BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SOCIAL SCIENCES AND HUMANITIES

DEPARTMENT OF SOCIAL WORK

THE EFFICACY OF GIRLS IN STEM TRUST'S DIGITAL SKILLS PROGRAM IN ACHIEVING QUALITY EDUCATION AMONG GIRLS IN ZIMBABWE. A CASE STUDY OF LOCH-VIEW PRIMARY SCHOOL AND SOS HERMAINN GMEINER PRIMARY SCHOOL IN BULAWAYO.

By

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A DISSERTATION REPORT SUBMITTED TO THE DEPARTMENT OF SOCIAL WORK, FACULTY OF SOCIAL SCIENCES AND HUMANITIES, BINDURA UNIVERSITY OF SCIENCE EDUCATION IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR BACHELOR OF SCIENCE HONORS DEGREE IN SOCIAL WORK.

ABSTRACT

The study emanated from the understanding that ICT skills are one of the most significant factors pertaining the quality of education in each and every country. However, Zimbabwe and other African countries have been facing challenges of shortage of resources which have been hindering its success in introducing ICT practical learning in primary schools. The failure to achieve digital skills amongst learners has been a source of discrimination due to the cultural background of gender roles. As a result, women tend to shy away from pursing STEM-based careers, possibly due to a lack of practical experience as they advance in their education. Thus, this study aimed to find out the efficacy of the Girls in STEM Trust's digital skills program in achieving quality education in SOS Hermann Gmeinner and Loch-view Primary School. The study also looked at the challenges and the measures to quality education. The study was conducted using qualitative research methods, leading to the application of the thematic analysis. The study employed the social learning theory as its theoretical framework, emphasising learning from different perspectives such as through observation, modelling, reinforcement and imitation. The aim of the research using this template was to understand efficacy of the digital skills program though the lenses of the social learning theory provisions. The study was folded up with recommendation to the challenges that were addressed and also the gaps that were discovered in the research. Some of the recommendations that were given were to involve the parents in the learning of the girls, programs follow-up, and background research before implementing programs in schools and collaboration among institutions as in order to achieve quality education.

DECLARATION FORM

I, **Oprah Masina Jackson**, student number **B200081A** pursuing the Bachelor of Science Degree in Social Work, hereby declare that this project under the following topic: **The efficacy of the Girls in STEM Trust's digital skills program in achieving quality education among girls in Zimbabwe. A case study of Loch-view Primary School and SOS Hermann Gmeiner in Bulawayo** is my own original work. I affirm that this dissertation has not been plagiarised from any other source without proper acknowledgements and citations of the original authors.

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DEDICATION

I dedicate this dissertation to my lovely parents (Shadreck Jackson and Sibongile Moyo) along with my siblings, who have stood by me in every phase of this study, offering me emotional and financial support from the beginning of this journey to date.

I would also like to dedicate this research to Girls in STEM Trust team, with special thanks to the Executive Director (Mrs Victoria Nxumalo) for allowing the research to be conducted within their program along with the participants who voluntarily gave their perceptions concerning the organisation and the program.

Finally, my gratitude also goes to the schools that participated in this research (SOS Hermann Gmeiner and Loch-view Primary School) as they cleared their busy schedules in order to participate in this research; without their involvement this research would not have succeeded.

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A warm thank you to my parents who fuelled the research through providing the necessary financial needs and a sincere appreciation goes to my friends for their encouragement and support.

APPROVAL FORM

I certify that I have read and understood the dissertation entitled "The efficacy of the Girls in STEM Trust's digital skills program in achieving quality education. A case study of Loch-view Primary School and SOS Hermann Gmeinner in Bulawayo" I hereby recommend its acceptance by the Bindura University of Science Education as part of the requirements for the completion of the Bachelors Honors Degree in Social Work.

Supervisor

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Chairperson of Department Board of Examiners

Upon reviewing this dissertation, the Board of examiners is convinced that the dissertation fulfils the examination requirements for the Bachelor's degree in social work. I therefore, advise that the Bindura University of Science Education to accept this project authored by Oprah M Jackson, student number B20081A titled "Efficacy of the Girl in STEM Trust's digital skills program in achieving quality education among girls in Zimbabwe. A case study of SOS-Hermann Gmeinner and Loch-view Primary School in Bulawayo."

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RELEASE FORM

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ACRONYMS

GIST	Girls in STEM Trust
STEM	Science, Technology, Engineering and Mathematics
NDS1	National Development Strategy
NGO	Non- Governmental Organisation
CRC	Convection on the Rights of Child
SDGs	Sustainable Development Goals
SDG 4	Quality Education
SDG 5	Gender Equality
SDG 8	Decent Work and Economic Growth
UNICEF	United Nations Children's Fund
ACC	African Code Challenge
WRO	World Robotic Olympiad
ICT	Information Communication Technology

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CHAPTER 1: INTRODUCTION AND BACKGROUND OF THE STUDY

1.0 Introduction

Girls in STEM Trust is a Non-Profit Organisation that is currently situated in Bulawayo. The Trust is on a mission to achieve the Sustainable Development Goals, mainly SDG 4, 5 and 8. However, the focus for this study is on SDG 4 which stands for quality education. The Trust implements programs that encourage girls to take up STEM careers, one of which being the digital skills program, which this study tackles so as to bring to the surface the extent to which it contributes to SDG 4 in primary schools. The topic also seeks to highlight on how the digital skills program have encouraged STEM education for girls as they usually fear to take STEM related programs/ subjects later in high school. The also finds out the quality the quality of education that has been brought about by the program in Loch-view Primary School and SOS Hermann Gmeiner Primary School situated in Bulawayo.

1.1 Background to the Study

Globally girl empowerment has been prioritised as a way of achieving inclusion and equal opportunities in the education sector. However, digital literacy is not yet fully considered as part of the package to achieving quality education due to a number of factors that can be argued to be both intrinsic and extrinsic. One of the factors is highlighted by UNICEF (2023), who alludes that as young people progress through education, girls tend to feel that Science, Technology, Engineering and Mathematics (STEM) courses are less relevant to them and they participate less overtime as technology is seen as a male domain. This has contributed to a cycle of discrimination in the educational system. In response to this the United Nations implemented the Sustainable Development Goals (SDGs) which according to Morton, Pencheon and Squires (2017) are a set of global goals for fair and sustainable health at every level The aim is to ensure that all people enjoy peace and prosperity now and in the future.

Thus, this indicates that girl education is a global phenomenon as it attracted the SDGs which aim at achieving quality education for girls across the globe.

There is a gap in the education system in Zimbabwe whereby the quality of education is only viewed as evidenced through high pass rates rather than practicality. Hence this study aims to uncover the gaps and highlight how the organisation 'Girls in STEM Trust Digital Skills Program' is managing to fill the gap and the challenges that might be faced during the process. According to Agnihotri (2017) quality education is one that focuses on the whole child- the social, emotional, mental, physical and cognitive of the student regardless of gender, race, ethnicity, socio economic status or geographic location. He further highlights that it prepares a child for life not just for testing. This is one of the reasons behind the undertaking of this study.

In most African countries it has been difficult to achieve quality education for girls due to the fact that the countries are still on their infancy when it comes to development. Apart from that African countries are guided by their culture which forms a patriarchal society whereby women and girls are usually inferior to their male counterparts. This labelling has led to girls growing to accept that education and career choices should be in line with one's societal roles. This has been highlighted as the reason why developing countries are still lagging behind when it comes to development, hence the introduction of Non-Governmental Organisations which work with the government towards promoting inclusion of girls in education and equal opportunities in all fields of work. Apart from culture resource shortages as well hinder the quality of education being offered in different schools, hence the existing dependency on developed countries.

1.2 Statement of the problem

Many efforts have been put forth in Zimbabwe as a way of achieving inclusive and quality education for all from the time the country obtained its independence up to date. The interventions have shown an increase in the number of children attending to education in both

rural and urban areas as education is prioritised as a right in the country as highlighted in the constitution. However, there have been very few examinations on the quality of education that is being offered in schools which might be one of the reasons why the country failed to adjust to the Covid-19 lockdown situation which indicated a gap in the quality of the education that is being offered in both primary and secondary schools in spite of the embracement of the slogan "education is for all".

Education in Zimbabwe encounters challenges such as inadequate resources. Kanyongo (2005) argues that computers have been part of the country's education system for a long time, their use has been limited to a few well-funded private and boarding schools that have electricity whilst the majority of the schools do not have basic facilities required for the use of computer technology. This remains a challenge in some of the urban based schools in Bulawayo. In order to improve the latter, according to Shava, Mathonsi and Hleza (2021) the UN has made it its mandate to advocate and implement education for sustainable development which fosters knowledge, skills and values that leads to a more sustainable future. The government has registered a lot of Non-Profit Organisation which exist to complement the SDGs and they have been licenced by the Ministry of Primary and Secondary Education to interact with different schools. However, the services rendered to schools by NGOs are usually not assessed which is yet another challenge which motivated this research topic.

1.3 Aim of the study

The main aim of this study is to examine the efficacy of Girls in STEM Trust's digital skill program in achieving quality education at Loch-view and SOS Hermann Gmeiner Primary Schools based in Bulawayo.

1.4 Research objectives

- To evaluate the efficacy of Girls in STEM Trust's digital skills programing bridging the gender gap in STEM education in Zimbabwe.
- To explore the challenges that affect the promotion of quality education for girls in Zimbabwe.
- To determine the measures that can be utilised to improve STEM education in Zimbabwe.

1.5 Research questions

This study seeks to answer the following three main research questions as the efficacy of GIST digital skills programs shall be analysed.

- How effective is the Girls in STEM Trust digital skills program in achieving quality education for girls?
- What are the challenges encountered in promoting quality education in Zimbabwe?
- What measures can be utilised to improve STEM education in Zimbabwe?

1.6 Assumptions of the Study

The research is based on the assumption that girls are usually discriminated from accessing quality education, which involves skills, them taking up STEM careers and their ability to use the different types of technologies that continue to evolve. Girls are normally left behind in digital skills training as they are advised to focus on Arts subject "which presumably do not require any digital skills training", a myth that has been given birth to by culture which encourages women to be lesser educated than man. The study is also based on the assumption that quality education is not necessarily based on the academic results but rather it should also be based on the ability of learners to be digitally literate and be in line with the changes in technology. Quality education also means inclusive learning and having girls being able to take

up STEM careers without any discrimination, allowing them to make their choices, all this is an assumption of what quality education should constitute.

1.7 Significance of the study

Since the study aligns with the Sustainable Development Goals, specifically SDG 4 which is based on inclusive and quality education this would help as a way of weighing the extent to which the Girls in STEM Trust is achieving the goal of quality education for girls in Zimbabwe. With the possible recommendations made from this study, they can help other Non Profit-Organisations like Elevate Trust, Women in Leadership Development (WILD), UNICEF and Girls in STEM Trust itself which work towards improving the women and girls education. The findings from this research might be useful to the Ministry of Primary and Secondary Education as they will be made aware of the strengths and gaps that exists in the implementation of SDG 4. When the SDGs reach the year of their deadline (2030) this information might be added as the existing literature of SDG 4 implementation at community level. The government might not be able to reach out to community to community examining the program's that contribute to the ongoing Sustainable Development Goals (2015-2030). Hence having a case study at community level is of paramount importance.

Also, the success of this study will also be of benefit in addressing what really constitutes quality education, is it the high pass rate or there is more. The views that may be brought from this study would also assist to understand on whether SDG 4 is it really being implemented accordingly or it is just on the surface. Once the roots that may hinder Sustainable Development Goals from being a success are highlighted this would help policy makers in intervening as 2030 approaches. This would also be of help to the community as it becomes aware of its areas of improvement, leading to a reduction in the impact that may be brought about by any disaster that may affect the educational system. Therefore, the study is important as it is envisaged to promote preparedness to avoid the recurrence of the challenges in learning as what was

evidenced during the COVID-19 lockdown in 2020 which took away the right to education for most learners leading to a number of dropouts from school.

1.8 Delimitations of the study

On the other note, Theofanidis and Fountouki (2019) defines delimitations as the limitations consciously set by the authors themselves. They are concerned with the definitions that the researchers decide to set as the boundaries or limits of their work so that the study aims and objectives become impossible to achieve. The study was carried out in Bulawayo as it is the area in which the Girls in STEM Trust organisations has been actively involved. In as much as the SDG goals are a global phenomenon the research only focused on two primary schools situated in Bulawayo as their sample, hence the findings may not be used as the standard to measure the extent by which the county is achieving the Sustainable Development Goals. In addition, analysing the effectiveness of the digital skills program, was a limitation for the researcher, as they had to focus only on this particular program of Girls in STEM Trust. The researcher pretended to be unaware of other programs and interventions, however, had to acknowledge their presence in achieving quality education (SDG 4) for girls in Loch-view Primary School and SOS-Hermann Gmeiner Primary School.

1.9 Limitations of the study

Limitations of the study can be defined according to Theofanidis and Fountouki (2019) as any potential weaknesses, usually out of the researcher's control and are closely associated with the chosen research design, statistical model constraints, finding constraints, or other factors. One of the limitations of the study is that of financial constraints. In order for information to be obtained from the area of study the researcher had to travel to reach out to schools, necessitating financial resources. As a result, the researcher had to use their personal savings to cover the transportation costs.

1.10 Definition of key terms

- **Sustainable Development Goals:** Morton, Pencheon and Squires (2017) define Sustainable Development Goals (SDGs) as a set of global goals for fair and sustainable health at every level: from planetary biosphere to local community with the aim of ending poverty, protecting the climate and ensure that all people enjoy peace and prosperity, now and in the future.
- **Quality Education:** According to Hammond (2013) in Thangela, Baratiseng and Mompati (2016) quality education entails the following aspects; learning resources, technology, program enrolled, modules done, lecturing methodology, qualifications, co-curricular activities.
- **Digital Skills:** A number of authors acknowledge that the definition of digital skills always differ. Digital skills are defined as being able to take the knowledge of how to accomplish specifically digital tasks and applying it to new circumstances, context, or platforms, Hecker and Loprest (2019). On the other hand World Bank (2021) defines digital competence as the ability to use a mobile phone for simple transactions or access or access and surf the internet, or, at the other end, to undertake coding and software programming
- **Girls in STEM Trust:** According to Girls in STEM Trust (2018) they define themselves as a non-profit organisation that invests in girls and young women in Africa to help them develop digital and entrepreneurship skills that will build future successful careers in all facets of STEM.

1.11 Chapter outline

Chapter 1: Introduction and background of the study

This chapter introduces the topic under study, highlighting the background of the study, significance of the study, the study objectives, research questions, aim and finally the conclusion of the chapter.

Chapter 2: Literature Review

This chapter reviews literature which complements the research globally, nationally and regionally. The chapter also introduces the theory adopted for the research under the theoretical framework and a justification for the study.

Chapter 3: Research Methodology

This chapter includes the research methodology that has been adopted for the study, the target population, sample size, sampling techniques, data collection methods used, data collection tools, data analysis and ethical considerations that guide the study along with the limitations and the delimitations that are part of the study.

Chapter 4: Data Presentation, Analysis and Discussion of Findings

This chapter introduces the data presentation based on the findings. The data is presented in different formats, for example, tables and bar graphs.

Chapter 5: **Chapter Summary, Conclusions and Recommendations**

This is the final chapter of the study which includes a summary of the study, conclusions and recommendation for the study conducted.

1.12 Chapter summary

This chapter focused on the introduction of the of the study through highlighting its background, the statement of the problem that motivated the study, the aim of the study, objectives of the study, research questions, assumptions of the study, significance of the study,

delimitations and limitations of the study, definition of key terms, chapter outline and finally the summary of the chapter.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter introduces the theoretical framework of the study by highlighting Albert Bandura's social learning theory. The research relates with previous studies on the topic under study by taking a look on the objectives from a global to a regional and local perspective for its literature review. This helps in discovering the similarities differences globally, nationally or regionally which would help in understanding of the relevance of this study. Finally, the chapter summary marks the end of this chapter as what would have been displayed is summarized.

2.1 Theoretical Framework

The research is based on the Social Learning theory by Albert Bandura. Lyons and Berge (2012) describe the social learning theory of Bandura (1954) as predicated on the notion that learning occurs through social observation and imitation of a certain behaviour. They further highlight that it is then up to the individual whether to imitate the observed behaviours or not, being aware of the rewards and consequences. Sutton (2021) further highlights that from Albert Bandura's perspective human beings learn from each other according to the following processes: observation, imitation, modelling and reinforcement.

Observation

Manik, Sembring and Pedang (2022) is of the view that from Albert Bandura's theory, an individual can simply learn certain behaviours through observation of what others are doing. This applies to both positive and negative behaviours. Manik et.al (2022) add on the observation learning by highlighting the models of social learning theory which involve: a live model of a real person demonstrating or performing a behaviour, verbal instructional models that include behavioural descriptions and explanations and finally a symbolic model that

includes real of fictional people who behave in books, movies. Thus, the observation stage of the social learning theory.

Imitation

Ediyang (2016) describes imitation as one which has to do with one's ability to replicate a behaviour. A child/ person who is exposed to a certain behaviour repeatedly is expected to be able to imitate and reproduce the behaviour. This stage of the social learning theory complements with the modelling stage as both the targets to learning have to display what they have learnt from their role models.

Modelling

In Ediyang (2016), p.42, para 3), O'Rorke (2006) indicated that modelling is also process that can lead to successful influence of one's behaviour according the Bandura (1954). The process includes a number of steps, being: "attention, which means that one has to first pay attention to the model, followed by retention whereby the observer is expected to remember the behaviour that was performed, reproduction as the ability of one to replicate a behaviour that has been demonstrated by a model and motivation as the final ingredient of modelling whereby learners must demonstrate what they have learned". Zhou, Chikara and Oudghiri (2023) are of the view of teacher's are the first role models to create positive environments for girls through having encouraging conversations with learners regarding the contribution of women in STEM (technology field). It is believed that this could counter stereotypical messages. Thus the process contained under modelling in this particular theory.

Reinforcement

Reinforcement can be said to be either positive or negative. When a behaviour is rewarded with good, it is most likely that the performed behaviour will be repeated over and over again as a way of maintaining the positive behaviour, McLeod, (2016). Nabavi and Bijandi (2012) explain

this stage by describing it as the intrinsic reinforcement whereby when on is rewarded of a deed they develop self-achievement, satisfaction which are of relevance when it comes to performance of a learner. Hence, this indicates that apart from the environments in which one dwells in, cognitive processes play an equal role in motivating positive behaviour.

2.1.1 Relevance of the social learning theory in this study

The adoption of the social learning theory specifically for this study is to find out the extent by which girls are influenced to take up STEM as careers or to continue in the trap the societal perceptions concerning girls' education which usually hinders quality education. Albert Bandura embraced the issue of observation and imitation of behaviour that learners may go through. Chikanyawu (2022) is of the view that school experiences influence how children view themselves inside and outside school, since school education has the potential to last a lifetime to determine learned future decisions. Hence this theory is valid for this study since when learners learn through observation, they are likely to be interested in digital literacy. For example, girls grow up in environment where they learn the expectation of women according to the culture which usually promotes gender inequality. Hence the purpose of this study is to find out how the Girls in STEM Trust digital skills program is promoting inclusion for girls. Observational learning can be said to be part of the ways by which young girls are helped to escape inequalities that affect quality education in Bulawayo.

In addition, the social learning theory also emphasizes on reinforcement as a way of encouraging certain unwanted behaviours. This technique can be argued to be a useful one in order to encourage girls' participation in the technical field through rewarding those that perform well to be confident in displaying their skills, instilling in them something that they had lost through the social expectations of girls from a young age. Keane, Linden and Snead (2022) support this view by arguing that girls have a natural interest in STEM related subjects or careers which then diminishes as girl's age due to gender-based stereotypes. An example is

Girls in STEM Trust promotes digital skills among girls in primary schools through allowing them to partake in digital competitions, solving digital problems as a way of motivating more female representation in STEM careers. Thus, promoting quality education through reinforcement. Therefore because of this the researcher would like to find out the effectiveness of the Trust‘s digital skills program to quality education.

The theory is useful in assessing how the digital skills program‘s emphasis on role models, success stories influence girl’s interest in excelling and accessing the digital skills and the impact the program has on their future careers through modelling. The study also makes use of this technique in finding out the extent to which the girls in SOS Hermann Gmeiner and Loch-view Primary school are able to demonstrate what they have learnt from Girls in STEM Trust. The models that have had an impact in their education are of importance so as to indicate whether the learners can demonstrate what they have learned. This part of provision of the theory is relevant as a measurement on whether quality education is being achieved at primary level and the learner’s perspectives shall shape the results.

2.2. Literature review

A literature review discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period, Ramdhani, Ramdhani and Amin, (2014). In line with the above definition, literature of this study is observed from a global to a regional and national perspective in order to explore the experiences of different locations on this particular subject under study on quality education in Zimbabwe.

2.2.1. Efficacy of digital skills in bridging the gender gap in STEM education.

Globally

Digital skills are important globally as the world is always improving in digital technology hence the need for uniformity in operation for easy communication and improved standard of

leaving. Countries across the globe are dependent on each other. One may find raw materials in one country whilst on the other a finished product. This is why digital skills are important for girls to grow up in so that they are not left behind when it even comes to job markets outside the country. They can be able to pursue, especially in the STEM industry which is fully technological oriented. Davaki (2018) notes that the participation of women in ICT are also involved in all European countries, amongst which are Austria, Denmark, France, UK and Ireland amongst others. The author also acknowledges the unskillfulness of women when it comes to ICT which becomes a threat for their positions in the industry as there are high chance of them losing their jobs to young future employees. Once women, especially girls from a primary level are moulded with digital skills the gender gap that exists in STEM education may be slowly erased as they pursue the careers that relate to the field and become eligible to obtain the positions upon completion.

To add on, digital skills are of importance in bridging the gender gap as they help many jobs need digital skills. Wiley (2021) is of the prediction that is based on the research conducted by Microsoft Data Science that over the next five years the global workforce is poised to add 149 million new technology-oriented jobs. This view indicates that if digital skills trainings are not equally distributed to both girls and boys, man and women, the gender gap would continue to exist. Once digital skills are not embraced the future labour force will continue to be having less representation of female in the technology field and other STEM fields as a whole. Advocating for equality in opportunities should not just be a mouth service but the people whom are being advocated for should withhold the skills which are required in the current workforce, once this is done there would be no reason for oppression of women in STEM fields as they are fit for the jobs due to the skills which would have been obtained. Once these skills are obtained from a primary level it becomes easy to build upon them as they advance to secondary up to the tertiary level. Digital skills should be embraced just as overall learning as

it is a process so are the skills as they are obtained through learning from its infancy stage and mature as learners advance with their education. Thus, bridging the gender gap once such lenses are used in digital learning.

Regionally

Digital skills can be said to be of importance in Africa so that they can get an opportunity to improve themselves and catch up with the already developed regions thus erasing the dependency syndrome. Due to a number of challenges such as high unemployment rates due to poor African economies, brain drain has affected the development of the countries. Similarly to raw materials that Africa is rich in, once learners complete their education, they apply for jobs in developed countries and contribute to their further development whilst, Africa continues to be a source of employees. Evans and Acosta (2020) acknowledge that in terms of quality education in Sub-Saharan Africa, in a class of third grade learners, only less than two in three children could read a letter whilst only half of the children could read a word or put number in order. This can be said to make digital skills training to become secondary as they also require skills of reading for girls to excel which when not attained dependency syndrome remains a cycle, although there have been interventions ever since independence to improve their economies. Any form of inequalities that may exist between countries they can also affect women and girl's careers and gender gap. According to United Nations (2023) education consist a key element to ensure a full participation of women in economic, political and social life in the digital era. Thus, education should be quality elements that enhances a learner to be able to fit in to changes in technology rather than being stuck in a certain era due to the skills that were lacking in the previous curriculum. Tembon and Fort (2008) supports this view by asserting that "education has social and economic benefits for the general public and private individuals." Therefore, unveiling the efficacy of digital skills in that they give girls an

opportunity to participate in development which can only be done through prioritizing the nature of education in Africa, addressing the root causes.

Nationally

In as much as there are a number of efforts that have been put in place to promote gender equality, there remain a gap, a fact that contributed to the inclusion gender equality and quality education under the Sustainable Development Goals (SDGs). This can be said to be an indication that girls' education is a global challenge. The quality of education that girls get is important in that once a girl is educated this may lead to a ripple effect, well-being of a family is improved meaning that the generation being raised by educated women may contribute to sustainable developed nations. Osarenren- Osaghae, Imhangbe and Irabor (2019) are of the view that the girl child education has suffered abuse and neglect over the years despite the efforts being put by the government and other organisations. The idea that a girl's duty is take care of children can be said to be another reason which has led to the neglecting of quality of education to be offered to girls as the only skill that they should be in possession of according to societal perceptions is that of household duties. Hence once girls are given access to digital equipment in order to advance their digital skills it then becomes easy for them to grow up with skills thus getting rid of the gender gap in STEM. This therefore reveals the efficacy of digital skills as already indicated.

Digital skills are important in bridging the gender gap in STEM education not just currently, also in future as well as. This is so because the world is continuing to evolve digitally meaning the current education curriculum should fit in to producing digital literate individuals from a young age. Children's life chances are strongly influenced by the quality of their education as there are certain skills which are a requirement for their development so that they may successfully contribute in the society, OECD (2012). Konyana and Konyana (2013) postulate

that there has been introduction of computers in the curriculum in Zimbabwe in order to enhance learners' digital skills thus enabling them to contribute to national and international development. Therefore, once digital skills are acquired in the absence of gender discrimination, woman and girls can have the skills that could fit them in to development, being qualified by skills not by their biological differences.

Digital skills are important as they would improves girl's confidence in pursuing STEM careers. Girls from a young age are expected to do household chores especially in developing countries. Choosing a career in STEM is achievable when they are made to realise of their capabilities outside the household chores. Unlike boys who are exposed to mechanics and have a natural interest in problem solving girls prefer to do uniform routines on a day-to-day basis. This is one of the reasons why there continue to be a gender gap in Zimbabwe on STEM education. In order to bridge the digital gap, there have been a rise of organisations which instils the confidence to pursue STEM related careers for girls across the country, whose presence highlight the efficacy of digital skills in bridging the gender divide. Some of these organisations are Girls in STEM Trust which has been commended for improving digital literacy in the country through African Code Week, according to Mrewa (CITE,2021).

2.2.2 Challenges that affect the promotion of quality education for girls.

Globally

Technological equipment scarcity can be said to be the reason behind poor quality education for the girls globally. Unicef (2020) emphasise the example of the COVID-19 pandemic which resulted in the unprecedented disruption of education globally threatening to reverse gains made in access to education and learning across countries. UNICEF, further elaborated on the issue of girl's education that the pandemic had an impact on. Girls had the greater risks of not returning to the classroom once schools open. This can be said to be an indication that girls

continue to be affected by poor quality education and for them to successfully complete their studies it is still a dream that every country has. Plan International (2020) in support of the above is of the view that "whilst disasters affect everyone, inequality is exacerbated during a crisis", Plan adds on to indicate that during the pandemic many reflected that they did not have access to the technology required for online learning or the money which was needed to pay for subscriptions. Hence the prevalence of covid-19 indicated a loophole in the education sector that was ignored, meaning quality education is indeed a global challenge especially during disasters.

Regionally

In indicating the challenges in the achievement of quality education for girls in Africa, Jama and Barre (2019) indicate a number of barriers that continue to affect girls education, such as early child marriages, the perception that a woman's only role is being a wife and in charge of their home, financial barriers which encourages parents to educate their boy children over the girl children, harmful traditional practices and a lack of female role models, amongst others. With this said Diamond (2022) is of the view that while education can play a part in challenging gender norms it can also reinforce and reproduce them if resource distribution, policies and systems are not grounded in the principles of gender equality. In line with this study the above arguments agree in saying that in order to improve the education for girls, not only is there need to start with introducing policies that are inclusive, but there is need to consider the environment in which the girls are coming from to promote quality education which will not just lead to the achievement of SDG 4 of quality education, but also lead to decent work and gender equality in Africa. If the causes of the challenges to improve the education delivery in Africa and other regions are not addressed, one can argue that gender equality, discrimination and under development may be a cycle that shall continue for ages as they are currently desired to be improved. Somani (2017) comes in with an emphasis that girls reduced access to

education creates a cycle of reduced development across a society and across generations as they are the future mothers to raise children.

In addition, the United State Department of State (2009) says that normally, adolescence should be a time of learning and growing, a time for endless possibility, but for nearly 600 million girls in the developing world today, adolescence is too often a time when doors close and opportunities are limited. This qualifies as a challenge which can be pointed back to the limiting education curriculum in developing countries which goes hand in glove with resource scarcity leading to a poor finished product of learners/ employees rather than employers. Continental Education Strategy for Africa (CESA, 2016- 2025) also highlight that pre-primary education is a pillar on which future learning and training are grounded however, it tends to be neglected in terms of policy and investment.

Nationally

Societal perceptions can be said to negatively impact girl's the quality education in Zimbabwe. Quality education has always been a challenge globally especially for the girls child in attaining the skills that would be useful in this digitally transforming world due to societal expectations from their adolescent stage, GPE (2019).Wodon, Montenegro and Nguyenotto (2018) add on that naturally, girls tend to outperform boys in reading but they score lowest in mathematics and science tests in many countries. This can be said to be one of the sources of the labelling that exists in STEM programs which has contributed to a limitation of female representatives hence leading to inequalities in education and pay gap affecting decent work for most girls. Having girls exposed to quality education from a primary level is one of the strategies that can be implemented as a solution to hinder the rise of discrimination and inequalities in access of education.

Zimbabwe has tried to improve the quality of education prior independence by taking a socialist perspective which was behind the education for all. According to Mazuruse, Nyagadza and Makoni (2022) "Zimbabwe Education Act and the Disabled Persons Act and various Ministry of Education circulars (for example, the Education Secretary's policy No.36, [Ministry of Education Sports, Arts and Culture] 1990) require that all students, regardless of their race, religion, gender, disability and creed, have access to basic primary education (up to grade 7)." The provisions indicates that indeed Zimbabwe has made many efforts in order to ensure that access to educations in awarded to every learner in spite of their gender. However, one can argue that as old as the provisions are quality education is still yet to be achieved in Zimbabwe due to a number of factors that affects its success. Mazaruse et.al (2022) indicate that the government has also not been following up on determining the approaches that were implemented from after independence up until to date on whether inclusive education has been achieved. Gudyanga (2016) supports Mazaruse et.al (2022) by arguing that in spite of the efforts that have been put in place in Zimbabwe as a way of fulfilling the rights of education for all learners that promotes participation in society the problem of gender inequity in Zimbabwe is far from being resolved. This can be said to be a challenge in achieving quality education which affects girls' education as a whole.

Madhlangobe and Madhlangobe (2014) are of the view that apart from the inequalities that exist between boys and girls, there are also inequalities in both public and private schools which can be said to be a challenge to the success of achieving quality education. They further argue the distinction between private and public schools which can be witnessed through availability of material resources and inclusion of technology in their curriculum. Kanyongo (2005) is also of the view that while most schools and other educational institutions in the industrialised countries have ready access to computers and the internet, the same cannot be said with developing countries.

2.2.3 Measures that can be utilised to improve STEM education for girls

Globally

In order to improve the quality of education globally, Carvalho and Cameron (2023) assert that in order for education to support empowerment, schools and communities should function as empowering environments. The use the evidence gathered from India that there is need for structural and practical policies support so that educators themselves can be empowered to create a learning environment that move away from patriarchal traditions so as for the girl child to feel empowered and supported. Hite and Spott (2022) add on to say the following quoted, "early adolescence (ages 10-14) is considered to be an ideal time to capture middle girls' interest in STEM fields; especially given that their interest strongly predicts STEM persistence more than their prior experiences and achievements in STEM."

Somani (2017) acknowledges that resource scarcity is a global challenge hence in order to improve girl's education the author suggests that countries should adopt an integrated approach instead of duplicating efforts, working individually without enough consultation or collaboration. The SDGs indicate an example of an integrated approach can be witnessed as one of the global tasks, upon the understanding the nature of education in different countries which has been witnessed to be the reason for a constant state in development there was the implementation of the Sustainable Development Goals (2015-2030). These were implemented as a way of allowing room for the sharing of ideas, experiences, finances towards the betterment of education worldwide.

Regionally

In the case of sub-Saharan African Countries Diamond (2022) suggests that "in order to bridge existing gender gaps in education including in the context of the Covid-19 pandemic and unlock education's gender transformative potential there is an urgent need to better understand

the complex social norms that limit girl's access, participation and achievement in education and the reason for their persistence." On a different note, Togo (2011) alludes that quality education encompasses effective teaching, well-equipped, safe schools, relevant curriculum and a functional school management. This can be taken as one of the measures to mirror the quality of the education being offered from primary level. In line with this study once an institution reflects the above provisions on quality education there will be improvement on the education delivery in Africa as it is one of the few regions lagging behind in development.

Evans and Yuan (2019) are of the view that attending school and acquiring learning should not be the finishing line for girls education but rather they should empower themselves through education and achieve their life aspirations. This is one of the measures that does not exist in a number of developing countries as girls learning is more theoretical which might be hard for them to adjust to trending technologies which then erases the desire to do STEM careers, of particularity technology field in this case. Adelabu (2021) predicts that until efforts are made to bridge the digital gap and school aged girls are provided with opportunities to benefit from remote learning, the number of girls school dropout will continue in Africa.

On another note UNESCO (2021) asserts that there is a need to reverse gender stereotypes through investment in mentorship at an early age with inclusive technology and innovation programs, which upon realisation of its inadequacy UNESCO initiated a STEM mentorship program in Kenya. In line with the social learning theory of Bandura once girls have accessibility to role models who have managed to make it in the presence of societal norms it becomes easy for them to be encouraged in excelling in those fields. Mentorship is an important aspect when it comes to realising of the root causes of failure of quality education attainment. Kauser and Awan (2015) highlight the importance of educating girls for the future as they argue that every girls one day will become a mother and mothers are the first mentors of their children during their first six years hence they can give better career counselling to their children due to

updated knowledge of the world‘s conditions. Hobbs (2020) adds on this view by alluding that the education of a girl is impactful not just to her but to her future children, community and generations to come.

Nationally

Programs that support the education elevation for girls in Zimbabwe‘s impact should be assessed so as to maintain the quality of education that is offered to girls without any discrimination. Kurebwa and Mabhanda (2016) in their assessment of PLAP in primary schools recommended that continuous assessment is essential so as to expose teachers to variety of assessments techniques in order to close learner achievements gap. One could concur with such a view as it could be a useful strategy that may be adopted as well when assessing the impact of programs that promote sustainable development in schools. If young girls get access to quality education at a primary level, it is can be said to be a better intervention in erasing the negative perceptions they have about digital skills, this could also become a ripple effect in motivating them to take up STEM careers with boldness which could not just contribute to SDG 4 (quality education) but as well to SDG 5 (gender equality) and SDG 8 (decent work and economic growth). In support of the above, Nziramasanga (1999) and World Bank (2002) in Mujuru (2015, p.155) highlight the importance of primary education which they believe that it encourages creative thought and pupils begin to learn through problem solving and discovering.

In order to improve STEM education, digital skills for girls in Zimbabwe, the National Development Strategy (NDS 1) is one of the tools being utilised by the government to improve the provision of education for all and the rights of women in education. Mukumbiri (2018) highlights that in order to improve education of every child which is free from discrimination, the government of Zimbabwe has implemented several policies among the NDS1 which are the African Charter on the Rights of human and people’s rights, the Constitution of Zimbabwe,

International Covenant on Economic, Social and Cultural rights (IESCR), the convection on the Rights of the Child (CRC). However, in as much as these instruments are acknowledged the major challenge is non implementation of the law and lack of adequate resources in the state further reveals, Mukumbiri. This can be said to be the reason why discrimination in education continues to exist which affects girls decision making in career choices further discriminating them in the workplace as they complete their studies.

2.3 Chapter Summary

In conclusion, this chapter looked at the social learning theory as it has been found fit in finding out the efficacy of digital skills to girl's quality education, upon identification of the theory, its relevance to the study was outlined stage by stage. The chapter also elaborated on the identified objectives by making each of them a topic and explaining into detail each subject objective by looking at the regional, global and national perspective. The research identified the efficacy of digital skills program, challenges that are met in achieving quality education and finally measures that have been suggested by different t authors in ways of improving the quality of education, the research highlighted how some of the measures have been implemented without ignoring their gaps as well which meant that they have been partly integrated.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

This chapter mainly focuses on the research methodology which consist of the research approach, research design, target population, sample size, sampling technique, data collection methods, data analysis and presentation, ethical considerations, limitations and delimitations of the study and finally the conclusion of the chapter. The chapter presents the procedure upon which the research considered in obtaining its findings and how the data shall be presented in the succeeding chapter.

3.1 Research approach

The study utilised a qualitative research approach in order to address the questions under study. The reason for using a qualitative research approach was based on the view of Mwita (2022) that qualitative research seeks to explore a social phenomenon, reveal feelings associated with the problem and understand the subjective experiences of people that are associated with the research problem. This was useful for this research as the motivation of the research is to find out the experiences of girls along with key informants in the achievement of quality education through the Girls in STEM Trust‘s digital skills program.

3.2. Research design

The study adopted a phenomenological research design under qualitative research. Kagimu (2019) highlights that “phenomenological research has the ability to infiltrate deep into human experiences and trace the intrinsic nature of a phenomenon and analyse it and develop it in detail in its primal form as experienced by individual”. This type of research design became of importance to the research as the girls and key informants who were involved in the GIST digital skills program were given an opportunity to share their perceptions based on their experiences with the program. These were used to analyse the effectiveness of the digital skills

program to quality education. Since the in-depth interviews, focus groups shall be a platform for obtaining the perception and experiences of participants the research will highlight the commonalities in the experiences and perceptions as Creswell, Hanson and Clark (2007,p.252) highlighted as a strength of the phenomenological research design.

3.3. Target Population

As drawn from the topic, the researcher‘s target population was all girls from Lock-view and SOS Hermann Gmeiner Primary School who were actively involved in the digital skills program. The researcher also involved key informant persons such as the heads of the schools and the educators who are actively involved in the digital skills program along with the organisation‘s perceptions, which delivers the digital skills to the girls in both primary schools This was so as to avoid the results to be one sided but rather to be from both the benefactor and the beneficiary. The reason why the researcher chose girls is because they are usually left behind when it comes to digital skills and STEM hence it is important to discover the impact of the digital skills program on quality education for girls in Zimbabwe.

3.4 Sample size

In total the research worked with the sample size of 20 participants who are involved in the digital skills program, (15 girls + 3 key informant interviews from schools under study and 2 key informants from Girls in STEM Trust). This was used for both schools which are under study.

3.5 Sampling technique

The sampling technique adopted for this research is the purposive sampling technique which is a non-random sampling technique. Thomas (2022,para1.pg 2) quoted Paul Oliver (2015) who alluded that “purposive sampling is a type of non-probability sampling in which the researcher determines who should be included in the sample based on several characteristics

such as subject matter expertise or the ability and desire to engage in the study. Purposive/ expect sampling technique was useful in the study for educators, the 3 educators who were selected according to the sample size and 2 stake holders from the Girls in STEM Trust. This was so in order to get primary information from the educators as they are the experts in this study.

In order to select participants for the focus group the study made use of convenience sampling technique. Ekitan (2016) highlights that in convenience sampling subjects are selected based on their accessibility. Hence the less effort can be consumed by the research to select the participants compared to other non-random sampling techniques, Golzar, Noor and Tajik (2022).Therefore, convenience sampling technique was convenient for this research for 15 girls in the sample and were to be divided into half to have a first group session and a second one from the total.

3.6 Data collection methods

Data collection has been identified as a process of collecting and measuring information about variables of interest in a systematic way that enables one to answer research question and evaluate results of a particular study, Goyal (2022). Data collection methods adopted for this research were face to face interviews, combined with focus groups discussions. These methods were effective in drawing a holistic conclusion. The information obtained from face-to-face interviews had to be compared and contrasted with the one from focus groups conducted with both primary schools. Key informants assisted with the number of girls who partakes in the digital skills program under the Girls in STEM Trust.

3.6.1 Focus Group Discussions

These were carried at the premises of the schools which were under study that is Loch-view Primary School and SOS-Hermann Gmeiner Primary School in Bulawayo. The research also

made use of the focus groups to understand the extent to which the girls have mastered the concepts they are being taught in their desire to be digitally literate. The groups from each school consisted of 15 girls (7 first group + 8 second group).Each group discussion was allocated 15-20minutes. Anthea (2020) is of the view that focus groups can be used within educational and other settings as a way of collecting people's opinions on particular topic. With the use of focus groups, the research obtained different views from the participants once hence saving time. The information obtained was used in conjunction with other data collection methods so as to draw a conclusion for the overall research.

3.6.2 Face to Face Interviews

These were conducted on a one-on-one basis with key informants who included, the educators, the school head and other two representatives from Girls in STEM Trust who were involved with the schools under study. In both schools for key informants the research shall select three whereas representatives from the Girls in STEM Trust were two. The duration for the interviews was around 50 minutes, divisible to about 10 minutes for each interviewee. Structured interviews, were carried out in the offices of the participants, some in classrooms and outside as they were the areas in which they were comfortable with and conducive for an interview. Key informants from the schools made use of the school offices since the interviews were carried out in schools whilst the Girls in STEM Trust as part of the key informants were reached out to their offices in town in Bulawayo.

3.7 Data collection tools

In order to obtain findings, the research relied on interview guide question that were prepared for both the focus groups and the key informants' face to face interviews. A list of open-ended questions became the guide for the interview which according to Elhami and Khoshnevisa (2022), empowers the interviewer to collect the related information from interviewees in detail with personal ideas and less self-censorship. These questions for the interview guide were

drawn from the study objectives in order to obtain information that draws one back to the research topic as the research is based on finding out the efficiency of the digital skills program in the primary schools under study.

3.7.1 Procedures to data collection

Upon the preparation of an interview guide the researcher obtained approval from the University in a form of a letter to proceed to the research findings upon the approval of the research. The following step was to reach out to Girls in STEM Trust in order to acquire permission to carry out the research by highlighting to them the importance of the researching on the efficacy of the digital skills program to quality education as they are the drivers of the program in both schools. Finally, upon the approval from the organisation the student went on to further acquire consent from the school heads of both Loch-view Primary School and SOS-Hermain Gmeiner in interviewing volunteers from the learners who participate in the digital skills program and educators who have witnessed the program. The interviews where then carried out on the given dates by the schools and participants were briefed on the research and its purpose.

3.8 Data analysis and presentation

According to Babajide (2022) data analysis has been defined as a process of inspecting, transforming, cleansing and data modelling with the aim of discovering useful information, informing conclusions, or supporting theories for empirical decision making. A thematic analysis was adopted for this qualitative guided research in data analysis and presentation, which has been described by Braun and Clarke (2012) as a flexible method that allows the researcher to focus on the data in numerous different ways.

To extend the definition Braun and Clarke (2006) also emphasised on the five stages of data analysis which begins from **familiarisation of data** by one conducting the research. In this

case the data was obtained from Loch-view Primary School and SOS Hermann Gmeiner which was familiarised with by the researcher in order to proceed to generating initial code. The research findings were revisited as was obtained from the schools through the focus group discussions and the face-to-face interviews with the key informants and the learners in order to be aware of the data which was collected. This was done through revisiting the recorded data of participants and putting the data on paper so as to observe the responses that were given in order.

Upon familiarisation of data the research proceeded to **generating of initial codes**. This is said to be the second stage of the thematic analysis as Braun and Clarke indicated. Naeem and Ozuem (2023) are of the view that the generating of initial codes in thematic analysis involves the identification of recurring patterns and terms and have them put into key words. Alhojailan and Ibrahim (2012) clarifies this phase with an example that the way that issues influence the perceptions of participants allows the research to code and categorise data into themes through the use of thematic analysis. Hence as guided by this stage the researcher constructed the key ideas from the perceptions got form the group discussions and interviews based on the research questions in finding out the efficacy of the digital skills program of Girls in STEM Trust. The researcher highlighted the main features from the data that was put in writing from the recording after familiarisation. Notes were made directly from the data collected and put under the key concepts that the research highlighted to be of importance for the study.

Searching for themes was the third stage of the thematic analysis according to Braun and Clarke. Dawadi (2020) highlights that this is the stage that builds on the generated codes as they should relate with the constructed themes of the study. Since the research finding were obtained from two schools with the key informants and learners at the same time, the researcher had to identify the patterns that are similar from the generated codes and group them into different themes ensuring that there is no repetition as each theme had to stand on its own.

The fourth phase in thematic analysis involves **reviewing themes** making sure that the themes relate back to the research questions which were a guideline of the research. The themes were edited so as to make sure that there are no repetitions that may disturb a proper analysis on the data presented. In this research it was made sure that the themes reflect back to the topic under study compiling them appropriately as it was done with the interview guide questions. The findings were revisited once again in order to make sure that there was no data/ theme that was left out which was relevant to the study.

As for the fifth stage of thematic analysis it involves **defining and naming themes**. In this phase the research chose from the reviewed themes final themes which would complement with the research topic. Maguire and Delahunt (2017) describe this phase as involving the understanding of what the themes are about and whether they relate to each other, data collected and sub-themes. This involved having the final theme named and a definition of each theme that has been approved as an explanation of the name behind the themes and how they relate back to the topic of the research which in this case is the efficacy of the digital skills program in achieving quality education in Zimbabwe. The themes were explained with the answers that were given by the participants from the interviews.

Finally, **producing the report** is the fifth stage according to Braun and Clarkes which is adopted upon the success of the five phases according to the thematic analysis. Once the data from both primary school and key informants has been displayed under the selected themes. As an extension to the final phase of thematic analysis, Ibrahim (2012) argues that thematic analysis allows a researcher to determine the relationships between concepts and compare them with the replicated data, therefore, justifying its adoption for this qualitative study of Lock-view Primary School and SOS Hermain Gmeiner Primary School. Therefore, this phase was put into use in the next chapter which displayed the analysed data's presentation as it was guided by the thematic analysis.

3.9 Ethical considerations

In Anwar's (2015) words "ethics in research are very important because the research frame and circumstances need participations from all parties and that ethics can become guidelines for researchers to conduct their research for making sure that there are no parties who are in harm or hurt." Therefore, the research employed ethical considerations like informed consent, confidentiality and voluntary participation.

- **Informed consent**

  Fleming and Zegwaard (2018) describes informed consent as one of the cornerstones of ethical research, the participants must be fully informed of what will be asked of, them, how the data will be used and what consequences could be present if any. The researcher made sure that before engaging with the participants they are made aware of the research, what it was all about as pertaining to the effectiveness of the digital skills program. This value was upheld in both the schools highlighted as the case study.

- **Voluntary participation**

  Marshall, Abedamowo and Adeyemo et.al (2014) highlights in his study that voluntary participation is a right of an individual to decide on whether or not to be part of the study. Once the participants were made aware of the research they were allowed to withdraw or continue with the research according to their own will. Thus, the researcher worked with those who volunteered to participate.

- **Confidentiality**

  Any information that relates to the private sphere of a person that they wish not to share with the public is considered confidential, Bos (2020). This is one of the ethics that a researcher is expected to respect for the safety of participants and they should be made aware of such a right. This is yet another ethic which the researcher recognized in the,

research; participants were not forced to disclose information which they are not willing to share. Hence confidentiality.

3.10 Assumptions of the study

The research was based on the assumption that girls are usually discriminated from accessing quality education, which involves skills uptake, them taking up STEM careers and their ability to use the different types of technologies that continue to evolve. Girls are normally left behind in digital skills training as they are advised to focus on Arts subject "which do not require any digital skills training" a myth that have been given birth to by culture which encourages women to be lesser educated than man. The study was also based on the assumption that quality education is not necessarily based on the academic results but rather it should also be based on the ability of learners to be digitally literate and be in line with the changes in technology. Quality education also means inclusive learning and having girls being able to take up STEM careers without any discrimination, allowing them to make their choices, all this is an assumption of what quality education should constitute.

3.11 Limitations of the study

Limitations of the study can be defined according to Theofanidis and Fountouki (2019) as any potential weaknesses, usually out of the researcher's control and are closely associated with the chosen research design, statistical model constraints, finding constraints, or other factors. One of the limitations of the study is that of financial constraints. In order for information to be obtained from the area of study the researcher had to travel to reach out to schools, necessitating financial resources. As a result, the researcher had to use their personal savings to cover the transportation costs.

3.12 Delimitations of the study

On the other note, Theofanidis and Fountouki (2019) defines delimitations as the limitations consciously set by the authors themselves. They are concerned with the definitions that the researchers decide to set as the boundaries or limits of their work so that the study aims and objectives become impossible to achieve. The study was carried out in Bulawayo as it is the area in which the Girls in STEM Trust organisations has been actively involved. In as much as the SDG goals are a global phenomenon the research only focused on two primary schools situated in Bulawayo as their sample, hence the findings may not be used as the standard to measure the extent by which the county is achieving the Sustainable Development Goals. In addition, analysing the effectiveness of the digital skills program, was a limitation for the researcher, as they had to focus only on this particular program of Girls in STEM Trust. The researcher pretended to be unaware of other programs and interventions, however, had to acknowledge their presence in achieving quality education (SDG 4) for girls in Loch-view Primary School and SOS-Hermann Gmeiner Primary School.

3.13 Validity and reliability

The research was conducted with the pioneers of the program so as to ensure the validity and reliability of the information captured. In order to make sure that the results obtained were reliable the researcher made sure that participants were not only the key informants but also to hear out on the opinion of the beneficiaries on the benefit of the digital skills program separately to make sure that the results are not biased. This had to be done so since while the digital skills program had been introduced by the Girls in STEM Trust, it also had an effect on teachers as well along with the learners that is why it was important to hear both sides of experience from different perspectives. Rather than relying on the findings alone the research also made use of content from different scholars in order to understand whether secondary information affects the way people think even though they have been exposed to such a program.

3.14 Conclusion of the chapter

This chapter has covered the research methodology that have been adopted for this particular study as a guideline of how the data have been collected in the research. The chapter began with the introduction to the chapter followed by the methodology which consisted of the research approach, research design adopted, target population, sample size, sampling techniques, data collection methods, data collection tools, data analysis, ethical considerations, assumptions of the study, study delimitations and limitations and finally the conclusion of the chapter. This chapter, thus, serves as a template for the proceeding chapter as it unlocks how the data collected shall be analysed.

CHAPTER 4: DATA ANALYSIS, PRESENTATION AND DISCUSSION OF FINDINGS

4.0. Introduction

The study focused on finding out the effectiveness of the Girls in STEM Trust's digital skills program in achieving quality education among girls in Zimbabwe with a focus of Loch-view Primary School and SOS Hermann Gmeiner Primary School. The main focus of the study was girls because the program and the organisation is mainly based on empowering the girl child through SDG 4, 8 and 5. The research was guided by the following objectives, which are, To evaluate the efficacy of the Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education in Zimbabwe, followed by, To explore the challenges that affect the promotion of quality education for girls in Zimbabwe and the last objective being, To determine the measures that can be utilised to improve STEM education in Zimbabwe.

Therefore this chapter's main purpose is to analyse the data, present and discuss the findings based on the response of the participants that was captured through interviews obtained from the interactions with key informants and the girls through focus group discussion. During the research the researcher maintained the research ethics which they committed this research to from the interaction with their participants and making sure that the ethics are considered in data presentation as well as the participants agreed to take part with the research due to the outlined ethics.

4.1. Demographic Information of Respondents

This section is meant to present the biographical information of the participants which are essential for this study as helps in analysing how the background, experiences of the participants had an influence on this particular study.

4.1.1 Demographic of Total Respondents

Table.1 Total Respondents

Respondent	Intended	Actual	Total
Key Informants	8	8	8
Girls	30	30	30
Total	36	36	38

The above table displays the total number of the participants who were interviewed by the research. The total number of each group that is shown in the table was extracted from both the schools under investigation and fused to create the designated group of girls and key informants. According to the above table, the two groups of participants which were of importance for this particular research were, the key informants who were interviewed on a one-on-one basis, being the first, followed by the second group which consisted of girls who became part of the research through their involvement in the focus group discussions. The total of the key informants was 8, two of which were obtained from the drivers of the program from Girls in STEM Trust and 3 from Loch-view Primary School while the remainder were captured from SOS Hermann Gmeinner. The total actual number of girls that has been indicated in the table consist of a combination of girls who participated in the focus groups from the 2 groups that were formed from each school. According to the table the research managed to attain the intended number of key informants and girls who were meant to be interviewed before the data was collected and the actual total number that was allocated during the data collection period. This alone, identifies the success of the research as the table shows the research's intentions were in line with the actual respondents that they aimed to interact with as part of their research.

4.1.2 Qualifications of Respondents

Table 2 Qualifications of key informants

Designation	**Gender**	**School/ Organisation**	**Years of Experience**	**Qualifications**
Project Coordinator	Female	GIST	4	Bachelor's degree in social Work
Administrator	Female	GIST	2	Bachelor's degree in social Work
Educator 1	Male	SOS	17	Bachelor of Information and Technology Honours & Diploma in Education
Educator 2	Female	SOS	20	International Computers Driver's Licence (ICDL)
School Head	Female	SOS	31	Diploma in Education, 2 Bachelor's degrees in Education Master's in Education (ECD)
Educator 3	Female	Loch-view	4	Diploma in Education
Educator 4	Female	Loch-view	17	Diploma in Education
Deputy Head	Female	Loch-view	20	Bachelor's Degree in Education

The table above illustrates the qualifications of the key informants and their current positions, under occupation. According to the table there are 2 social workers from the Girl in STEM who

formed part of the key informants and one having their current position in the organisation as a Projects co-ordinator whilst the other is the Administrator in the organisation, which is relevant to this research as they are involved in the program implementation in both schools. 2 educators from SOS Hermann Gmeiner were also involved whereby one was a holder of a Diploma in Education and a Bachelor of Information and Technology whilst the other educator had an International Computer's Driver Licence which qualified them to be the school ICT educators. Lastly from SOS, the school head also became a key informant whose qualifications as illustrated in the table are, a diploma in education, 2 bachelor's degree in education and a Master's in Education (ECD). These qualifications illustrated from SOS primary school justifies relevance of participants in this particular study on the digital skills program that helped the research to obtain in-depth information which is backed up by the level of experience of the educators in the education sector. The table also illustrated the qualifications of educators from Loch-view Primary School as part of the school under study. The key informants from the school were all females, and 2 were holders of Diplomas in Education whilst the school head had the Bachelor's Degree in Education. The educators indicated to have much experience in the education sector in as much as they had not focused particularly on ICT, they represented the department in the school. The table also shows the key informants' years of experience which are of importance to the qualitative data which shall be analysed in this chapter. Some of the key informants' years of experience indicate that they have been in the education industry for quite some time which helped the research to obtain in-depth information which is of importance in a qualitative study as it aims in attaining practical insights of the program under study. Amongst the key informants the research only managed to interview one male educator as part of their key informants having the rest being female educators.

4.1.3 Learners age range and total number of participants from both schools

Table 3 Girls age range

School	Age range	Current Grade	Gender	Total
SOS Group 1	10-11 years	Grade 6	Female	8
Loch-view Group 1	10-11 years	Grade 6	Female	8
SOS Group 2	11-12 years	Grade 7	Female	7
Loch-view Group 2	11-12 years	Grade 7	Female	7
				30

The table above shows the ages, grade and total of the female learners who participated in the focus group discussions. The researcher facilitated two focus group discussion with the learners per school. The first group of each school comprised of grade six learners who were eight in total. The second group of the focus group discussions consisted of grade seven learners who voluntarily participated in the focus group and they were seven per both schools. The age range was the same for both primary schools hence this table shows the total number of girls who participated from both schools upon conducting the focus group discussions. The overall total number of the girls who were part of the discussions added up to 30 as displayed on the table and all learners involved were female as the program is meant to empower girls and improve the quality of education through technology which could also have an impact on their desire to expand to other STEM fields.

4.2. Qualitative data presentation

The major aim of the research was to find out the efficacy of the digital skills program that is pioneered by Girls in STEM Trust in SOS Hermann Gmeiner Primary School and Loch-view

Primary School in Bulawayo which then led to the exploration of the challenges encountered upon the acknowledgement of the importance of the program and measures to overcome the challenges displayed. Upon conveniently sampling the key informants for both schools and the organisation under study, the research also conducted voluntary focus group discussions in order to get the different perspectives as guided by the research objectives. As a way of analysing the data that was obtained from participants the researcher adopted the thematic analysis which became a template for the research data presentation. Therefore, the qualitative data shall be presented objective by objective below.

4.3. Efficacy of the Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education in Zimbabwe.

This was the first objective which guided the interviews with key informants. The researcher managed to obtained different views on what the key informants and the participants from focus group discussions had to say about the digital skills program under the Girls in STEM Trust. This subsection is to identify what the organisation offers as per what was said by the participants and it is to be preceded by the perceived performance of the Trust with the school under study.

4.3.1 Services offered by Girls in STEM Trust to Loch-view Primary School and SOS-Hermann Gmeiner Primary School

Girls in STEM Trust is a Non-profit organisation that empowers mostly girls in taking up STEM careers through different programs, however, for this particular study the research 's main focus is the digital skills program. As a way of describing the organisation two of the key informants from the organisation, the administrator and the projects co-ordinator had the following to say;

4.3.1.1 Scratch programming

One of the key informants from the organisation identified scratch programming as one of the programs which the organisation offers as they introduce digital skills literacy to girls in both primary schools.

> *"At GIST we have quite a lot of programs that we run but with Loch-view Primary School we have one program that is Naledi (digital skills program). It is a program that is based on scratch application where we engage the girls to participate in this program in trying to bring digital skills to the girls in urban areas because we have realised that the majority of our girls are a forgotten group and also the girls themselves do not feel the need to want to learn anything besides Arts. With SOS we also do Robotics, thus blending the two programs"*

The majority of the learners concurred with this, as witnessed from the responses which were given which became a sign of their knowledge to the scratch programming under the digital skills program.

> *"I have learnt how to create a game using an application called scratch and I also about Random Access Memory and Random Open Memory"*

One of the educators from SOS said the following;

> *"I am very familiar with the Girls in STEM Trust digital skills program. I have been in touch with the GIST for the last 5 years, I also took part in the training for training the educators, and I even have 2 certificates on coding with scratch"*

The above quotations indicate that the learners were quite familiar with the organisation and the program under the digital skills as they expressed what they have learnt so far with the organisation. The girls also acknowledged what they have learnt through the application by describing what they do such as creating games. They also indicated that there is learning of

the basics of the computer, Introduction to computer literacy by identifying some of the words which they have acquired through the interaction with the organisation. It is also evident that the program also includes educators as displayed in the last quote.

4.3.1.2 Introduction to ICT

One of the key informants, a social worker by profession who is fulfilling the role of a projects co-ordinator identified the organisation as follows;

> *"We offer educational services in the sense that GIST's motto is "her digital skills her future", so we have realised that most students in most schools are taught the theory part of ICT and we have actually decided to go further and gave them a practical feel of what ICT is for both schools"*

A Loch-view pupil also indicated what the organisation offers through the following statement whereas some helped her by adding on to what she had to say as she listed what she has known so far.

> *"Safunda ukuthi igame iyenziwa njani lokuthi icomputer ilayitwa najni lokuyicitsha, ukutyper lokuspacer, lokuthi ifile icreathwa njani lokwenza ishortcut" (We* have learnt how to code a game, to switch on and switch off a computer, how to type, how to space, how to create a file, how to create a shortcut)

The deputy head of Loch-view Primary School in order to justify their familiarity with GIST, alluded that;

> *"I am very familiar with GIST as I am the one working with the organisation, they started September last year, and it is a six-month program which they started with this group of grade sixes and sevens. We didn't have much of the theoretical part but the STEM program came with the practical part matching it with the theoretical part which has added knowledge to our girls."*

From the above contributions of the participants, they clarify the existence of introduction to ICT, computer literacy which has been brought to life through the digital skills program. However, due to group influence the girls could only identify what they do by adding on to what one member of the group had to say and they all agreed with what would have been identifies not giving room to new opinions. The head of Loch-view primary also acknowledged the practical part that has been brought by the organisation and also highlighted the timeframe of the program meaning that it has a timeline to achieve their goals.

4.3.1.3 World Robot Olympiad/ Robotic Expo

One of the educators from SOS, identified the Robotic Expo as one of the programs that they have been invited to by the organisations to empower girls to take part in the STEM fields through exposing them to how the digital world operates through their exposure to the professions in the fields.

> *"We have even attended the Robotic Expo in GIST where we were doing hackathon that was a good program for our learners as the girls got a world's view on how technology is used and how to use technology in solving problems and interact with professionals in the industry"*

This quotation builds on the earlier response that was given by one of the key informants from the Girls in STEM Trust, who acknowledge that they have worked with some of the girls from SOS during their Robotic Expo as part of the services that they offer to only SOS and they have not yet expanded with it to Loch-view Primary School. The interaction of girls with other professionals during the Robotic Expo can be said to expose them to the feel of Engineering as a profession in STEM as well which seems to be the main mandate of the organisation as said by the key informant.

4.3.1.4 Counselling/ Mentorship

Upon studying the perception of the key informants and the girls which were obtained through focus group discussion, the research found out that counselling and mentorship is yet another service that the organisation offers for the girls to become digital literate which is combined with the practical part of ICT as elaborated above.

This is also supported by one of the later participants who revealed that the interaction with professionals in the industry of technology to help girls erase the perceptions that there are certain professions which they cannot be part of due to their gender, especial in STEM. Out of the total number of the girls who were part of the focus group discussions only one identified attaining counselling through the below statement. However, from the below engagement the researcher detected that not all girls attend the same programs such as that of financial literacy which was stated, whilst one said I attended the other said I did not attend this one because only a specific number is usually taken for some programs. This meant that, in as much as the programs are improving the learning environment programs that are conducted outside the school are not involving the majority of the girls but the minority, for example the Robotic Expo. This can be said to disturb the quality of education delivered in a school as some are left behind.

"*I got to learn financial literacy from Girls in STEM Trust, learning the importance of saving money"*

A grade seven learner said that had the following to say about the organisation;

"Girls in STEM Trust encourages girls to do sciences, to do jobs that men do"

Therefore, from the above given explanation it is evident that the organisation is working together with the schools to achieve career counselling. This is so as to motivate STEM future career choices as it has been indicated that from the digital skills to digital careers girls are

usually discriminated hence the need for empowerment. Once the learners are deprived of digital skills chances are high that they won't be interested in digital careers. All the key informants had the same description of what the organisation does. It is also evident that the organisation's main focus is on all the STEM related careers not just the technology field in as much as the digital skills program dwells much on technology.

4.4 Positive impacts of the program

From the data that was collected from participants through face to face interviews the study obtained different views when it comes to the above objective. In as much as the interviews were done separately some of the key positive impacts that were obtained were similar as shall be illustrated by the quotes obtained. These impacts are a combination of the perceptions of the key informants, learners and the pioneers of the digital skills program

4.4.1 Bridging the gender gap

Five (5) participants from both schools acknowledged the efficacy of the digital skills program. One of the five gave the below argument in illustrating on the digital skills program's ability to bridge the gender gap. An ICT educator from SOS said the following,

"*Yes, the digital skills program does bridge the gender gap however, we still have got grey areas. The short comings are we still lack man power to teach, we lack resources required to teach and digital skills are still new in teaching*"

Apart from the challenges that have been identified by the educator, they did acknowledge that the program is efficient in bridging the gender gap. In order for it to successfully do so there is still need for resources which shows a gap that need to be addressed as the program progresses.

In addition to the efficacy of the program in bridging the gender gap another respondent had the following to say;

"*It is a very important, program; it impacts very critical skills in this modern day and it is something that should grow and expand to capture every learner from every part of our country. Especially on skills such as coding, such as cyber security those are important concepts that affect our daily lives and are concepts which are in demand in industry and in other life skills so the Girls in STEM Trust is an important program hence it should get priority*."

A key informant from Girls in STEM Trust gave the following acknowledgement which is in line with what other educators put across,

"*Ï think the organisation had done tremendously well for itself because we have gone as far as Tsholotsho for the benefit of the girl child with digital skills. We have done a lot of programs which have been meant to bridge the gender gap as it is said that when you educate a woman you educate the whole nation. We are working really hard to try to also catch up with first world countries and bridge that gap as well, I am impressed with what we have done so far"*

The above argument also elaborated on the efficacy of the digital skills and the participant later on proved their familiarity with the program by identifying the skills in which the program has brought about as it aims to bridge the gender gap. On another note, the insights also given by GIST also indicate that by empowering women through the program the gender gap is being bridged and they seem to acknowledge that they are still work in progress as they have begun to reach out even to other areas outside the city of Bulawayo. The program's expansion also emphasises its effectiveness.

4.4.2 Improved learning environment

Key informants highlighted an improvement in the way of learning in their schools which clarifies the efficacy of the program. The school head from SOS Hermann Gmeiner had to say the following;

" *The program has improved the learning environment as the learners are doing what they like, so as they are doing the digital skills it becomes easier for them to access information and do things easy, and we are living in the digital world so we are moving with the times and the children like it*"

Whereas, most participants agreed that introducing digital skills is good at primary as it is important to catch the children at a young age, another participant gave the following elaboration on the learning environment that has been brought about by the digital skills in bridging the gender gap

"Digital skills are a necessity at primary level even before because you will realise that primary education is the foundation and, in this day, and age we need to introduce our learners to digital skills, to technology, early on like, catch them young. The good think about learners in primary school is that they already have interest so it won't be much of a challenge to bring them on board or to introduce them to digital skills concept because they already have interest.

Now in the digital world learners already have got some exposure, it's not like long ago when you would start to say "this is a computer, cyber security and stuff" those things would be so foreign, now learners are exposed, they already have the background hence they only need channelling, they need to be equipped but it is very necessary it should be introduced at primary school level even earlier. At SOS we are forced to be inclusive they don't segregate in in terms of the program, promoting gender balance".

The participants highlighted the efficacy of digital skills at a primary level and also identified the interest that learners have at primary level which has also been identified as a driver to successfully improvement of the learning environment as the gender gap is bridged. Girls have become exposed to digital skills because of the Girls in STEM Trust, an opportunity they are usually deprived of.

4.4.3 Positive attitude towards technological education and STEM careers among girls

The understanding that was captured from both the grade six and seven girls from both schools indicated that it is possible that girls take up careers that require digital skills .One of the grade seven pupils from SOS Primary school said the following and the contributions that were given by others built upon the argument below such as the issue of rights, the issue of equal opportunities as well.

"It is important that girls take up STEM careers because so that they also encourage other girls and people won't discriminate girls that they cannot do work that man can do once they are in the fields"

Learners from grade six also from SOS and Loch-view primary school were of the same line of arguments, one had to explain herself with an example by saying that;

"There is evidence of police women and they have not been discouraged to do those careers hence when it comes to STEM girls should have the opportunity and do what they want since there are a lot of jobs in the world."

This highlighted that the program is not just teaching girls digital skills but also contributing to the confidence of taking up careers in STEM so that digital skills are sufficiently applied and the gender gap is erased. This goes hand in hand with the social learning theory which upholds observational learning, imitation and modelling which once adopted behaviour is learned and adopted bringing a positive impact in the gender gap. The contribution of the

learner emphasized on the importance of modelling as a way of abandoning discriminatory behaviours towards girls and women. There is indeed a need for evidence of empowered women who also become role model and mentors for the upcoming generations.

4.4.4 Gender pay gap

A grade seven learner who was part of the focus group discussion indicated the importance of digital skills led by the Girls in STEM Trust and highlighted its impact on the gender pay gap. The respondent from the focus group seem to have understood that it's not just about equal opportunities but it has to start from acquiring the rightful knowledge which would then change the perspectives of the community on girls education;

"Girls should be digitally literate like most boys so that they can have the same opportunities as boys and they can build a living, for example when they get paid"

This indicated that girls are now knowledgeable that in order to get the same opportunities as boys they have to work for it, be exposed to the digital skills so this would not just bridge the gender gap but the gender pay gap as well thus a ripple effect as alluded above. The respondent proved to be aware of the gender pay gap that exist between women and man, its foundation is on the career choices that are made from an early age such as their current age.

4.5 Negative impacts of the program

In as much as the majority of the participants applauded the potency of the program in bridging the digital gap, other participants argued about the gaps that still need to be addressed from their standpoints.

4.5.1 Discrimination

Whilst most of the key informants proved to be in agreement with the program successfully bridging the gender gap from both schools, one of the educators from Loch-view primary school had the following argument

"*I really feel like I should thank this program because it has really assisted us a lot, these girls have actually benefited and have improved a lot because of the program. We used to record zero percent when it comes to ICT as a subject for girls but as we speak the girls are doing a lot of wonders.*

However, I don't think the program is addressing the gender gap in STEM education, I feel the boy child is some kind of being neglected and why is it the program accommodates girls only? We are now having challenges in class whereby when I am teaching ICT and answers are mostly coming from the girl child and the boys won't be participating because they also need to be empowered the same way as girls so I think there should be some kind of gender balance."

One of the key informants also said the following argument to say;

"*I think the program came a bit late, had we started earlier, I think we would be at a more advanced stage as a country in digital skills utilisation but still what is important is that it is now there."*

In as much as the majority acknowledged the program bridging the gender gap one of the educators proved to be worried about the boy child whilst the girl child is being empowered boys are now being left behind. The participant said this while looking at the situation at hand that the school doesn't have resources at all hence the program could benefit everyone once it is made to be inclusive rather than the boys being left behind.

4.5.2 Coverage

One of the learners gave the following explanation, that the digital skills program is open to girls, however not all programs are attended by every girl meaning that apart from the program excluding boys there is failure to benefit the majority but a few. The majority of learners from

SOS agreed with the statement whilst as for Loch-view the learners are new to the digital skills program and have also been exposed to counselling as they learn their practical.

> *"Mina ngikwazi iscratch kuphela yiyo esiyenza le GIST, ifinancial literacy angiyenzanga, kwahamba abanye" (*I have only been part of the digital skills program which involves scratch but I was not awarded the opportunity to attend other programs like the financial literacy*"*

The learner indicated also a loophole in the program which indicated the need for collaboration so as to reach out to the majority of learners, since it is not all learners attend the other programs conducted but only a few get a chance. This then can be said as something that affects other girl's attainment of the full package of the program which in turn have an effect on the quality of education and bridging the gender gap as a certain group is left behind, thus hindering its effectiveness as a whole.

4.6 Challenges that affect the promotion of quality education for girls in Zimbabwe

This objective assisted the researcher to allow the participants to outline the different challenges that they come across as they aim to promote quality education delivery for the girl child in Zimbabwe. The key informants first gave their own definition of quality education before identification of what they have observed as problems that hinder the program success.

4.6.1. Understanding of Quality Education among key informants

Before identifying the challenges that are believed to affect quality education the educators first gave their understanding of quality education which shall be identified below. This helped the research to find out the link between the challenges identified and the definition that has been given by the key informants from both the schools under study.

One of the social workers from the Girls in STEM Trust upon acknowledging that quality education is one of the pillars of the organisation had the following definition;

Quality education encompasses an inclusive environment in terms of educating the girl child. So, when we talk of quality education as GIST we talk of a holistic point of view whereby we don't just train the girl or the boy child but we also train the trainer, by trainer I mean the educator as well. If we train students alone and eave them the students are then left redundant doing absolutely nothing but if you include the teacher, it means they can carry on where we left off"

One of the educators from SOS Hermann Gmeiner described quality education as:

"*Quality education is impacting knowledge and skills to learners regardless of their learning abilities, their background their gender, at the end of the day every learner should be accommodated. I also believe that quality education gives learners critical skills, skills that they would use in solving problems in their communities, homes even at schools. Quality education should include technology. Technology is a very important component, when I am saying technology, I don't mean just computers but technology that is relevant in the areas that they are in, whether it is in Agriculture, Arts or Mathematics, hence quality education should have a component of technology*".

The school head also had the following definition to describe quality education:

"Quality education is not just education but it is education that has value, which equips children with relevant skills and knowledge that they will use latter and rather than just teaching them useless things that will not be relevant in their future, Quality education is that kind of education that involves the learning which is inclusive of the ICT gadgets"

A participant, the deputy head of Loch-view Primary School identified quality education as follows;

"Quality education is education that has value, that adds value to a person and makes someone a better person and it brings change in a person, in the community and in the country at large."

The researcher deducted from the definitions that all six key informants from both the schools had an almost similar thought on defining quality education. From the above definitions on quality education, the similarity in the definitions that the educators gave it is evident that in as much as they were interviewed separately and they were not aware of the questions this brought about first-hand information on their perspectives as key informants. Hence quality education from the combination of the definitions does not just involve learning for the benefit of the current but it has to mould learners for future experiences, professions and be adaptable to the changing technology and it is inclusive. Quality education has to be impactful for all learners, everyone must progress together to avoid any bias in its fulfilment as deducted from the key informants.

4.6.1.1 Resources inadequacy

Most of the key informants highlighted resources inadequacy as the main impact of quality education delivery for girls in Zimbabwe. In order to elaborate on this challenge one of the Loch-view Primary School educators had to say the following:

"We have shortage of infrastructure when it comes to education, a lot of schools lack infrastructure, as you can see you found me having a lesson outside with these learners, so learners are crowded in one place, we don't have enough furniture to seat on, and they only have desks to use. We also lack ICT gadget on their own, like in this school we don't have a computer lab, we don't have laptops and almost every learner in this school they don't know how to switch on computers which affect the quality of education"

In addition, to inadequate resources to promote digital skills most of the learners, from the 4 groups from both schools only 2-3 in each group had access to a computer at home, one group from both SOS and Loch-view primary had none, with the group agreeing with what was said by a certain grade 6.

> *"Mina ngingafika endlini ngiyabala ama notes kuphela esiyabe siwaphiwe esikolo ngoba angila laptop lasendlini akulamuntu ole laptop"* (When I arrive home, I only read the notes that we would have been given because I don't own a laptop and at home, no one does")

To add on the challenge of resource inadequacy one key informant from Girls in STEM has also to highlight the depth of the challenge in the eyes of the organisation by saying that;

> "*When it comes to Loch-view we have the challenge that they don't have computers at all, so now we have to go to the school with our resources but thankfully to our sponsors who provide us with resources, but they are also not enough as you would find that the kids have to share so the impact is not really effective as you would find out that one child out of three is the one who is actually using the computer whilst other are just watching*"

Therefore, the above perspectives indicate that indeed in as much as the schools are trying their best to involve the girl child in digital skills literacy, most schools continue to be left behind when it comes to digital skills literacy as it is hindered by resource shortages for the practical part. However, the arguments that where given indicated that Girls in STEM Trust have filled that gap especially in Loch-view Primary school by bringing in computer to elevate digital literacy in as much as the organisation itself is facing the challenge they have tried to make use of the little resources to accommodate a lot.

4.6.1.2 Gender based discrimination

Gender based discrimination is yet another challenge that has been identified by one of the key informants as they had the following to say based on its effect on girls' education:

> "*I believe that gender discrimination affects quality of education delivery for the girls in Zimbabwe which has resulted in less opportunities like in education and employment compared to boys"*

The above can be indeed said to be still prevalent as also another learner identified that they have witnessed discrimination when it comes to career choices by the following which was said to them.

> *"Some boys in class discouraged me from being an engineer because they said it is a boys profession but I said to them that in this time I can because it's no longer the old days were girls couldn't but in the modern days they can*"

A grade seven learner also said that:

> *"My father had discouraged me to become a computer hardware engineer because hard labour is not for woman but man*"

The majority of the respondents from both schools indicated that they have in some point been discouraged in taking up digital careers/ STEM careers by their parents, some by their relatives, siblings and peers.

4.6.1.3 Cultural expectations

One of the educators from SOS also highlighted that cultural beliefs can be considered to be a challenge as well that affects girl's education as he argued the influence of culture in how girls are treated in their homes which then shapes their perspective on the subject they would want

to do when it shouldn't be the case but what they choose should in line with their passion. The respondents said the following:

> *"Certain areas are dedicated to certain group of people and usually that allocation doesn't include girls. That is an area which really need to be attended to. These cultural expectations start from home because you will see that boys are allowed to change a channel, to use smartphones whereas girls are told that they must be sweeping, they must be doing dishes so there is seclusion and that seclusion comes into schools*"

Another educator was of the emphasis that,

> *"When it comes to culture there are certain aspects that needs to be attended to make sure and to be made mandatory that girls must have access to digital skills education otherwise girls will remain at a disadvantage."*

The above arguments indicate that when it comes to digital literacy and education as a whole the girl child is still moulded at home not to take part in certain duties but maintain the ones that are expected by their culture. So basically, culture contributes to career choices of the girls as they grow up.

A grade six pupil from Loch-view primary school further elaborated on the issue of culture by arguing that:

> "*Backward beliefs for example, if culture says that boys are the ones who are supposed to go to school it affects the career choices of girls"*

The awareness that was given by the participant indicated that there has been a shift of cultural discrimination when it comes to the education sector, having programs such as the GIST digital

skill program has included girls in promoting the achievement of quality education in both schools.

4.6.1.4 Student participation

One of the key informants from Girls in STEM Trust gave their concern on student's participation and application on what they would have learnt in their absence. The argument was on whether

> *"When it comes to SOS, the resources are available but the challenge is that we are not really sure on whether once we leave, do the learners continue with the practice of what they have been taught or not"*

From the insight that was obtained from the learner, the majority indicated that they are not able to practice what they have been taught at home due to lack of equipment, at times parents limit them from using digital devices whilst at school they are only allocated a few minutes slot for ICT which identifies that digital skills practice is mostly done with the organisation.

A key informant had the following to add;

> "*In rural areas, some of the schools that we have visited you will find that the educators would tell you that some of the children do not actually come to a school due to menstrual health situations, it can be a week, so you would see that they are already missing out on a week's worth of work whilst the boy child is at a much better advantage so that is when we find out that when a school has low pass rates the majority of the girls are present"*

The participant's view indicated that at time the girl child's unique challenges can also contribute to failure to excel in digital skills or STEM as they attain low marks due to missing a number of lessons, thus leading to the prevalence of discrimination.

4.6.1.5 Electricity cuts

One of the respondents from the organisation out of eight had to identify that electricity is a challenge and it is affecting the progress of the learners especially with Loch-view primary school.

> "*You know when you work in the tech field you need your tech equipment, you need electricity. So once there is no electricity for that particular day it means that a lesson is lost so that becomes one of our greatest challenges"*

This indicated that in areas where electricity is not stable as indicated the digital skills program becomes affected also affecting the empowerment of girls as once there is no electricity of substitution in a school, they would remain a gap hence a need for an alternative.

4.7 Measures to improve STEM education in Zimbabwe

Guided by this objective the researcher managed to acquire information from the respondents on the measures that has been done by the schools in a bid to promote quality education, thus sustainable development goal 4 ever since it was implemented. The respondents were also awarded an opportunity to suggest measures that they believed could improve their current situations and address quality education delivery for the girl child as they addressed the government and non-governmental organisations.

In order to solve the challenges that the schools identified as affecting the girl child's education advancement through the digital skills program the educators highlighted a number of measures that have been of effect in their schools. This help the research to identify that the schools had not been idle, just observing the challenges as they acknowledged their efforts.

4.7.1 Infrastructure development

An educator from SOS highlighted to have been taken seriously by their administration as a way of improving girl's digital literacy and for the benefit of the whole school. The following was said;

> "*As a school we had a challenge of limited resources, so when I came here, the first thing I had to advice my administration was that for us to be efficient, for us to be productive in educating our learners in technology we need to improve what we have so we ended up having this new lab, we now have two computer laboratories*."

The educator elaborated on the above by saying that;

> "*Also apart from infrastructure development, me being here is part of the expansion because we initially ha 1 ICT teacher, however now we have two in the school"*

As illustrated, the primary school managed to increase their infrastructure in order to improve the learning environment for their learners. However, this can be said not to be the so with other schools as they face resource shortages which hinders room for improvement maintaining a poor education delivery which mainly affects the girl child at the end of the day expanding discrimination in career choices and education environment as a whole.

4.7.2 Collaborating with Girls in STEM Trust

Two educators, one from SOS Hermann Gmeiner highlighted that collaboration with Girls in STEM Trust has been a measure that they have adopted in improving the learning environment for the girls as the organisation encourages them to be involved not just in technology but Science fields, Engineering and Mathematics fields something that they have been deprived of for a long time. The following was said;

"We also have the ICT computer club which came to existence because of Girls in STEM Trust. I remember last year we had discussions with GIST so that they also come and assist us so that we improve our digital skills education."

"We have even attended the Robotic Expo in GIST where we were doing heckathon that was a good program for our learners as the girls got a world's view on how technology is used and how to use technology in solving problems and interact with professionals in the industry"

This indicates that apart from the digital skills program there is a lot of interaction that has been of benefit to the primary school and it also proves that the organisation doesn't solely focus of empowering girls in their school by coming in with digital literacy but they have also exposed girls to the industries in which they are often discriminated such as in Sciences and Engineering by allowing them to interact with other professionals as well which is in line with the modelling, observational learning of Albert Bandura 'social learning theory which is the foundation of this study.

One of the educators from Loch-view Primary School was of similar demonstration as she indicated that

"*The school has allowed our girls to engage and attend the digital skills program despite the normal learning hours. The school has also afforded the girls the opportunity to take lead when it comes to digital literacy instead and of depending on boys hence the girls are taking lead in the front seat of technology"*

4.7.3 Educating learners on gender discrimination

Both the primary schools indicated that both the girls and boys are now educated as a way of erasing discrimination so that girls participate sufficiently in technology and science subjects. The heads of both schools gave their opinions as follows

"With *us (SOS) we have a gender policy so from time to time we have gender sessions whereby we talk to the children, the girls and boys that all children are the same hence they shouldn't look down upon each other in terms of gender when it comes to their education*"

In Loch-view Primary the head also had the following to say;

"The school encourages, learners; we talk to them as they learn together and encourage equal opportunities for both sexes"

As indicated, both the schools indicated the importance of learning for the learners by impacting their cognitive abilities which would have been corrupted by culture and other factors that rejuvenates discrimination among learners. Both girls and boys learn to unlearn discriminatory behaviours which indeed is a significant measure to improve digital literacy among girls in Zimbabwe.

4.7.1.4 Involving parents

One of the primary schools' educators indicated the need of involving the parents when it comes to improvement of the girl's learning bas a measure that has been adopted by the schools. Such an action done by the school indicated that they were aware of the importance of the involvement of the family as the primary empowering environment. The other two respondents also highlighted on why parents should be involved in the journey of education for their girl child. The respondent had said that:

"*With us as a school we talk to parents from time to time so that they give children equal opportunities, girls are equally important and we also as a school offer sanitary wear so that if the parents did not buy at home the child knows that at school, I am a bit covered."*

Thus, involving parents to improve STEM education for girls has been proven to be important. This is also in line with one of the arguments that was given by a certain girl in grade six on that she has been discouraged on doing certain careers by their parents. They said the following

"My father told me that I should follow their footsteps and become an electrician like him"

Another educator gave the following argument on clarifying the importance of involving parents in the education of their children

"Parents should expose their children to programs that develop their children in learning technology, they should acquire resources if necessary, such as computers because the problem we are currently facing is that leaners just get exposed at school and when they go home the flame is extinguished. So, it is always a cycle of trying to resuscitate when schools close, we start again and we really don't make progress"

Hence once parents are enlightened as well it is a helpful step to the girls as the parents are the first educators for every child before school hence the importance of collaborating with parents as indicated by one of the schools under study. Involving parents can also lead to the acquirement of resources to improve the learning of the girls as they shall are likely to be given access to digital equipment just like boys as long as parents are knowledgeable on the opportunities available and the need for digital literacy.

4.8 Suggested measures to the Government and NGOs

The key informants also managed to highlight measures that they believed need to be considered by the government in order to improve the programs that are already there supporting girl empowerment.

4.8.1. Equip educators

Equipping educators was yet another suggestion that was named by one of the key informants upon observing the absence of ICT educators in some schools which then affects the quality of education delivery and achievement for girls. The key informant's suggestion below;

> "*The government has really done well in having digital skills to be part of the curriculum but more still needs to be done in having teachers are adequately skilled and schools especially rural areas to be equipped with necessary devices, necessary technologies and necessary access to the internet because digital skills largely rely on the access to the internet*."

A learner from Loch-view Primary school was also of the same view as she gave a suggestion that;

> "*Asila mbalisi wama computers, so sifunda ama computer nge Friday kuphela ma kubuye iGirls in STEM ngoba baya buya lama computer futhi eskolo akula*" (We do not have a computer qualified teacher, so, we learn computers on Fridays only with the coming of Girls in STEM Trust as they bring us computers to learn from, since we have none at school)

The learner suggested that, the school should find them an ICT teacher because currently there is none, they only learn much of ICT with Girls in STEM on Fridays. This indicates that there is still a need for the enrolment of ICT professionals in primary school. This should be prioritised in order to reinforce quality education in primary schools.

4.8.2 Partnership between Government and Corporate Sector

One of the key informants outlined partnership between the government and corporate partners as a measure that could improve the delivery of quality education for girls in Zimbabwe. The key informant said the following;

"I suggest that the corporate world should chip in and partner with the government and other organisations to see how they can equip schools and also as a result equip girls because we have seen that girls tend to be disadvantaged.

Also technologies that promote digital skills should be made available to the schools, the corporate world has a part to play again there because it is the corporate world that feed from schools at the end of the day, as it will need graduates that are digitally enabled, that they have got the skills they require, so they should invest if they want to harvest"

One of the grade seven learners from Loch-view primary school also gave a suggestion in line with the above by asserting that

"*The school should buy computers for the upcoming learners because and built a computer lab because when doing ICT we do it in class it is only now that Girls in STEM Trust brings us computers in class"*

The key informants highlighted the need of equipment as a driver to the success of promoting quality education through digital skills program. A successful measure once the government collaborates with other willing partners**.** The key informants indicated the importance of investing in the education sector, if the industry requires digitally literate workforce or educated women, they should have an input so as to get the desired employers who are in line with the changing technologies.

4.8.3 Sensitisation programs

Key informants from both schools had the suggestion of the implementation of sensitisation programs which could educate the communities in which girls are nurtured not to discriminate but invest in girls' education as much as boys so as to empower their self-development first which will empower them to empower the nation as well. The following was said:

"I think the government can go on sensitisation programs especially on the poor communities, they should engage the communities, community leaders, and the parents so that they value educating the girls and also providing sanitary wear for girls."

Another key informant elaborated on with the involvement of parents as well in the learning of the girl child.

"My suggestion would also include parents at home, parents, especially us African parents, we really do not do much to support our children in their school activities, let alone in technology. Hence parents should be very involved in the learning of their children and support in collaboration with schools, communicate with their teachers and attend to activities that align to the learning of their children and support"

The suggestions given above, further elaborates on the issue of involving the family and the community when it comes to the desire to promote quality education for the girl child, which doesn't only benefit them currently but in their future as well.

4.8.4 Positive Reinforcement

One of the key informants from Girls in STEM Trust identified a positive reinforcement strategy that is implemented by the organisation in order to encourage them to take up Science, Technology, and Engineering and Mathematics careers.

"The community should include educational competition to motivate girls to be part of the STEM curriculum, as GIST we have been hosting inclusive competitions such as the African Code Challenge whereby, we encourage girls to identify problems that we are facings a nation in Zimbabwe and come up with possible solutions through scratch programming language"

A grade seven learner also supported this view by saying that;

"The school should create competition for us so that we learn more of science and technology"

The above statement indicated that there is still need for girls to be encouraged as a way of motivating them, in that way the digital gap might be bridge between the girls and boys as they also desire to take part in technology. Thus, such activities also promote quality education as girls would be involved in all aspects of learning. This is also in line with the positive reinforcement that Albert Bandura emphasized on in the social learning theory as a way of learning behaviour.

4.8.5 Policy and program follow-up

One key informant acknowledged the need for the government and non-governmental organisations to follow up on the programs and policies that are put on paper to empower girls along with other inclusive programs when it comes to monitoring the quality of education. One of the following;

"The government and Non-Governmental Organisation should make sure that the policies which have been put now and that shall be put in future so as to ensure that the programs are of benefit"

The participant indicated the need of follow-ups in every program that is implemented so that where there are gaps, they may be filled as the program goes by as a way of maintaining its effectiveness. This would also help in adding more programs as a way of improving quality education as the highlighted programs seem to be few. A strategy that would succeed once the government and NGOs continue to work together for the betterment of the leaner's future through policy and program follow ups.

4.9 DISCUSSION OF FINDINGS

The research focused on examining the efficacy of the Girls in STEM Trust digital skills program in achieving quality education in Zimbabwe a case study of two primary schools that are based in Bulawayo that is, Loch-view Primary School and SOS Hermann Gmeiner Primary School. The researcher was guided by the following objectives; to evaluate the efficacy of the Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education in Zimbabwe, followed by, to explore the challenges that affect the promotion of quality education for girls in Zimbabwe and lastly; to determine the measures that can be utilised to improve STEM education in Zimbabwe. The researcher managed to interview a total of eight key informants as was intended by the research whereby 3 were representatives of each school. The research also obtained information on the efficacy of the program from 2 key informants from the Girls in STEM Trust along with 15 learners who gave their opinions through focus group discussion that were conducted according to their grades. The researcher was guided by the objectives in interviews as well as in the focus group discussions and the data that was collected became the evidence for the validation of the sub themes that were withdrawn from the participants.

The first objective that guided the research focused on finding out the efficacy of the digital skills program in bridging the gender gap in STEM education. Upon presenting the findings the researcher found out that apart from the gender gap that exist in digital skills between the girls and boys there are also inequalities that exist between schools that have had an effect in the quality of education being delivered for the girls. These inequalities are widened by resource shortages. An example is with the primary schools that were under study that whilst one primary school had a challenge of not few but none digital equipment whereas the other sufficient digital equipment these affects the quality of education that is being delivered in each school not just for girls alone but all the learners. Although, Madhlangobe and Madhlangobe

(2014) asserted the same challenge as they argued that there are inequalities that exists between private and public schools which affect the quality of education apart from availability of material resources, the researcher managed to witness such form of inequalities that they are still in existence hence a need for aid as schools have unique challenges. The researcher then understood the efficacy of the digital skills program that it does not bridge the gender gap between girls and boys but it has also worked on bridging the gap that exists in schools so that quality education is achieved for all as education is the right for all.

Moreover, the researcher had to learn from both the schools that were part of the study by observing what was said by some of the key informants and what was already happening around them. Resource inadequacy, in form of furniture such as classrooms shortages also expanded the issue of existing inequalities amongst school such as the ones under study. Whilst some learners would suggest for an increased time to Sciences and ICT slots others could argue that they don't have the labs, the qualified ICT teacher or the equipment which hinders the quality of education among learners. This proved the effectiveness of Girls in STEM Trust digital skills program in bridging the gender gap by coming on board and allowing the learners who are limited to a theoretical form of education to a practical one which is a significant aspect of quality education as the educators elaborated.

Albert Bandura's Social learning theory was relevant in the findings that the research obtained as, it reflected the link between observational learning and reinforcement as a way of motivating the girl child in taking up digital skills program in order to bridge the gender gap. Manik, Sembring and Pedang (2022) clarified the social learning theory observational stage as essential in reinforcing a certain behaviour as it is through observing behaviour of a real person, followed by verbal instructions. This has been applicable as presented in the data that was obtained from participants. The digital skills program requires observational learning and practical follow upon what would have been instructed, learner's views have indicated the

impact of observational learning whereby the researcher found that girls desire to be like successful women in the fields of technology and STEM as a whole, as they said if they can we can. Thus, combining what they observe in the school environments and outside the environment has made it possible for the historical perspectives to be erased or abandoned as they are positive talks that are fed into their mind thus also contributing to behaviour change towards digital skills as was indicated through the findings.

To add on, according to Albert Bandura imitation is described as one that has to do with one's ability to replicate a behaviour, this has been in line with research as is has been evident that upon teaching the girls computer literacy they are required to apply what they have learnt through the scratch application on a program called the Africa Code Week Challenge that has been identified by respondents. This goes hand in glove with the theory, which indicates its relevance with the evidence that has been presented.

Whilst the majority where of the same agreement that the digital skills is bridging the gender gap the researcher discovered a concern on the boy child whilst most programs are said to be for girls. The fact that boys are beginning to have low marks as compared to the girls can be said to promote discrimination but not on the girls' side but the boys. In as much as the organisation indicated the presence of some inclusive programs like the World Robotics Olympiad which was highlighted by the respondents boys are left behind which could also rejuvenate a need of the boy child to be empowered in future by boy led organisations, thus creating a cycle of dependency. This was evident to researcher in one of the schools under study that apart from the school having no computers, girls are the only ones who are being accommodated which then leaves one to ask on what would happen to the boy child coming from a disadvantaged background, where the only hope is to get everything from school for the securement of their future.

To expand on the above, much focus on the girl child in a school that already has poor quality of education due to resources inadequacy and other reasons discriminates the boy child could be a root of another problem that may lead to the need of boy empowerment programs as it has been noted in one of the schools that the exposure to digital skills to girls only has led to them outperforming the boys because while they have gained knowledge the boys are left without the knowledge at all due to poor backgrounds which they come from already. This could produce a generation of dependencies as they would require empowerment over and over again hence involving the boys in such disadvantaged backgrounds would support equal opportunities. OECD (2012) 's line of argument is of similarity with the findings as they argued that children's life chances are strongly influenced by the quality of their education as there are certain skills that they need to have acquired in order for them to contribute in the development of the society in which they come from. As it has been obtained through the literature and the findings from respondents the world is becoming more and more digital, so are the job markets so are most opportunities. Thus, a need to priorities boys as well along with girls so as to exclude discrimination as they grow up understanding that girls are capable of being involved in certain fields of work such as STEM as they attained good results with the same learning material acquired by every learner.

The second objective that guided the research was based on finding out the challenges that are usually encountered in both schools which hinder the quality of education of the girls. The researcher was exposed to a number of challenges that are said to affect quality education delivery for the girls. Some of the founded challenges were resource inadequacy, gender-based discrimination, cultural expectations, students' participation and electricity cuts. These challenges that were identified, it was observed that they affect both the schools and the organisation that brings in digital skills differently. It has been evident that in order for a program to be effective there is need for the beneficiaries, the schools to meet halfway with the

pioneers of any program that requires hands on interaction. This has been observed so because from the finings the organisation was also affected by the girls out numbering the equipment which led to learning in a ratio of 1 computer is to 3 learners. If a school is found with a limited number of computers adding on would be much better as the goal is to promote quality education, having every learner to gain the same experience when using any digital equipment. Thus, this goes in line with the issue of collaboration of organisations in a bid to achieve quality education for the girls.

Under the second objective, there was also a same line of argument between key informants in understanding what the term quality education encompasses. The research was guided by the definition of quality education by Hammond (2013) where he identified it as constituting of learning resources, technology, program enrolled, modules done, lecturing methodology, qualifications and co-curricular activities. Most of the aspects identified are in line with the arguments that were given through the findings of the research, of most importance the aspect of qualifications, where one finds a teacher not qualified in a certain subject like the ICT educating learners on that particular subject it the hinders the quality of education for the girl child which would also have a negative effect on their future as girls. Upon combining the different definitions that were given by the participants, when it comes to quality education theoretical learning is not irrelevant once it is accompanied by the practical part in STEM which are also supported by modern technologies and equipment. This could benefit not just the individual but the community and country at large once such skills are instilled in them. It has also been identified through the research that once the education in primary schools is quality and it proceeds its advancement to secondary school then out of the identified challenges such as discrimination in certain subjects or in digital skills learning for the girl child would be erased. Therefore, it can be concluded that the fulfilment of the SDG 4 of quality education is still work in progress in Zimbabwe as illustrated by some of the named challenges.

The researcher also learnt of the uniqueness of challenges that exist among girls in Zimbabwe which the boy child is not exposed to, as identified by some of the key informants which is that of the girl child's menstrual health. Key informants identified that some of the girls fail to attend school normally because they could lack sanitary wear which intern affect their school performance. This challenge has been identified and found a solution for by other schools although some continue to be stuck in such a dilemma. The research thus discovered the importance of investing in girl's education through collaboration of the government with the corporate world so as to get the desired work force. Carvalho and Cameron (2023) alluded that in order for education to support empowerment schools and communities should function as empowering environment. This has been evident in one of the schools under study as they discovered a challenge and a measure of making sure that what affects girls 's attainment of quality education and not leaving them behind is catered for through the provision of sanitary wear which exposes them to similar opportunity of learning in the classroom. In this case in order to acknowledge the quality of education for girls in Zimbabwe the input of resources such as computers and other needs for its achievement should be catered for.

The last aim of the research was to find out from the participants measures which they believe could improve quality education for girls in Zimbabwe. As a measure to improve quality education, the researcher identified the involvement of the family, community as one of the important measures to uproot the causes and effects of gender discrimination, cultural expectations amongst others. Since the family, community are the first educators of their children it is indeed important that they be involved in the change of the mind-set of having to categorise career choices of the girls and also upon close supervision support the girls with technological equipment from a young age which has an input to their cognitive development. This concurs with the measure that was given by Carvalho and Cameron (2023) which says that communities and schools should function as empowering environments in order to

improve the quality of education delivery for girls at a global perspective. Kauser and Awan (2015) also gave highlight that educating girls is like educating a mother as they are to educate their children during the first six years of their life. This strongly emphasizes that community involvement is indeed important in erasing the effects of gender discrimination. The researcher got to understand that rather than addressing the effects through bringing programs to empower the girl child this does not erase the root causes of the effects but it only pacifies them thus addressing the environment in which girls come from and maintaining that as they grow up would change the negative mind-set as indeed observation is a learning input hence it is effective when positive behaviour is maintained.

Extracted from the response that has been given by the learners, the research identified an ignited interest of partaking in the STEM fields of study due to the exposure to digital skill. The majority of the girls when they were asked for the profession they desire to take up due to the exposure to the careers, more than half of them identified STEM careers and displayed knowledge on why it is important for them to do so. Some have gained the confidence to put aside the discouragements that they come across to say, girls are capable, it is girl's right to do this and that. The researcher came to an understanding that the digital skills program does not just focus on the practical way of doing ICT but the girls are also exposed to mentorship and counselling during their lessons from the organisation and their schools and other programs as well that were highlighted such as the World Robotic Olympiad. It is not just about knowing how a computer work or the different programming language but it is also much about having girls to experience the fields in STEM, how things work or are made is STEM fields. Thus, the program is effective in implementing quality education, in that what the government or schools are failing to achieve due to a number of factors they have come in to feel that gap.

The research also obtained a need for program and policy follow up as a measure to improve the quality of education for girls in Zimbabwe. This was identified so as the improve programs

that are implemented for the achievement of quality education. Mazaruse, Nyagadza and Makoni (2022) are of the acknowledgement of the efforts that have been put by the government in improve the quality of education through the implemented provisions such as the Zimbabwe Education Act and Disabled Persons Act amongst others. Mukumbiri (2018) became of the similar perspective with Mazarunge, Nyagadza and Makoni by highlighting the NDS1 which he also suggests that implementation has been a challenge which needs to be considered. However, it has not been following up on the approaches that were implemented on whether or not inclusive education has been achieved from independence up until this date. Therefore, a link between the existing literature and the findings that was obtained through this research as already illustrated in the issue of policy and program follow-up.

4.10 Chapter conclusion

This chapter successfully presented the demographic information of the respondents of the research and presented the findings of the research as they were obtained from face-to-face interviews and focus group discussions. The research presented the findings as they were guided by the research objectives which identified the challenges, measures and efficacy of the digital skills program in girl's attainment of quality education. Prior to the conclusion of the chapter the findings were also discussed on their own section, this was also done according to the objectives.

CHAPTER 5: SUMMARY OF FINDINGS, RECCOMMENDATIONS AND CONCLUSIONS

5.0 Introduction

This section provides a summary of the research finding on the efficacy of the GIST's digital skills to quality education amongst girls in Zimbabwe. It outlines the conclusions obtained from the research findings. These are related to the efficacy of the digital skills program in bridging the gender gap in STEM education in Zimbabwe, challenges that affect quality education in Zimbabwe and Measures to improve the STEM education in Zimbabwe. Additionally, the chapter highlights the recommendations which may be useful for the furtherance of this study under quality education progress in Zimbabwe. This information could be useful to the organisations that are working with the government in the education sector so as to identify gaps that need to be addressed in schools making sure that every program is highly effective.

5.1 Summary of findings

The former chapters introduced the topic under study outlining the background of the study, the literature review, the methodology, data presentation and analysis of the findings that were obtained upon a conduction of face-to-face interviews and focus group discussions. The study aimed to examine the effectiveness of Girls in STEM Trust's digital skills program in promoting quality education in Loch-view Primary School and SOS Hermann Gmeiner Primary School as the research's case studies. Three objectives guided this study which are: efficacy of the Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education, followed by the challenges that affect the promotion of quality education for girls in Zimbabwe and lastly measures that can be utilised to improve STEM Education in Zimbabwe. The study focused on obtaining in-depth information from the participants as it was

a qualitative guided study. Qualitative data was obtained through focus group discussions which were conducted with two groups per each school and face to face interviews which formed the number of key informants. A total of eight key informants were interacted with from the Girls in STEM Trust and the two schools under the study through purposive sampling technique while voluntary participation was applied in the formation of focus group discussions. The social learning theory of Albert Bandura was the template of the study.

5.2.1 Efficacy of the Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education in Zimbabwe.

As deduced from the findings, the digital skills program's effectiveness has been credited to the scratch programming, introduction to ICT, World Robot Olympiad and mentorship which has brought a unique approach to the way girls have been excluded from digital skills. When it comes to the digital skills program in bridging the gender gap in STEM education in Zimbabwe the research discovered that the Girls in STEM Trust has contributed to a greater extent when it comes to improving the learning environment for the girl child. This has been noticed through the information that was displayed by the participants under this objective from both key informants to the focus group discussions. The research identified that the digital skills program has been successful in bridging the gender gap in digital skills through improved the learning environment, ignited a positive attitude towards technological education and STEM careers among girls and lastly closing the gender pay gap. However, discrimination and coverage were identified as loopholes that are seen through the program.

5.2.2 Challenges that affect the promotion of quality education for girls in Zimbabwe

The study revealed that some of the challenges that were identifies whilst the government and the non-governmental organisations like Girls in STEM Trust in the case of this research were resource inadequacy, gender-based discrimination, cultural expectations, student participation and lastly electricity cuts. These challenges indicated that whilst there is an effort of improving

the quality of education in both schools they remain present and they need to be addressed so as to progress in achieving quality education. Upon the identification of the latter the researcher became enlightened on the uniqueness of challenges that the schools under the study experience.

5.2.3 Measures that can be utilised to improve STEM Education in Zimbabwe.

The research brought out that that the schools were trying their best in reducing the prevalence of some of the stated challenges. Some of the measures that were put in place were: infrastructure development, collaborating with NGOs such as Girls in STEM Trust, educating learners on gender discrimination and lastly involving parents in the educational journey of their child. On the other hand, apart from the efforts which have been put in place as measures the participants also gave suggestions to the government and NGOs so as to promote collaboration in the achievement of quality education. Some of the measure equipping educators, encouragement of partnership between the government and the corporate sector, sensitisation programs, positive reinforcement and policy and program follow-up. Thus, the measures to improve STEM education in Zimbabwe as a whole.

5.3 Conclusion of the study

Deriving from the research findings the study concluded that:

In order for quality education to be achieved there has to be sufficient learning equipment that encourages practical application of the skills that would have been attained through theory. Once theory is not accompanied by practical's it is most likely that girl would deviate from pursuing technological careers as they would find them suitable for boys only as they could be the only ones found with suitable knowledge as the society strongly supports that STEM should be for boys. This would leave the girl child with more room of negativity as they would also not get a chance to be counselled, encouraged in pursuing STEM. The success of bridging the

gender gap is in first sharing knowledge with the affected group so as to erase the societal perceptions which has shaped the way they view technological careers disqualifying female figures by the look of what is around them.

The study also concluded, the desire to achieve quality education for the girls should not only be left to be a school burden but the parents at home should be involved and the communities in which the learners come from. This could help school in successfully producing quality learners through the quality education which would have been instilled in the girls hence quality workforce input. As it has been indicated that quality education doesn't only include the learning equipment alone but is also inclusive of the participation of both the female and male learners' regardless of their gender, race or nationality.

5.4 Recommendations

The aim of the research was to identify the effectiveness of the Girls in STEM Trust's digital skills program in achieving quality education in Zimbabwe, with Loch-view Primary school and SOS Hermann Gmeiner being the areas under study. Thus, this section is to highlight the recommendations that could help in improving the digital skills program and the gaps that might need to be filled by other organisations as the schools journey to quality education achievement. The recommendations are as follow:

- There is need for continual involvement of the parents as they work with schools to reduce discrimination whilst the Ministry continues to collaborate with Non-Governmental Organisations so that they are awarded a proper platform to display their services for the benefit of the learners. This could also help in program allocation having the two meeting halfway when it comes to resources as some NGOs are still growing and share limited resources which affect their progress.

- Following up the programs that are put in place as a way to benefit the learners, making sure that they are benefiting the learners. This could be done by separately finding out the progress of learners and their perceptions so as to identify loopholes that may need to be addressed as the programs on goes. This applies to the government as they approve the programs before their implementation and the NGOs as they are the facilitators.
- There is need for background check before implementation of any program in schools so as to identify the inequalities that exist among boys and girls and address them sufficiently. In cases were both boys and girls are deprived of certain rights such as failure to attain practical education due to resource insufficiencies they should also be involved so that they are not left under the category of discrimination but rather they should both get equal opportunities that leaves not the other learners behind because the aim is not that girls over empower boys but to get equal learning opportunities which could also be of significant in their field of study. Thus, this would reduce the going back and forth movement to empowerment in achieving quality education.
- NGOs that offer multifaceted programs in schools should also consider following the programs separately, in order to understand their impact towards their main goal.
- There should be continual advocacy for quality education which also support the inclusion of girls in the STEM field until the labelling of STEM as a field for boys is erased through having more female figures in the fields as they are the future mentors for the coming generations.
- The NGOs should consider reaching out to the rural located schools so as to make sure that quality education is not identified per school but it becomes achieved as well in rural areas. This could erase the inequalities that exists among schools awarding every learner the opportunity to acquire the same job opportunities those learning in urban based schools as they would have acquired the skills.

- There is need for collaboration in every school program so that the curriculum that are put in place as a way of achieving quality education so that different organisations can bring their expertise in order to complete the cycle of quality education since it is a global phenomenon (SDG 4) that the governments are looking forward to achieve.

5.5 Chapter Summary

In summation, this chapter has identified the summary of the research finding through identifying the conclusions that were deduced from each objective. The chapter successfully identifies the effectiveness of the Girls in STEM Trust's digital skills program, the challenges that have been encountered in achieving quality education along with the measures for the listed challenges. Upon identifying the conclusions objective by objective the chapter also introduced recommendations for the Government, NGOs along with other partners who are interested in promoting quality education for the girl child, encouraging the need for equal opportunities in every field. Some of the addressed recommendations are follow-up on programs in schools, background check in schools before offering services, involvement of parents un their children's education, reaching out to rural schools as a way of promoting equality among schools and collaboration with more sectors that could bring in different strengths in the achievement of quality education as it is amongst the crucial SDGs. Thus, the suggestions of this research are meant to highlight the progress so far when it comes to the fulfilment of the SDG 4 on quality education, a highlight to the NGOs, the Government and the Schools under this study.

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APPENDICES

APPENDIX 1: Permission Letter

FACULTY OF SOCIAL SCIENCES & HUMANITIES
DEPARTMENT OF SOCIAL WORK

P. Bag 1020
BINDURA, Zimbabwe

Tel: 263 - 71 - 7531-6, 7621-4

Fax: 263 - 71 - 7534

BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 22/11/2023

TO WHOM IT MAY CONCERN

RE: REQUEST TO UNDERTAKE RESEARCH PROJECT IN YOUR ORGANISATION

This serves to introduce the bearer, JACKSON OPRAH M, Student Registration Number B2000818, who is a BSc SOCIAL WORK student at Bindura University of Science Education and is carrying out a research project in your area/institution.

May you please assist the student to access data relevant to the study, and where possible, conduct interviews as part of a data collection process.

BINDURA UNIVERSITY OF SCIENCE EDUCATION
SOCIAL WORK CHAIRPERSON
22 NOV 2023
FACULTY OF SCIENCE EDUCATION
PRIVATE BAG 1020, BINDURA, ZIMBABWE

Yours faithfully

MR L.C Nyamaka
Acting Chairperson - Social Work

APPENDIX 2: Consent Form 1 (GIST)

Consent Form for Girls in STEM Trust in carrying out the research and in participation

I, Samantha Muwanwa, in my capacity as Administrator at Girls in STEM Trust , have read and understood the research topic of the following student: Oprah M Jackson B200081A which focuses on "***The efficacy of Girls in STEM Trust's digital skills program in achieving quality education in Loch-view Primary School and SOS Hermain Gmeiner Primary School***".

I acknowledge that the above mentioned are the schools which we work with in delivering digital skills literacy. Furthermore, I give my consent that the student can interview some of our staff members voluntarily and the learners participating in our program upon the approval from the schools to do so. This consent is granted in order for the student to get the information needed for the completion of this research.

Signature.....**Date**. 26/01/24

By signing below, I acknowledge that I voluntarily participated in this research. The student explained that the information that I am withdrawing as per this research shall be treated with pseudonymity.

Interview Participant 1

Position in the Organisation. Project Coordinator

Signature.....

Date. 26/01/24

2 June 2024

Interview Participant 2

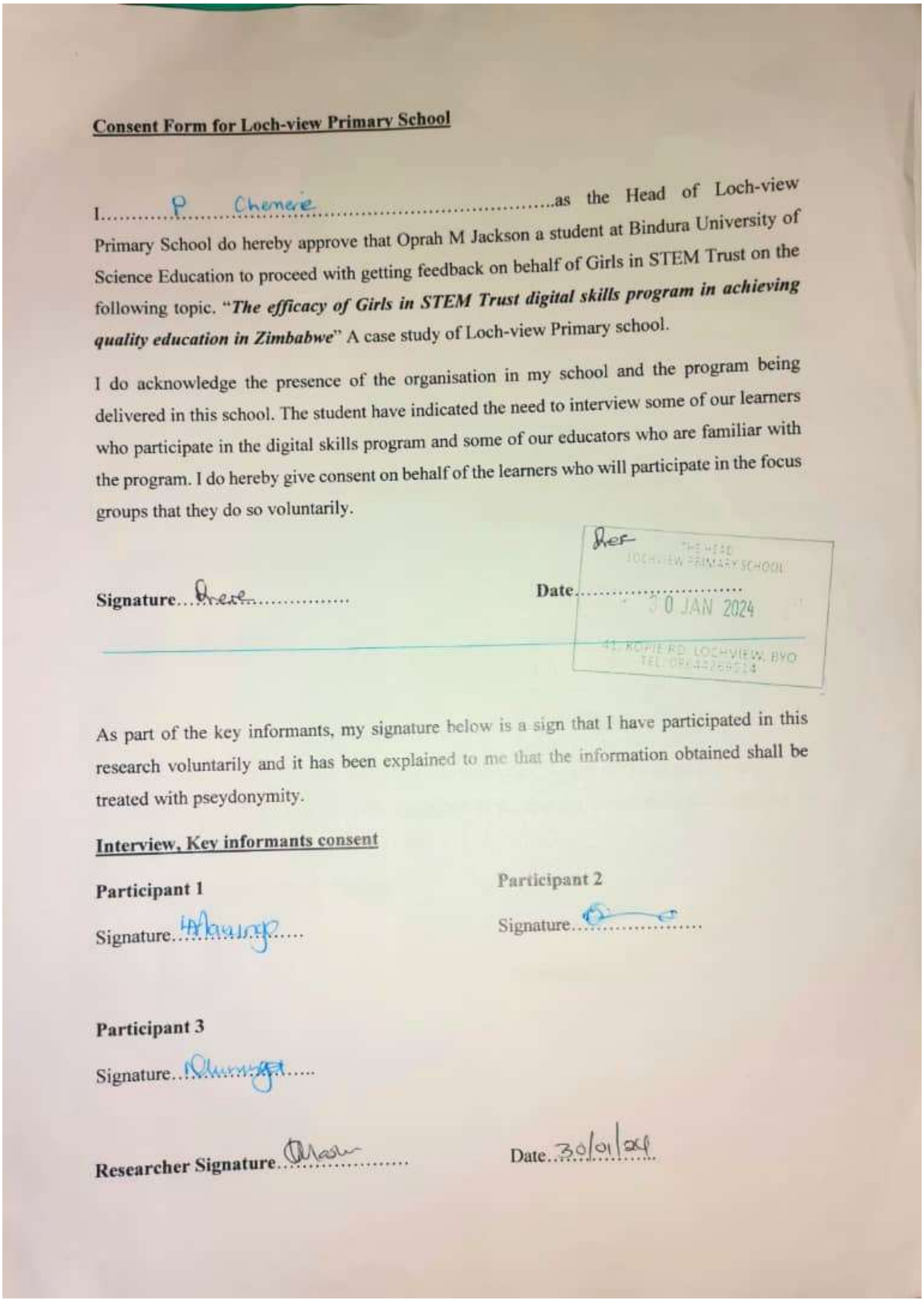
Position in the Organisation. Community Manager

Signature.....

Date. 26/01/24

Researcher's signature.....**Date**. 26/01/24

APPENDIX 3: Consent Form 2 (Loch-view Primary School)



Consent Form for Loch-view Primary School

I.........P Chenere..as the Head of Loch-view Primary School do hereby approve that Oprah M Jackson a student at Bindura University of Science Education to proceed with getting feedback on behalf of Girls in STEM Trust on the following topic. "***The efficacy of Girls in STEM Trust digital skills program in achieving quality education in Zimbabwe***" A case study of Loch-view Primary school.

I do acknowledge the presence of the organisation in my school and the program being delivered in this school. The student have indicated the need to interview some of our learners who participate in the digital skills program and some of our educators who are familiar with the program. I do hereby give consent on behalf of the learners who will participate in the focus groups that they do so voluntarily.

Signature.............................. **Date**..............................

THE HEAD
LOCHVIEW PRIMARY SCHOOL
30 JAN 2024
41 KOPIE RD LOCHVIEW, BYO

As part of the key informants, my signature below is a sign that I have participated in this research voluntarily and it has been explained to me that the information obtained shall be treated with pseydonymity.

Interview, Key informants consent

Participant 1

Signature..............................

Participant 2

Signature..............................

Participant 3

Signature..............................

Researcher Signature.............................. Date..30/01/24..........

APPENDIX 4: Consent Form 3 (SOS Hermain Gmeiner Primary School)

<u>Consent Form for SOS Hermain Gmeiner Primary School</u>

I……Mrs Nyathi……as the Head of SOS Hermain Gmeiner Primary School do hereby approve that Oprah M Jackson a student at Bindura University of Science Education to proceed with getting feedback on behalf of Girls in STEM Trust on the following topic. "***The efficacy of Girls in STEM Trust digital skills program in achieving quality education in Zimbabwe***" A case study of SOS Hermain Gmeiner.

I do acknowledge the presence of the organisation in my school and the program being delivered in this school. The student have indicated the need to interview some of our learners who participate in the digital skills program and some of our educators who are familiar with the program. I do hereby give consent on behalf of the learners who will participate in the focus groups that they do so voluntarily.

PRINCIPAL
SOS HERMANN GMEINER
PRIMARY SCHOOL
24 -01- 2024
P.O. BOX 41, NORTHEND
BULAWAYO

Signature……Nyathi…… **Date**……24.01.2024

As part of the key informants, my signature below is a sign that I have participated in this research voluntarily and it has been explained to me that the information obtained shall be treated with pseydonymity.

<u>Interview, Key informants consent</u>

Participant 1

Signature……

Participant 2

Signature……

Participant 3

Signature……Nyathi……

Researcher Signature…… Date……24/01/24

APPENDIX 5: Key Informants Interview Guide

FACE TO FACE INTERVIEW SCHEDULE FOR EDUCATORS

Section A: Biographical Information of Participants

- How old are you?
- How many years of experience in the school?
- Qualifications of key informants?

Section B: Efficacy of Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education.

1. How familiar are you with the Girls in STEM Trust digital skills program?
2. How many girls from your school are participating in the digital skills program and how has the digital skills program improved the learning environment for the girls?
3. In your own opinion, do you think the program is successfully bridging the gender gap that currently exists in STEM education?
4. Is the digital skills program necessary for primary school learners or rather it should be adopted at secondary level going upwards?
5. Can you comment overally on the Girls in STEM Trust program?

Section C: Challenges affecting the promotion of quality education for girls in Zimbabwe.

6. What do you understand by the term quality education, and what are the main aspects that you believe make up quality education?
7. In your own point of view, what are the challenges that you believe affect quality education delivery for girls in Zimbabwe?
8. How did you solve the above mentioned challenges? Where did you seek help and did the help you got assist you to overcome the challenges?

Section D: Measures that can be utilised to improve STEM education for girls in Zimbabwe.

9. What efforts has the school adopted in encouraging digital literacy for girls as equally for boys?
10. Suggestions on what can be done by the government along with NGOs in order to further improve service delivery for quality of education of girls in schools.

FACE TO FACE INTERVIEW SCHEDULE FOR GIRLS IN STEM TRUST KEY INFORMANTS.

Section A: Biographical Information of Participants

- How old are you?
- How many years of experience in the school?
- Qualifications of key informants?
- Current position in the organisation?

Section B: Efficacy of Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education.

1. Briefly explain the services offered by Girls in STEM Trust to Lock-view Primary school/ SOS-Hermain Gmeiner
2. How has the organisation managed to bridge the gender gap through the digital skills program?

Section C: Challenges affecting the promotion of quality education for girls in Zimbabwe.

3. What are the challenges that are encountered by the organisation as they reach out to schools (the two primary schools) in their intent to promote quality education for girls?
4. Quality education SDG 4 is one of the pillars of the organisation, briefly explain what it encompasses as per the eyes of the organisation?
5. What is your opinion on the current education curriculum in primary schools in promoting quality education for the girls?

Section D: Measures that can be utilised to improve STEM education for girls in Zimbabwe

6. Suggest measures that can be of effect in improving STEM education for girls in Zimbabwe.

APPENDIX 6: Focus Group Discussion Guide

FOCUS GROUP DISCUSSION FOR GIRLS IN LOCH-VIEW PRIMARY SCHOOL AND SOS HERMAIN GMEINER PRIMARY SCHOOL.

Section A:

- How old are you?
- Which grade are you in?
- How many years of experience in the school? (from which grade have they been part of the school)

Section B: Efficacy of Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education

1. What is Girls in STEM Trust and what skills have you gained from the digital skills program?
2. What profession do you want to study since you are now exposed to digital literacy?
3. Is it necessary for girls to take part in technological careers/ be digitally literate like most boys? If Yes, Why so?

Section B: Challenges affecting the promotion of quality education for girls in Zimbabwe.

4. How many practice what they are taught during the digital skills program and how often do they practice at home?
5. Have you ever experienced any discouragement in doing any STEM career? If yes which career and by who?
6. What challenges do you think girls encounter in acquiring good education that boys do not?

Section C: Measures that can be utilised to improve STEM education for girls in Zimbabwe

7. What do you suggest the school should do in order for girls to become digitally literate?

Ndebele Translation for learners

Section A

- Uleminyaka emingaki?
- Ukuliphi izinga lesifundo?
- Waqala ukufunda kuzinga lesingaki kulesisikolo?

Section B: Efficacy of Girls in STEM Trust's digital skills program in bridging the gender gap in STEM education

8. Ungaba lolwazi olunganani nge Girls in STEM Trust njalo usufundeni kuyo?
9. Usulesifiso sokufundelani ngemva kokuba ukhuthazwe yiprogram eye Girls in STEM?
10. Ngkubona kwakho, kungabe kudingakala ukuba amankazana abe yingxenye yezifundo ze technology kumbe abe lolwazi lawo njengabafana? Phana isizatho uma uvumelana lawo lowo umbono.

Section B: Challenges affecting the promotion of quality education for girls in Zimbabwe.

11. Bangaki ababuyelela lokhu abakufundayo kuhlelo lwe Girls in STEM uma befika ngekhaya, njalo babuyelela lezo zifunso okwesikhati esingakanani?
12. Suwake wayaliswa ukufisa ukwenza umsebenzi ongengxenye ye STEM? Uma kunjalo, wayaliswa ngubani njalo uphi umsebenzi?
13. Yiziphi zehlakalo ezingabe zihlangana labasakhulayo abesifazana ekubeni bathole ukufunda okweneleyo ezingahlangani labesilisa?

Section C: Measures that can be utilised to improve STEM education for girls in Zimbabwe

14. Sikhuthazo bani ongasinika esikolo sakho esingancedisa ukuba abatsha baqwephetshe kudigital technology

THANK YOU FOR PARTICIPATING!