionnaires**

## Questionnaire for teachers

 **BINDURA UNIVERSITY OF SCIENCE EDUCATION**   
**FACULTY OF SCIENCE EDUCATION AND TECHNOLOGY**  
**DEPARTMENT OF MATHEMATICS AND SCIENCE**

**QUESTIONNAIRE GUIDE FOR TEACHERS**

Dear Colleagues

My name is Mudzingwa Melody. I am currently studying my Bachelor of Science Education Honors degree in Chemistry at Bindura University. My research has to do with the experience of girl child in taking up STEM subjects at secondary school level. All completed questionnaires will be treated confidential and anonymous. The questionnaire consists of multiple choice questions and you can answer it by indicating it with a tick next to your choice and some few descriptive questions.

I want to thank you for your willingness to be of help in this regard.

Kind regards

Questionnaire for teachers

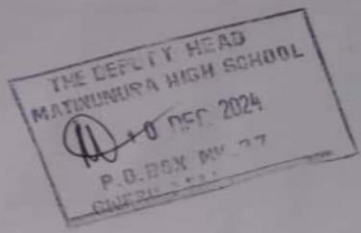
Section 1:

Demographic Information

1. Age: \_\_\_\_\_
2. Gender: \_\_\_\_\_
3. Teaching experience (years): \_\_\_\_\_
4. Subject(s) taught: \_\_\_\_\_
5. Grade level(s) taught: \_\_\_\_\_
6. School type (public/private): \_\_\_\_\_
7. Location (urban/rural): \_\_\_\_\_

Section 2

Teaching Practices



1. How often do you incorporate STEM-related activities into your lessons?

|            |  |
|------------|--|
| a. Daily   |  |
| b. Weekly  |  |
| c. Monthly |  |
| d. Rarely  |  |

2. What teaching methods do you use to engage girls in STEM? (Select all that apply)

|                             |  |
|-----------------------------|--|
| a. Hands-on experiments     |  |
| b. Real-world examples      |  |
| c. Collaborative group work |  |
| d. Technology integration   |  |
| e. Other (please specify    |  |

3. How do you assess girls' understanding and progress in STEM subjects?

|                               |  |
|-------------------------------|--|
| a. Quizzes and tests          |  |
| b. Projects and presentations |  |
| c. Class discussions          |  |
| d. Observations               |  |
| e. Other (please specify)     |  |

### Section 3

Girls' Participation and Engagement

1. Have you observed any differences in participation and engagement between girls and boys in STEM classes?

|     |  |
|-----|--|
| Yes |  |
| No  |  |

2. If \_\_\_\_\_ yes, \_\_\_\_\_ please describe \_\_\_\_\_

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3. How do you encourage girls to participate in STEM discussions and activities?

|                               |  |
|-------------------------------|--|
| a. Positive reinforcement     |  |
| b. Individualized attention   |  |
| c. Peer-to-peer encouragement |  |
| d. Other (please specify)     |  |

4. Do you notice any specific challenges girls face in STEM subjects? (Select all that apply)

|                                       |  |
|---------------------------------------|--|
| a. Lack of confidence                 |  |
| b. Limited exposure to STEM resources |  |
| c. Stereotype threat                  |  |
| d. Language barriers                  |  |
| e. Other (please specify)             |  |

## Section 4

### Stereotypes and Bias

1. Have you witnessed or experienced biases or stereotypes affecting girls' participation in STEM?

|     |  |
|-----|--|
| Yes |  |
| No  |  |

2. If yes, please describe:

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3. How do you address and challenge these biases and stereotypes in your teaching practice?

|                                   |  |
|-----------------------------------|--|
| a. Open discussions               |  |
| b. Counter-stereotypical examples |  |
| c. Inclusive language             |  |
| d. Other (please specify)         |  |

## Section 5

### Support Systems

1. What resources or support systems do you provide for girls struggling in STEM subjects?

(Select all that apply)

|                           |  |
|---------------------------|--|
| a. Extra tutoring         |  |
| b. Mentorship programs    |  |
| c. Online resources       |  |
| d. Peer support groups    |  |
| e. Other (please specify) |  |

2. How do you involve parents/guardians in supporting girls' STEM education?

|                               |  |
|-------------------------------|--|
| a. Regular updates            |  |
| b. Parent-teacher conferences |  |
| c. Volunteer opportunities    |  |
| d. Other (please specify)     |  |

## Section 6

### Professional Development

1. Have you received training or professional development on teaching STEM subjects to girls?



|     |  |
|-----|--|
| Yes |  |
| No  |  |

2. If yes, please describe:

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3. What topics would you like to see covered in future professional development opportunities?

|                                      |  |
|--------------------------------------|--|
| a. STEM pedagogy                     |  |
| b. Addressing biases and stereotypes |  |
| c. Technology integration            |  |
| d. Other (please specify)            |  |

## Section 7

### Open-Ended Questions

1. What strategies have you found most effective in engaging girls in STEM subjects?

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2. How do you think schools and policymakers can better support teachers in promoting girls' participation in STEM?

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3. Are there any additional comments or insights you'd like to share about teaching STEM to girls?

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## Questionnaire for learners

|                                                                                                                                 |                                                                                                                                                                          |                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <br>Bindura University<br>of Science Education | <b>BINDURA UNIVERSITY OF SCIENCE<br/>EDUCATION</b><br><br><b>FACULTY OF SCIENCE EDUCATION<br/>AND TECHNOLOGY</b><br><br><b>DEPARTMENT OF MATHEMATICS<br/>AND SCIENCE</b> | <br>Bindura University<br>of Science Education |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|

**QUESTIONNAIRE GUIDE FOR LEARNERS**

Dear Learner

My name is Mudzingwa Melody. I am currently studying my Bachelor of Science Education Honors degree in Chemistry at Bindura University. My research has to do with the experience of girl child in taking up STEM subjects at secondary school level. All completed questionnaires will be treated confidential and anonymous. The questionnaire consists of multiple choice questions and you can answer it by indicating it with a tick next to your choice and some few descriptive questions.

I want to thank you for your willingness to be of help in this regard.

Kind Regards.

Section A

All answers in this work remain as a confidential as possible.

1. Age: \_\_\_\_\_

2. Grade level: Ordinary level ( )  
Advanced level ( )

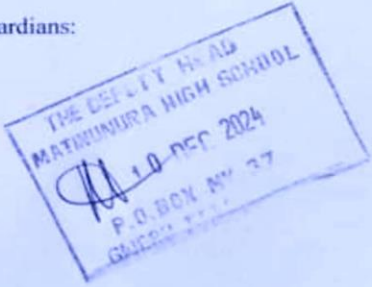
3. Name of school \_\_\_\_\_

3. School type public ( )  
private ( )

5. Parent's/guardian's occupation: \_\_\_\_\_

6. Highest level of education completed by parents/guardians:

i. Certificate ( )



ii. Diploma ( )

iii. Bachelor ( )

iv. Postgraduate ( )

## Section 2: STEM Subject Enrollment

1. Which STEM subjects do you currently study

| SUBJECT                                 | INDICATE WHERE APPLICABLE WITH A TICK |
|-----------------------------------------|---------------------------------------|
| Mathematics                             |                                       |
| Science (Biology, Chemistry, Physics)   |                                       |
| Computer Science/Information Technology |                                       |
| Engineering                             |                                       |
| Other (please specify)                  |                                       |

2. What motivated you to take up STEM subjects? (Select up to 2)

|                         |  |
|-------------------------|--|
| Interest in the subject |  |
|-------------------------|--|

|                                |  |
|--------------------------------|--|
| Parental/teacher encouragement |  |
| Career aspirations             |  |
| Peer influence                 |  |
| Other (please specify)         |  |

3. How long have you been studying STEM subjects? \_\_\_\_\_

### Section 3: Learning Experiences

1. How would you rate your interest in STEM subjects?

|                |                   |            |                 |
|----------------|-------------------|------------|-----------------|
| Not interested | Fairly interested | Interested | Very interested |
|                |                   |            |                 |

2. How confident do you feel in your ability to learn STEM subjects?

|               |                  |           |                |
|---------------|------------------|-----------|----------------|
| Not confident | Fairly confident | Confident | Very confident |
|               |                  |           |                |

3. Have you experienced any challenges while studying STEM subjects? (Yes/No)

|     |  |
|-----|--|
| Yes |  |
| No  |  |

If \_\_\_\_\_ yes, \_\_\_\_\_ please \_\_\_\_\_ describe:

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4. How supportive are your teachers/parents/peers in your STEM education?

| Not supportive | Fairly supportive | Supportive | Very supportive |
|----------------|-------------------|------------|-----------------|
|                |                   |            |                 |

#### Section 4: Career Aspirations

1. Do you plan to pursue a career in STEM? (Yes/No/Undecided)

|           |  |
|-----------|--|
| Yes       |  |
| No        |  |
| Undecided |  |

2. If yes, which field? \_\_\_\_\_

3. What factors influence your career choices?

|                    |        |
|--------------------|--------|
| Personal interest. | (    ) |
| Job prospects.     | (    ) |

|                                 |
|---------------------------------|
| Parental/peer influence. (    ) |
| Societal expectations    (    ) |
| Other (please specify)          |

## Section 5: Barriers and Stereotypes

4. Have you faced any stereotypes or biases while studying STEM subjects?

|     |  |
|-----|--|
| Yes |  |
| No  |  |

If yes, please describe:

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2. Do you feel pressured to conform to traditional gender roles?

|     |  |
|-----|--|
| Yes |  |
| No  |  |

5. How do you think society perceives girls/women in STEM?

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## Section 6: Support Systems

1. Who encourages and supports your STEM education?

|                          |  |
|--------------------------|--|
| Parents                  |  |
| - Teachers               |  |
| - Peers                  |  |
| - Mentors                |  |
| - Online resources       |  |
| - Other (please specify) |  |

2. Have you participated in any STEM-related extracurricular activities?

|     |  |
|-----|--|
| Yes |  |
| No  |  |

If yes, please describe:

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## Section 7:

2. What do you enjoy most about studying STEM subjects?

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3. What challenges have you faced, and how have you overcome them?

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4. How do you think schools/parents/society can better support girls in STEM?

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## Section 8: Additional Comments

Is there anything else you'd like to share about your experiences as a girl child in STEM?

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# Appendix 3:

## INTERVIEW GUIDES



**BINDURA UNIVERSITY OF SCIENCE  
EDUCATION**

**FACULTY OF SCIENCE EDUCATION AND  
TECHNOLOGY**

**DEPARTMENT OF MATHEMATICS AND  
SCIENCE**



**INTERVIEW FOR TEACHERS**

Greetings colleagues my name is Melody Mudzingwa I am currently studying with Bindura University of Science Education doing my Bachelor of Science Education Honors Degree in Chemistry. I am currently doing a research study on the experiences of girl child in taking up STEM subjects at secondary school. For the purpose of this research I will be asking questions and I want you to as open as you can and be honest when answering the questions. You are also free to tell us what you like and dislike during the interview.

Moreover, all the information that I am going to collect during the course of this interview will be kept during safe and secret. I would not use your name or any other identifying information and everything that you would say will only be entirely used for the research purpose.

**Interview guide**

1. What factors influence girl child to take up STEM subjects?
2. What are the challenges faced by girl children when taking up STEM subjects?
3. How best can these challenges be mitigated?
4. What are the views of the society towards girl child in STEM
5. What have been done to motivate the girl child in taking up STEM subjects.
6. How can the women in STEM motivate the girls in taking up STEM subjects.

Thank you for participating and I will contact you again if I have any further questions or need further clarifications.





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