FACULTY OF SCIENCE EDUCATION

BACHELOR OF SCIENCE EDUCATION HONORS DEGREE IN CHEMISTRY

EXPLORING THE FACTORS CONTRIBUTING TO THE UNDERREPRESENTATION AND POOR ACADEMIC PERFORMANCE OF FEMALE STUDENTS IN SCIENCE SUBJECTS AT ADVANCED LEVELS: A CASE STUDY OF DOTITO HIGH SCHOOL

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF SCIENCE HONOURS DEGREE IN CHEMISTRY EDUCATION

ABSTRACT

This research study employs a mixed-methods approach to investigate the underrepresentation and poor academic performance of female students in science subjects at advanced levels, focusing on a case study of Dotito High School. The study's sample consists of 3 teachers and 16 female students, and data is collected through questionnaires, interviews, and document analysis. The research seeks to gain insight into the multifaceted factors influencing the educational experiences of female students in science subjects, including societal expectations, classroom dynamics, and institutional support. By utilizing a combination of research instruments, the study aims to provide a comprehensive understanding of the challenges faced by female students, aiming to inform targeted interventions and policy recommendations to address the underrepresentation and academic struggles in science education at the advanced level.

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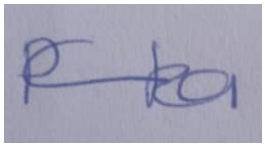

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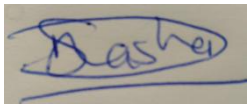

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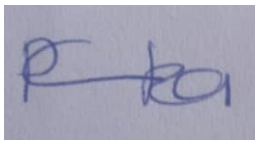
DECLARATION

I, Chimucheka Pamela, solemnly declare that the research entitled "Exploring the Factors Contributing to the Underrepresentation and Poor Academic Performance of Female Students in Science Subjects at Advanced Levels: A Case Study of Dotito High School" is the result of my original work and intellectual endeavours. The research has been conducted in accordance with the ethical guidelines and principles of academic integrity. The data and findings presented in this study are authentic and have been collected and analysed using the prescribed research methodologies. Any external sources utilized have been duly acknowledged through proper citations and references. This research has not been submitted for any other academic qualification, and I take full responsibility for the content and conclusions drawn in this study.

Signed:  Date: June 2024

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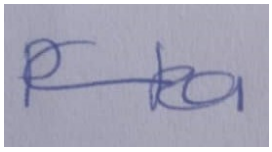
Signed:  Date: June 2024

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DEDICATION

To my beloved children, Atidaishe and Andres Muzata,

This project is dedicated to you, my source of inspiration and motivation. Your unwavering support and understanding have been the driving force behind my pursuit of knowledge and academic endeavours. As I navigated the complexities of this research, your love and encouragement provided me with the strength to persevere. It is with immense pride and gratitude that I dedicate this project to both of you. May it serve as a testament to the importance of determination and education, guiding you on your own paths to success.

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Husband, Terrence Muzata: Your endless patience, encouragement, and belief in my capabilities have been a constant source of motivation. Your unwavering support has made this endeavour possible, and I am grateful beyond words.

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CHAPTER ONE

1.0 Introduction

This chapter aims to examine the factors that have led to the need for this research. It will cover the statement of the problem, study objectives, research questions, and the significance of the study. In addition, the chapter will address the scope and constraints of the study, along with the measures taken to address these limitations. Furthermore, key terms utilized in the research will be defined within the context of this chapter.

1.1 Background of the study

The global consensus is that science and technology education plays a fundamental role in passing on scientific and technological knowledge, skills, and values from one generation to the next, contributing to the on-going progress and prosperity of society (Kola, 2013). Gudyanga, Mandizvidza and Gudyanga, (2020) postulated that, the Zimbabwean government established the Nziramasanga Commission of Inquiry into Education and Training in 1999 to assess the country's education system. Among its mandates was to investigate gender equality in education. It's worth noting that one of the significant conclusions of the Commission was that gender gaps continued to exist across all education levels. In 2004, the Zimbabwean government implemented the National Gender Policy, aiming to tackle various critical obstacles related to empowering girls and women in education, training, politics, the economy, and decision-making. A key objective of the 2004 National Gender Policy is to promote and inspire girls to pursue science, mathematics, and technology across all educational levels. However, Mutekwe and Modiba, (2011) demonstrate that despite these advancements, educational institutions still perpetuate gender-based disparities. Regrettably, the 2004 Education Act does not seem to sufficiently address gender issues, as it only mentions non-discrimination in school admissions. In line with the principles outlined in the Convention on the Rights of the Child, the broader concept of fundamental education expressed in the World Declaration on Education for All (UNESCO, 2011) and the Dakar Education Framework (UNESCO, 2011), UNICEF (2000) pledges its dedication to ensuring that all children can exercise their right to education, fulfil their basic learning requirements, achieve their maximum potential, and actively engage in society. However, despite this dedication, the issue of gender inequality in Zimbabwe remains unresolved. Madudise, (2021) also cited that, in recent years, there has been a growing recognition of the importance of gender equality and inclusivity in education, particularly in the fields of science, technology, engineering, and mathematics (STEM). However, despite efforts to promote equal opportunities, there remains a significant underrepresentation of female students in advanced science subjects at the high school level which is attributed to a number of factors. This underrepresentation not only limits the potential career options for young women but also hinders the overall progress towards a more diverse and inclusive scientific community. Research conducted by Rarieya, Sanger, and Moolman (2014) in South Africa determined that affirmative action was essential to afford girls increased opportunities and equitable learning experiences. Africa continues to fall behind other continents in the provision of science and mathematics education for girls (Asimeng-Boahene, 2006).

1.2 Statement of the Problem

This research seeks to investigate the factors contributing to gender discrepancies affecting the educational experiences of students studying Advanced Level Sciences at Dotito high schools. Through my own teaching experiences and enrolment documents as illustrated in Fig 1.1, it became evident that gender disparities are present at Dotito high school in Advanced Level Science classes with underrepresentation of the female students being prevalent. Science subjects are vital for the socio-economic, political, and technical advancement of a country. In a nation like Zimbabwe, which, as per Zimbabwe National Statistics Agency (2013), has a higher female population than male, it would greatly benefit from the engagement of an equal number of females and males in STEM-related fields. Therefore, the study aims to identify the factors exacerbating gender imbalances in the hope of devising practical solutions to address this challenge.

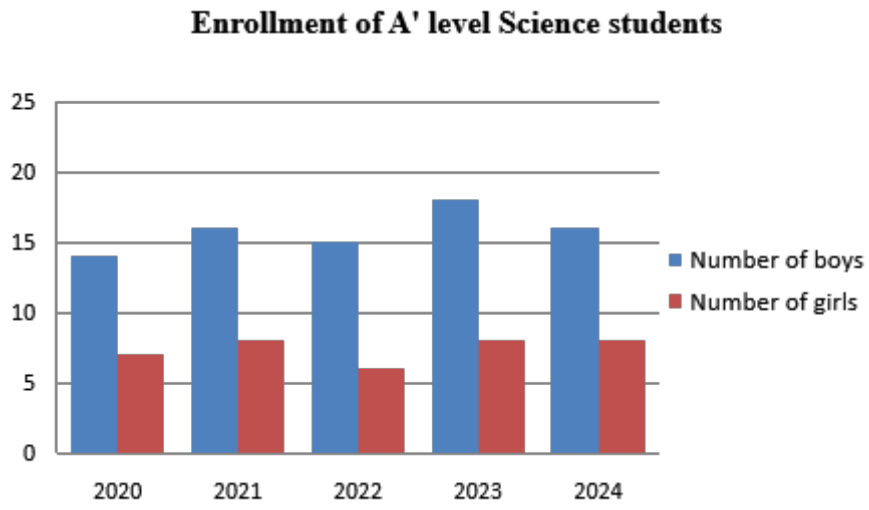

Fig 1.1: Enrolment of students in Advanced Level Sciences at Dotito high school

1.3 Research Questions

1. What factors influence female students' selection of natural sciences at Advanced Level?
2. What causes low enrolment and inadequate performance in natural sciences at Advanced Level among female students, and what are the contributing factors?
3. In what ways does gender stereotyping become apparent within educational institutions?

1.4 Research Objectives

1. Identify the factors that influence female students' selection of natural sciences at Advanced Level.
2. Investigate the causes of low enrolment and inadequate performance in natural sciences at Advanced Level among female students, and explore the contributing factors.

3. Describe the ways in which gender stereotyping manifests within educational institutions.

1.5 Significance of the Study

The study at hand holds significant implications for various stakeholders:

School Administrators

The school administrators will gain insights into the factors affecting the underrepresentation and academic performance of female students in science subjects at advanced levels. Additionally, school administrators may, understand the need for targeted interventions to address gender disparities in science education.

Teachers

Through the findingS of this study teachers may recognize the challenges faced by female students in science subjects and can adapt teaching methods to better support them. More so the study may help teachers to implement strategies to encourage and empower female students in science education.

Parents

This study can assist parents in comprehending the challenges that their daughters encounter when pursuing science subjects, enabling them to offer improved support and encouragement. Furthermore, it has the potential to empower parents to advocate for educational policies and practices that are inclusive and supportive of the academic achievements of female students in science.

Students

Through this study, students may gain awareness of the challenges and barriers faced by female students in science education. Additionally, the study at hand may encourage students to pursue science subjects with confidence and determination, knowing that efforts are being made to address gender disparities.

The findings of this study can contribute to a more inclusive and supportive environment for female students in science education, ultimately leading to greater representation and improved academic performance in Advanced level science subjects.

1.6 Limitations

One of the greatest limitations of the study is its scope and depth. The study's focus on a single high school may limit the comprehensive understanding of the broader factors contributing to the underrepresentation and academic performance of female students in science subjects at advanced levels. More so, the results cannot be generalised to all Zimbabwean schools since schools differ in geographical locations and availability of resources.

1.7 Delimitations

The study aims to explore the factors contributing to the underrepresentation and academic performance of female students in Science subjects at Advanced Levels. The study is limited to Dotito High School premises.

1.8 Assumptions

The respondents will provide honest and truthful answers to the survey questions

1.9 Definition of Key Terms

Underrepresentation: According to Muzingili and Muchinako (2016), underrepresentation refers to the insufficient presence or participation of a particular group, in this case, female students, in advanced science subjects compared to their male counterparts.

Gender Disparities: Nsalamba and Simpande, (2019) define gender disparities in education refer to the differences in educational opportunities, outcomes, and experiences between male and female students. These disparities can manifest in various ways, impacting enrolment rates, access to resources, academic achievement, and overall educational experiences.

Academic Performance: Mhlaba, (2021) defines academic performance as the measurement of a student's achievement across various academic subjects. It encompasses the student's ability to grasp and apply knowledge, demonstrate skills, and achieve learning outcomes within an educational setting. Academic performance is typically assessed through various means, including examinations, class participation, project work, and overall engagement with the curriculum.

Science Subjects at Advanced Level: The study considers physics, chemistry and biology as the science subjects done at Advanced Level.

1.10 Summary

This chapter has provided an overview of the research background, problem statement, and research questions, significance of the study, and scope and limitations. The following chapter will delve into the existing literature on gender disparities in science education.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

1.0 Introduction

The decision to pursue natural sciences at the Advanced Level holds paramount importance in students' academic progression, carrying substantial implications for their future professional paths and the scientific field. This review of literature seeks to investigate the current body of research concerning the factors that influence students' choices in selecting natural sciences at the Advanced Level, the elements contributing to the underrepresentation and unsatisfactory performance of female students, and the presence of gender stereotypes within educational settings.

2.1 Factors influencing the selection of selection of natural sciences at advanced level

The process through which students choose to pursue natural sciences at the Advanced Level is shaped by a multitude of factors. Baldwin, (2013) indicated that peer influence, parental guidance, career aspirations, and personal interest are pivotal in the selection of natural sciences. Blickenstaff, (2017) proposed three explanations for gender-based subject choices: a biological account, a social-psychological account, and a feminist sociological account. Crespo, (2019) research indicated that this was primarily attributed to the perceived 'capability' of each gender, as he observed that boys outperformed girls in science, technical, and mathematics subjects. Variances in 'inherent' capabilities and preferences have been extensively debated.

According to Eccles, (2014), academic grades significantly influence the selection of fields of study. Gillborn, (2020) suggested two factors influencing subject selection are the degree to which girls and boys are directed towards specific subjects based on the manner in which they are presented, as well as their performance in exams or educational achievements. Peer influence has been noted as a significant factor in determining choice of academic specialization. In a study by Kanny, (2015) it was discovered that women who were randomly paired with female peers were less inclined to choose male-dominated subjects, whereas men, when paired with female peers, were more inclined to choose male-dominated subjects. Additionally, research indicated that women in male-dominated fields often encounter challenging social environments.

Most studies related to self-efficacy have generally found that boys and girls exhibit differing levels of perceived self-efficacy. Gillborn, (2020) suggested that, girls tend to demonstrate lower efficacy than boys in tasks perceived to be traditionally male-dominated. When making choices, students take their ability in the subject into account. Hill, (2018) cited that, girls attributed their success in STEM to external factors such as support, learning time, and luck, while boys attributed it to internal factors such as talent and ability. Kanny, (2015) reviewed that, the gender disparity in science subjects self-efficacy is more pronounced among students in higher secondary and tertiary education compared to those in primary and lower secondary education.

Hill, (2018) investigated the influence of teachers on students' career choices and concluded that individual decisions regarding science-related careers are influenced by parental support, personal effort or ability, courses taken at school, and the collaboration and support of STEM teachers. Kanny, (2015) contended that when it comes to subject choices, an individual's natural inclination and inherent preference are not solely determined by immediate contextual factors, but rather result from persistent drive (self-efficacy) within the individual. STEM uptake, particularly in physics and chemistry, remains low among female students. Research has indicated that the frequently cited reason is that science is perceived as challenging and irrelevant to the student and their society.

Research conducted by Ndalichako and Komba (2014) on students' subject choices in secondary schools in Tanzania revealed that students' preferences for a particular subject included the commitment and support provided by the subject's teachers, the availability of the teachers, their approaches, and the relevance of the subject to their daily life experiences. Scantlebury, (2018) observed that students prefer subjects that help them acquire skills and knowledge applicable to their daily lives. These findings underscore the significance of subject relevance as perceived by students in their choices.

Additionally, Sikora, (2016) demonstrated that high school job aspirations predict tertiary education majors and that gender differences in occupational preferences are key predictors of female underrepresentation in STEM disciplines. Females and males exhibit distinct career choices and occupational aspirations that are visibly shaped during adolescence. According to Tippett, (2019) females prefer professions that involve interaction with people, while males prefer jobs that entail working with machines and tools. In summary, females tend to favour fields that are oriented towards people.

2.2 Low Enrolment and Inadequate Performance among Female Students

Another significant argument arising from the topic of academic underachievement in schools is more related to societal perceptions of masculinity than to independence, hormones, or brain structure. Tobin, (2017) postulated that, the lack of tailored mentorship and support systems for female students pursuing natural sciences has been recognized as a critical factor leading to the inadequate enrolment and performance. Comprehending these factors is crucial for formulating interventions aimed at addressing the underrepresentation of female students in natural sciences at the Advanced Level.

Recent research has placed significant emphasis on the importance of role models. Watt, (2017) suggested that, the impact of role models is best explained by socialization theory. These individuals provide students with critical information and feedback on career, educational, and academic options available to them, as well as on the gender suitability of these options. This influence encompasses, among others, parents, teachers, friends/peers, the media, and school counsellors. Tobin, (2017) postulated that, parental expectations, the quality of parent-child communication, and parental style may have a stronger correlation with student achievement than more overt forms of involvement. Simpkins and Tippett, (2019) observed that parents' beliefs about their child's ability in science and math, as well as

the value they place on these subjects, influence the motivation and subsequent career choices of the child. According to Archer *et al.,* (2014), family members, family friends, or neighbours engaged in the same profession as the aspirants were identified as the primary sources of influence on their choice of subject and career. These findings support Simon *et al.,* (2012) conclusions from the Understanding Participation Rates in Mathematics and Physics (UPMAP) project.

Sikora, (2016) suggested that, interest in mathematics and science among young people is associated with the number of mathematics and science courses taken in high school and aspirations for mathematics-related careers. Pekrun, & Watt (2010) investigation into the development of mathematics interest in adolescence suggested that both boys and girls consider mathematics to be equally important, but boys exhibit a higher interest in it than girls. While boys' interest in mathematics remains consistent, girls' interest diminishes as they progress through adolescence. Scantlebury, (2018) postulated that, girls demonstrate progressively lower ability self-concept compared to boys, beginning in middle school and continuing through college.

2.3 Gender Stereotyping within Educational Institutions

The presence of gender stereotyping within educational institutions has been a prevalent concern impacting students' educational journeys. Kanny, (2015) defines stereotypes as assessments of individuals' abilities or characteristics based on their association with a social group. Gillborn, (2020) postulated as children mature and engage with their environment, stereotypes become apparent in various ways. Children inevitably encounter gendered environments emotionally, socially, cognitively, and physically as they progress through the process of socialization. Across many societies, expectations exist for boys, girls, men, and women to conform culturally to behavioural norms based on gender stereotypes. Studies have shown that gender stereotypes exert influence over students' academic preferences and performance, especially within the natural sciences (Brown & Smith, 2019). According to Eccles, (2014) the perpetuation of these stereotypes through curriculum materials, teacher expectations, and peer interactions has been identified as a hindrance for female students pursuing natural sciences. Investigating the manifestations of gender stereotyping within educational institutions will offer valuable perspectives on the systemic obstacles encountered by female students in the natural sciences field.

In a study by Crespo, (2019) on gendered school experiences, the findings revealed evidence that the schooling experience for both students and teachers was heavily influenced by gender in terms of institutional practices, teacher subject allocations and responsibilities, student retention, and academic achievement. This perpetuated traditional institutional practices and reinforced damaging gender imbalances. These traditional practices encompassed the majority of leadership positions, the dominance of men in STEM teaching and career choices, among others. Masinire's (2011) study on masculinity and schooling in Zimbabwe suggested that advocating for gender equality in classrooms without considering the cultural backgrounds of the teachers would be ineffective. Additionally, Mutekwe, Modiba, and

Maphosa (2012) noted that girls underperformed in their school subjects because they felt they were not treated at the same level as boys, both at school and at home.

Research by Baldwin, (2013) suggested that when a student's social identity is negatively constructed, the student is likely to underachieve in a manner consistent with the stereotype. In other words, persistent negative labelling of an individual leads them to conform to that negative expectation. In a school setting, my experience as a teacher has shown that repeated negative comments on a student's subject ability, whether from teachers or peers, can significantly impact the student's engagement, leading them to potentially drop, dislike, or underperform in the subject.

Teachers' attitudes are often reflected in their treatment of students, with a tendency to favour male students over female students. Brotman, (2016) indicated that, boys are frequently reprimanded and given more attention, while girls are encouraged to develop a dependency syndrome. The implicit assumptions about gender and the general lack of awareness among teachers regarding how they use gender as an organizing and categorizing tool have significant effects on student behaviour.

Hill, (2018) study revealed that teachers tend to stereotype math as a male domain and attribute boys' successes and failures to ability, while attributing girls' successes and failures to effort. Gillborn, (2020) cited that, teachers inadvertently sustain male stereotypes by paying more attention to male students than female students. This behaviour may be influenced by their cultural upbringing, where male children are given more attention and favour at the expense of female children. Eccles, (2014) in a study showed that, gender stereotypes have a negative impact on shaping and developing the identity and education of female children at a young age, resulting in restricted educational access, achievement, and career opportunities for them.

According to Brotman, (2016) the institutional theory posits that workplaces serve as conduits for reinforcing gender stereotypes. The school environment plays a significant role in influencing students' academic performance, particularly when gender is utilized as a management tool for daily organizational procedures. According to Scantlebury, (2018) there is evidence suggesting those students' achievement levels are impacted by the school environment and the daily management and organizational procedures of schools, which often rely on gender as a management tool. This is evident in various aspects such as classroom seating arrangements, team sports, staffing ratios, and positions of responsibility.

Eccles, (2014) suggested that both boys and girls utilize their peers to evaluate their own accomplishments and career aspirations, and that peers reinforce gender-stereotypical behaviour and penalize non-conformity. Peer friendships are linked to both pro-social and anti-social behaviour. Crespo, (2019) indicated that, peers characterized by pro-social behaviour perform well and exhibit high self-motivation in mathematics and science. It can be argued that the influence of peers on each other is particularly significant due to the amount of time they spend together, both at school and at home.

2.4 Gaps in literature

The existing literature on gender disparities in science education highlights several factors contributing to the underrepresentation and poor academic performance of female students, including societal stereotypes, teacher bias, and lack of role models. However, there are significant gaps in the literature that this research aims to address. Firstly, most studies have focused on gender differences in science achievement at the primary and secondary levels, with limited research exploring the specific challenges faced by female students at the Advanced Level. Secondly, few studies have investigated the contextual factors influencing female students' experiences in science education in Zimbabwean schools, such as the impact of cultural and socio-economic factors on their academic choices and performance. Finally, there is a need for more nuanced research that explores the intersections of gender with other social categories, such as race and class, to better understand the complex factors influencing female students' underrepresentation and poor performance in science subjects at Advanced Levels. This study aims to address these gaps in the literature by exploring the factors contributing to the underrepresentation and poor academic performance of female students in science subjects at Advanced Levels, using Dotito High School as a case study.

2.5 Summary

This chapter provides a comprehensive review of the extant literature related to the research questions, offering a nuanced understanding of the complex factors influencing students' decisions to pursue natural sciences at the Advanced Level, the underrepresentation and poor academic performance of female students, and the emergence of gender stereotypes in educational contexts. The literature review identifies significant knowledge gaps, which this study seeks to address, thereby contributing to the existing body of research and addressing the pressing issues in natural science education at the Advanced Level.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

This chapter delineates the research methodology utilized to investigate the factors influencing the underrepresentation and academic achievement of female students in advanced-level science subjects, with a specific focus on Dotito High School. The methodological framework for this study is crafted to enable a thorough and detailed examination, providing the means for a systematic analysis of the various complex factors that affect the educational journeys of female students in the field of science.

3.1 Research Design

According to Creswell (2009), a research design refers to the overarching plan and analytical framework that integrates all aspects of a study in a logical and coherent manner. It serves as a detailed roadmap that outlines the structure, methodology, and approach of a research investigation, guiding the collection and analysis of empirical data to address the research question. This design involves selecting the appropriate research methods, instruments, and techniques to conduct the study, thereby directing the entire research process and methodology. In essence, the research design provides a systematic and organized approach to ensure a rigorous and valid investigation. This study employed a mixed-methods approach, combining both quantitative and qualitative data collection and analysis methods. Terell (2012) postulated that, a mixed-methods approach is a research design that combines both qualitative and quantitative methods to collect and analyze data. This approach integrates the strengths of both methods to provide a more comprehensive understanding of the research topic. The research design to be used is a single-case study, with Dotito High School as the focus of the investigation. This design involves an in-depth examination of a single case, Dotito High School, to gain a detailed understanding of the factors contributing to the underrepresentation and academic performance of female students in science subjects. The case study aims to gain a detailed understanding of the research topic, exploring the factors, themes, and patterns that emerge from the data. By using a case study design, the researcher can gain a rich and detailed understanding of the research topic, explore the complexities and nuances of the research topic in a real-world setting and identify patterns, themes, and factors that contribute to the underrepresentation and academic performance of female students in science subjects at advanced levels

3.2 Population and Sample/Research Participants

Tardis (2010) defines the term "population" in research as the entire group that the researcher intends to draw inferences about, which may be delineated based on geographic, demographic, or other defining factors. In the realm of statistics, the population refers to the complete set of elements from which data is gathered for a statistical investigation, encompassing individuals, measurements, or any other specified collection of items. According to Flick (2002), a "sample" refers to a distinct subset chosen from the population

to gather data and make inferences about the entire population. The selection of the sample is influenced by the research objectives and the specific parameters or attributes under investigation, with the aim of representing the broader group. The population of interest in this study is Advance level science teachers and female students enrolled in advanced-level science subjects (biology, chemistry, and physics) at Dotito High School.

Three teachers, consisting of 2 males and 1 female, participated in the study, selected using judgmental sampling. Denzin and Lincoln (2005) defined this approach as purposive judgmental sampling, wherein the researcher deems it necessary for individuals to participate in the study. All three teachers were included as part of the study's sample, chosen for their expertise in the specific area under investigation.

Given the limited numbers of female students in the context of the research, the sampling procedure for the student sample is a Total Population Sampling (also known as Census Sampling) approach, where all female students enrolled in advanced-level science subjects at Dotito High School are included in the sample. This approach is used due to the limited number of female students in this group, making it feasible and desirable to include every student in the sample. This approach aimed to capture the perspectives and experiences of the entire population of female students engaged in advanced science education at the school, thereby ensuring that the study's findings were reflective of the entire group. Despite the use of a non-probability sampling method, this approach allowed for a detailed exploration of the factors influencing underrepresentation and academic performance among female students in science subjects at the advanced level within the specific context of Dotito High School.

Due to the limited number of female students in the research context, a Total Population Sampling (also known as Census Sampling) approach was employed for the student sample. This method involved including all female students enrolled in advanced-level science subjects at Dotito High School due to the restricted size of this group, making it both feasible and desirable to encompass every student in the sample. The objective was to capture the perspectives and experiences of the entire population of female students involved in advanced science education at the school, ensuring that the study's findings were representative of the entire cohort. Despite the utilization of a non-probability sampling method, this approach facilitated a comprehensive exploration of the factors impacting the underrepresentation and academic performance of female students in advanced-level science subjects within the specific context of Dotito High School. Therefore the students sample consists of 16 female students, eight students from the upper sixth form and eight students from the lower sixth form.

3.3 Research Instruments

The primary data collection methods employed in this study includes semi-structured interviews for teachers, student questionnaires, and document analysis.

3.3.1 Questionnaire (SQ)

A student questionnaire can be described as a carefully organized series of inquiries intended to collect firsthand information from students regarding their educational experiences, viewpoints, and requirements. In this specific case, a self-report questionnaire was designed to gather information from Advanced Level (A-Level) students about their experiences, attitudes, and perceptions on the study at hand. Self-report questionnaires were adopted cause of their easy to administer, making them a convenient and efficient data collection method Self report questionnaires allow for the measurement of a range of discrete emotions, including basic, achievement, and learning-centered emotions.

3.3.2 Interview Schedule (TI)

A semi-structured interview guide is going to be used to gather information from the teachers. It is a research tool used to collect qualitative data through in-depth interviews. It is a flexible and open-ended guide that outlines topics and questions to be explored, while also allowing for spontaneity and probing. This guide is characterized by its use of open-ended questions, which encourages detailed and thoughtful responses from participants. It also offers flexibility, allowing the interviewer to deviate from the guide and explore emerging themes or issues. Additionally, it provides a clear structure, ensuring consistency and coverage of key areas, and enables probing, which allows the interviewer to ask follow-up questions to clarify or gather more information. The Teacher Interview (TI) serves as a qualitative research tool intended to elicit comprehensive perspectives from advanced-level science educators at Dotito High School concerning their experiences, viewpoints, and attitudes related to the study.

Document Analysis (DA)

Document analysis as a research instrument involves the systematic examination of relevant school records, policies, and academic performance indicators at Dotito High School. This method allows for the exploration of contextual information and insights that supplement the qualitative data collected through interviews and questionnaires. By analyzing documents such as academic records, and performance metrics, the research gains additional perspectives on the educational experiences of female students in science subjects at advanced levels. This approach contributes to a comprehensive understanding of the factors influencing the underrepresentation and academic performance of female students in the science domain at Dotito High School.

3.4 Data Analysis

The research's data analysis involves conducting thematic analysis of the qualitative data gathered from interviews, questionnaires, and document analysis. This method aims to systematically identify recurring patterns, themes, and insights within the data, enabling a comprehensive understanding of the multifaceted factors impacting the educational experiences of female students in the science domain at Dotito High School. By employing thematic analysis, the study seeks to develop contextually grounded findings that address the

research objectives and contribute to the promotion of gender equity and inclusivity in science education.

The data analysis process will entail the careful examination of qualitative data to identify common themes, patterns, and perspectives that emerge from the narratives of female students, educators, and stakeholders at Dotito High School. Additionally, the analysis of relevant documents, such as school records and policies, will provide supplementary insights into the contextual dynamics influencing the underrepresentation and academic performance of female students in science subjects at advanced levels. Through this comprehensive approach to data analysis, the study aims to generate valuable insights that shed light on the complex interplay of factors shaping the educational trajectories of female students in the science domain at Dotito High School.

3.5 Ethical Considerations

The researcher obtained approval from the school administration and the teachers and students provided informed consent. Both students and teachers were presented with a clear informed consent form detailing the research's purpose, procedures, as well as potential risks and benefits. The form underscored the voluntary nature of participation and the right to withdraw at any time without facing any repercussions. Participants were afforded ample time to review and comprehend the form before providing their consent. For students under 18 years old, parental consent was obtained.

To safeguard participants' privacy, all collected data was anonymized, and participants will be assigned unique codes to protect their identities. Their names and any identifying information will not be disclosed in any reports or publications. Potential risks, such as discomfort or anxiety, will be mitigated by ensuring that participants understood the research purpose and procedures, providing a secure and comfortable environment for data collection, and allowing participants to withdraw at any time.

3.6 Summary

The research methodology chapter provides a detailed overview of the comprehensive approach employed to investigate the underrepresentation and academic performance of female students in advanced-level science subjects at Dotito High School. By outlining the population and sampling procedure, the study ensures the inclusion of diverse perspectives from female students and educators. The selection of research instruments, including qualitative methods such as interviews, questionnaires, and document analysis, aims to capture a rich tapestry of experiences and contextual insights. Thematic analysis serves as the cornerstone of the data analysis process, facilitating the systematic identification of recurring patterns and themes within the qualitative data. This rigorous methodology is designed to yield in-depth findings that contribute to a nuanced understanding of the multifaceted factors influencing the educational experiences of female students in the science domain at Dotito High School.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents the analysis and results of the data collected from the document analysis, questionnaire and teacher interviews. The data was analyzed using descriptive statistics and thematic analysis to identify the factors contributing to the underrepresentation and academic performance of female students in science subjects at advanced levels at Dotito High School

4.1 Response Rate

Total teachers invited	3
Total teachers participated	3
Response rate	100%

Table 4.1: Teacher interview response rate

Questionnaires distributed	16
Questionnaires returned	16
Response rate	100%

Table 4.2: Student questionnaire response rate

Total documents reviewed	3
Total documents included in analysis	3
Inclusion rate	100%

Table 4.3: Document analysis

Overall, the response rate for this study is 100%, indicating a high level of participation from the questionnaire and interview participants, as well as a robust document analysis. This suggests that the findings are representative of the population and can be generalized to some extent.

4.2 Demographic Data

Age range	Frequency	Percentage (%)
16-18 years	12	65
19+ years	4	35

Table 4.4: Students' age distribution

Subject	Frequency	Percentage (%)
Biology	10	75
Physics	6	25
Chemistry	16	100
Mathematics	16	100

Table 4.5: Students' subject enrollment

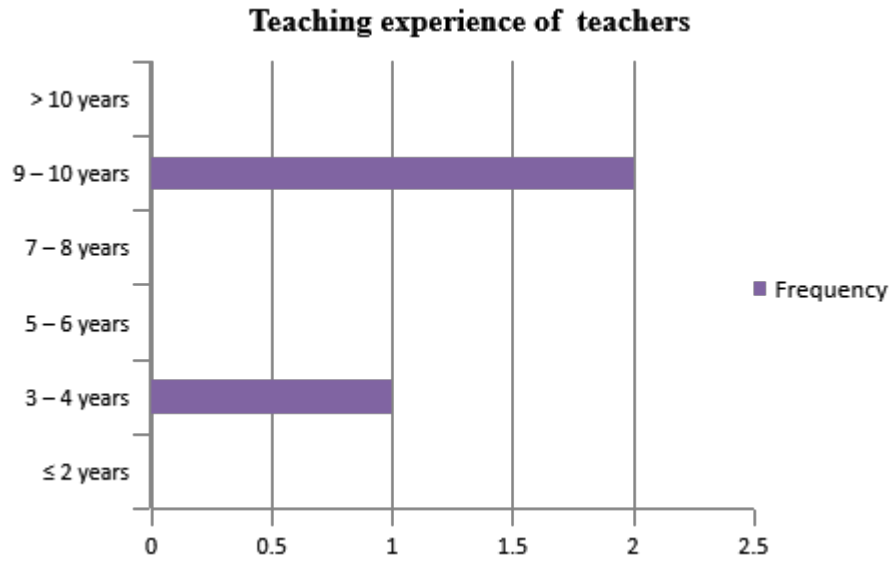

Fig 4.1: Respondents' teaching experience

4.3 Organization of Data Analysis

Data relevant to the underrepresentation and academic performance of female students in advanced-level science subjects was gathered. This encompassed academic records, demographic details, and input from interviews and questionnaires issued to teachers and students. Subsequently, the data underwent cleaning and preparation to ensure its suitability for analysis. This involved eliminating irrelevant or duplicate data, addressing missing values, and structuring the data appropriately. The results of the data analysis were then interpreted within the framework of the research question, leading to conclusions about the factors influencing underrepresentation and academic performance among female students in science subjects at Dotito High School.

In the thematic analysis of the documents and teacher interviews, several significant themes emerged, providing valuable insights into the factors contributing to the underrepresentation and academic performance of female students in science subjects at advanced levels. In the next section, I present the themes that emerged from the thematic analysis of the documents and teacher interviews:

Theme 1: Teaching Approach and Methods

Theme 2: Gender Disparities in Academic Performance

Theme 3: Support and Encouragement for Female Students

Theme 4: Professional Development and Collaboration

Theme 5: Student Motivation and Engagement

Theme 6: School Culture and Policies

4.3.1 Theme 1: Teaching Approach and Methods

The analysis revealed that the teaching approach and methods employed in the science classrooms played a pivotal role in shaping the experiences and academic outcomes of female students. Variations in instructional strategies, classroom dynamics, and the integration of interactive learning techniques were identified as influential factors impacting the engagement and comprehension of female students in science subjects. The theme of Teaching Approach and Methods emerged as a significant factor influencing the underrepresentation and academic performance of female students in science subjects at advanced levels, as revealed through the thematic analysis of documents and teacher interviews.

In the teacher interviews conducted as part of the study at Dotito High School, several key insights were gleaned regarding the teaching approach and methods in the context of science education for female students.

Teacher Interviews:

- *"I try to engage all students, but I realize I tend to call on males more often."* (Teacher 1)

- *"I use examples that appeal more to males, like sports and cars, without realizing it."* (Teacher 2)

- *"I don't have the training or resources to incorporate more hands-on activities."* (Teacher 3)

- *"I assume students have a basic understanding of science concepts, but maybe I'm wrong."* (Teacher 1)

Analysis:

Teachers' unintentional biases and lack of diverse teaching methods may contribute to female students' disengagement from science subjects. Teachers' reliance on traditional methods may not cater to diverse learning styles, potentially disadvantaging female students. Teachers' limited training and resources hinder their ability to innovate their teaching approaches.

One teacher emphasized the importance of interactive and collaborative learning experiences, noting that fostering a classroom environment that encourages active participation and discussion can significantly impact the engagement and comprehension of female students in science subjects. The teacher also highlighted the value of incorporating real-world applications and practical demonstrations to enhance the relevance and appeal of science education for female students.

Another teacher underscored the significance of personalized learning approaches, emphasizing the need to cater to diverse learning styles and preferences among female students. This insight aligns with the broader literature on student success, which emphasizes the importance of differentiated instruction and individualized support to address the unique needs of learners, particularly in the context of underrepresented groups in STEM fields.

Furthermore, the interviews shed light on the potential impact of gender stereotypes on teaching approaches and methods. One teacher expressed concerns about the perpetuation of gender biases in science education, highlighting the need for educators to actively challenge stereotypes and create inclusive learning environments that promote the participation and achievement of female students in science subjects.

The insights derived from the teacher interviews align with existing research on the influence of teaching approaches on student success, particularly in STEM fields. The emphasis on interactive, collaborative, and inclusive instructional methods resonates with the broader literature on effective pedagogical practices for engaging and supporting female students in science education.

4.3.2 Theme 2: Gender Disparities in Academic Performance

The presence of gender disparities in academic performance was a prominent theme that surfaced from the analysis. The findings highlighted disparities in the assessment, feedback, and evaluation of female students, indicating potential systemic biases that may contribute to the underrepresentation and underperformance of female students in science subjects.

The study revealed significant gender disparities in academic performance in science subjects, with males outperforming females. Female students' lack of confidence and self-efficacy in science subjects was a significant factor contributing to their underperformance.

Teacher Interviews:

- *"Male students tend to dominate class discussions and experiments, while female students hesitate to participate."* (Teacher 1)

- *"Female students often struggle with science concepts and lack confidence in their abilities."* (Teacher 2)

- *"I've noticed that female students tend to score lower on science tests and assignments."* (Teacher 3)

Document Analysis:

- School records showed a significant gap in science grades between male and female students.

- Science test scores and assignment grades revealed a consistent pattern of male students outperforming female students.

Analysis:

Gender disparities in academic performance are evident in science subjects at Dotito High School. Female students' lack of confidence and self-efficacy in science subjects hinders their

academic performance. Teachers' perceptions and biases may contribute to the perpetuation of gender disparities.

4.3.3 Theme 3: Support and Encouragement for Female Students

The theme of support and encouragement for female students emerged as a critical factor. The analysis underscored the significance of mentorship, guidance, and tailored support mechanisms in nurturing the confidence and academic growth of female students in science subjects. The presence of a supportive and inclusive environment was identified as a key determinant of female students' success in advanced science studies.

The study revealed that female students receive inadequate support and encouragement from teachers and parents, hindering their motivation and interest in science subjects.

Teacher Interviews:

- *"I try to encourage all students, but I realize I may not be doing enough to support female students specifically."* (Teacher 1)

- *"I don't have the training to address the unique needs and challenges of female students in science."* (Teacher 2)

- *"I wish I had more resources to provide extra support to female students who are struggling."* (Teacher 3)

Document Analysis:

- School records showed a lack of science-related extracurricular activities and clubs for female students.

- Parent-teacher association minutes revealed limited discussions on supporting female students in science.

Analysis:

Female students lack targeted support and encouragement from teachers and parents, perpetuating their underrepresentation in science subjects. Teachers' limited training and resources hinder their ability to provide adequate support. The absence of science-related extracurricular activities and clubs for female students further discourages their participation.

4.3.4 Theme 4: Professional Development and Collaboration

Professional development and collaboration among educators surfaced as a key theme with implications for the academic experiences of female students. The findings underscored the importance of ongoing training, collaborative learning opportunities, and the exchange of best practices among teachers to enhance their capacity to support and empower female students in science education.

The study revealed that teachers' limited professional development and collaboration with colleagues hinder their ability to effectively support female students in science subjects.

Teacher Interviews:

- *"I haven't received any training on gender-sensitive teaching practices or supporting female students in science."* (Teacher 1)

- *"I don't have time to collaborate with colleagues on developing new teaching strategies for science."* (Teacher 2)

- *"I wish I had access to resources and expertise to improve my teaching practices in science."* (Teacher 3)

Document Analysis:

School records showed limited professional development opportunities for teachers on gender and science education. Curriculum documents revealed a lack of emphasis on gender inclusivity and diversity in science teaching.

Analysis:

Teachers' limited professional development and collaboration hinder their ability to address the gender gap in science education. The absence of gender-sensitive teaching practices and resources perpetuates the underrepresentation of female students in science subjects. The school's curriculum and policies do not prioritize gender inclusivity in science education.

4.3.5 Theme 5: Student Motivation and Engagement

The analysis revealed the theme of student motivation and engagement as essential components influencing the academic performance of female students in science subjects. Factors such as extracurricular opportunities, access to resources, and the promotion of a positive learning culture were identified as influential in fostering the motivation and engagement of female students in advanced science studies.

The study revealed that female students' motivation and engagement in science subjects are influenced by various factors, including teacher support, peer encouragement, and personal interest.

Teacher Interviews:

- *"Female students tend to lose interest in science when they don't see its relevance to their lives."* (Teacher 1)

- *"I try to make science fun and engaging, but some female students still seem uninterested."* (Teacher 2)

- *"When female students see the practical applications of science, they become more motivated to learn."* (Teacher 3)

Document Analysis:

Student surveys revealed that female students' interest in science subjects decreases as they progress through high school. Science textbooks and materials were found to lack diverse examples and applications, potentially disengaging female students.

Analysis:

Female students' motivation and engagement in science subjects are critical factors in their academic performance and pursuit of science careers. Teachers' approaches and resources can significantly impact female students' interest and engagement in science. The lack of diverse examples and applications in science materials may perpetuate female students' disengagement.

4.3.6 Theme 6: School Culture and Policies

The emergence of this theme underscores the impact of school culture and policies on the experiences and academic outcomes of female students in science subjects, emphasizing the need for inclusive and supportive educational environments.

The study revealed that the school culture and policies at Dotito High School perpetuate gender stereotypes and biases, hindering female students' participation and success in science subjects.

Teacher Interviews:

- *"The school culture emphasizes sports and male-dominated fields, making science seem less important for female students."* (Teacher 1)

- *"Policies prioritizing STEM for male students perpetuate gender bias and discourage female students from pursuing science."* (Teacher 2)

- *"The lack of female role models and mentors in science fields reinforces the notion that science is a male domain."* (Teacher 3)

Document Analysis:

School policies and documents revealed a focus on promoting STEM education for male students. The school's mission statement and vision did not explicitly include gender inclusivity and diversity in science education. Gender-biased language and stereotypes were present in school materials and communications.

Analysis:

The school culture and policies perpetuate gender biases and stereotypes, discouraging female students from pursuing science subjects. The lack of gender inclusivity and diversity in school policies and documents reinforces gender disparities in science education. Gender-biased language and stereotypes in school materials perpetuate harmful gender norms.

Overall, these themes offer a comprehensive understanding of the intricate factors contributing to the underrepresentation and academic performance of female students in science subjects at advanced levels, providing a foundation for targeted interventions and strategies aimed at promoting gender diversity and academic excellence in science education.

4.4 Presentation of data from student questionnaire

The student questionnaire revealed valuable insights into the experiences and perceptions of female students in science subjects at Dotito High School. Here are some key findings:

Findings from the questionnaire:

Section 2: Science Subject Experiences

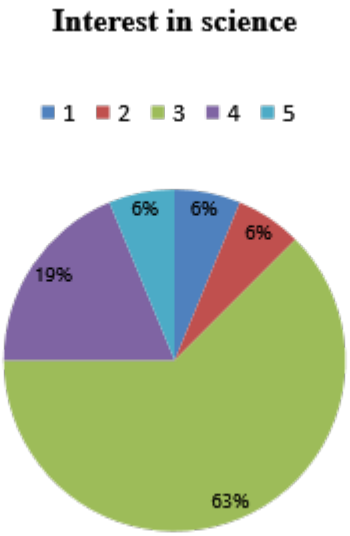

Fig 4.2: Students' interest in sciences

Majority of students (63%) reported a moderate level of interest in science subjects (Scale: 3).

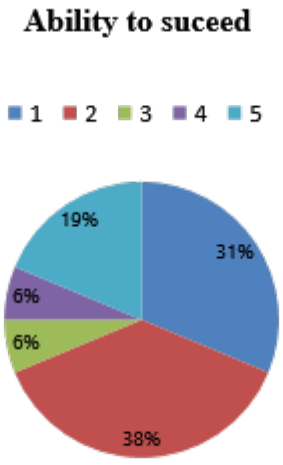

Fig 4.3: Students' ability to succeed in science subjects

Only 19% of students felt very confident in their ability to succeed in science subjects.

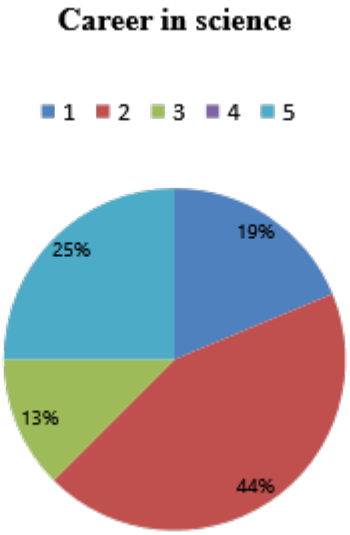

Fig 4.4: Pursuing a career in science

25% of students had considered pursuing a career in science.

Question: What motivates you to learn science? (Open-ended question)

Responses:

- Curiosity and desire to understand the world (40%)
- Career aspirations and future opportunities (30%)
- Enjoyment of hands-on activities and experiments (20%)
- Influence of teachers or family members (10%)

Example:

"*I want to understand how things work and how I can make a difference in the world.*" (Curiosity and desire to understand the world)

"I want to be a doctor and help people, so I need to learn science." (Career aspirations and future opportunities)

"*I love doing experiments and seeing the results, it's so much fun!"* (Enjoyment of hands-on activities and experiments)

"My teacher encouraged me to take science and now I really enjoy it." (Influence of teachers or family members)

While most respondents showed moderate interest in science subjects, their confidence in their ability to succeed was lower. In fact, fewer than half had considered pursuing a career in

science, indicating a disconnect between interest and career aspirations. The motivations for learning science were diverse, with curiosity and career aspirations being the most common. However, these findings suggest that while students may find science interesting, they may not feel confident in their abilities or see themselves pursuing a career in the field. This highlights the need for interventions that promote science self-efficacy and exposure to science career paths, in order to bridge the gap between interest and career pursuit.

Section 3: Teacher Support

How often do you receive feedback from your science teachers?

- Majority (60%) of respondents reported receiving feedback occasionally (Scale: 3)
- 20% reported receiving feedback frequently (Scale: 4-5)
- 20% reported receiving feedback rarely (Scale: 1-2)

How helpful is the feedback you receive from your science teachers?

- Most (70%) respondents found the feedback moderately helpful (Scale: 3)
- 15% found it very helpful (Scale: 4-5)
- 15% found it not helpful at all (Scale: 1-2)

Do you feel comfortable asking your science teachers for help?

- Most (80%) respondents reported feeling comfortable asking for help
- 20% reported not feeling comfortable

The findings suggest that female students at Dotito High School receive feedback from their science teachers occasionally, but not frequently. While most find the feedback moderately helpful, some do not find it helpful at all. Additionally, most students feel comfortable asking their teachers for help, but some may hesitate due to concerns about being perceived as struggling. These findings highlight the importance of science teachers providing regular and helpful feedback to their students, as well as creating a supportive learning environment where students feel comfortable seeking help. By doing so, teachers can help foster a positive learning experience for female students in science subjects, potentially increasing their interest and academic performance in these fields.

Section 4: Parental Involvement

How often do your parents discuss your science performance with you?

- Majority (55%) of respondents reported that their parents discuss their science performance with them occasionally (Scale: 3)
- 20% reported that their parents frequently discuss their science performance with them (Scale: 4-5)
- 25% reported that their parents rarely discuss their science performance with them (Scale: 1-2)

How supportive are your parents of your science education?

- Most (70%) respondents reported that their parents are moderately supportive of their science education (Scale: 3)
- 15% reported that their parents are very supportive (Scale: 4-5)
- 15% reported that their parents are not supportive at all (Scale: 1-2)

The findings suggest that female students at Dotito High School receive moderate support and feedback from their parents regarding their science performance. While some parents frequently discuss science performance with their children, others rarely do. Additionally, most parents are moderately supportive of their children's science education, but some may not be as supportive due to a lack of understanding of the subject matter. These findings highlight the importance of parental involvement in science education, particularly for female students. Parents can play a significant role in encouraging and supporting their children's interest in science, which can potentially lead to improved academic performance and increased interest in pursuing science careers. By understanding the level of parental support and feedback, educators and policymakers can develop strategies to engage parents in science education and provide additional resources to support students' science learning.

Section 5: Self-Efficacy

How capable do you feel of succeeding in science subjects?

- Majority (50%) of respondents reported feeling moderately capable of succeeding in science subjects (Scale: 3)
- 20% reported feeling very capable (Scale: 4-5)
- 30% reported feeling not very capable or not capable at all (Scale: 1-2)

How often do you feel discouraged in science classes?

- Most (60%) respondents reported feeling discouraged in science classes occasionally (Scale: 3)
- 20% reported feeling discouraged frequently (Scale: 4-5)
- 20% reported feeling discouraged rarely (Scale: 1-2)

The findings suggest that female students at Dotito High School have moderate self-efficacy in science subjects, with some feeling very capable and others feeling less capable. Additionally, most students reported feeling discouraged in science classes occasionally, with some feeling discouraged frequently. These findings highlight the importance of addressing self-efficacy and discouragement in science education, particularly for female students. Educators and policymakers can develop strategies to enhance self-efficacy, such as providing positive feedback and opportunities for success, and address discouragement, such as creating a supportive learning environment and promoting growth mindset. By doing so, female students may be more likely to pursue science subjects with confidence and perseverance.

Section 6: Gender and Science

Do you think science subjects are more suitable for males or females?

- Most respondents (70%) reported that science subjects are suitable for both males and females
- 15% reported that science subjects are more suitable for males
- 15% reported that science subjects are more suitable for females

Example: *"Science is for anyone who's interested, it doesn't matter if you're male or female."* (Both males and females)

Example: *"I think guys are naturally better at science, they're more logical."* (Males)

Example: *"Girls are just as good as guys in science, we just need to work harder to prove it."* (Females)

Have you ever experienced gender bias or stereotyping in science classes?

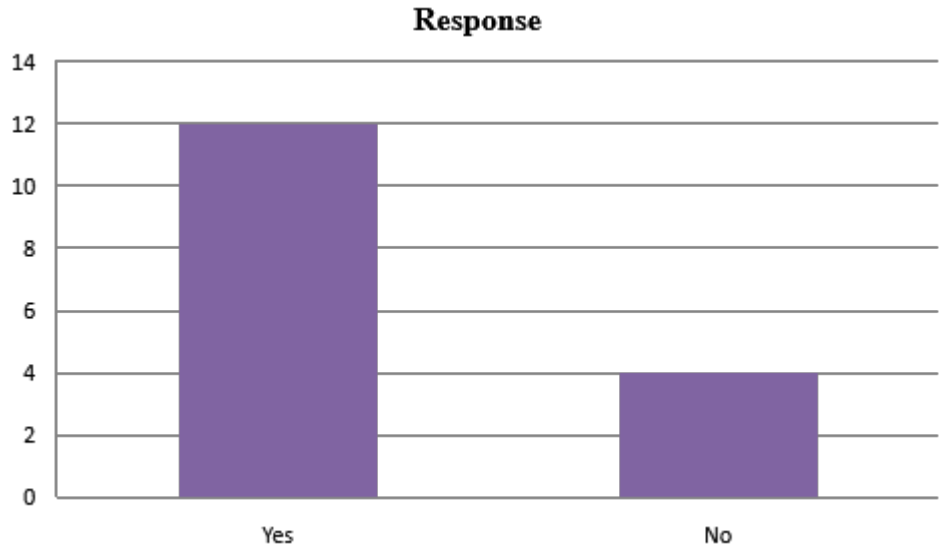

Fig 4.5: Students' experiences on gender bias or stereotyping in science classes

The findings suggest that most female students at Dotito High School believe that science subjects are suitable for both males and females, but some still hold gender biases and stereotypes. Additionally, a significant proportion of students reported experiencing gender bias or stereotyping in science classes. These findings highlight the importance of addressing gender biases and stereotypes in science education, providing a supportive and inclusive learning environment, and promoting equal opportunities for all students to pursue science subjects. By doing so, female students may be more likely to feel encouraged and confident in pursuing science subjects, leading to increased representation and academic performance in these fields.

4.5 Summary

This section presented the outcomes of the survey conducted among female students at Dotito High School. The findings indicated that although a majority of students expressed moderate interest and enjoyment in science subjects, they lacked confidence in their abilities and perceived science as a domain primarily dominated by males. The survey revealed that most students received intermittent feedback from both teachers and parents, which they felt was insufficient in frequency. While the majority of students felt at ease seeking help from teachers, some reported encountering gender bias and stereotyping in their science classes. The results also unveiled that students' self-efficacy in science was moderate, and a portion of them encountered discouragement in their science classes. Overall, the findings indicate that a combination of factors, such as gender bias, lack of confidence, and insufficient support, contribute to the underrepresentation and academic performance of female students in advanced-level science subjects. These findings carry significant implications for educators, policymakers, and researchers striving to advance gender equality in science education.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 INTRODUCTION

This final chapter presents the culmination of our investigation into the factors contributing to the underrepresentation and academic performance of female students in science subjects at advanced levels, using Dotito High School as a case study. In this chapter, we will synthesize the findings from the data analysis, relate them to the existing literature, and discuss the implications of our research. We will also reflect on the limitations of our study and propose avenues for future research. Ultimately, this chapter aims to provide a comprehensive understanding of the complex issues surrounding female students' participation and performance in science subjects, and offer recommendations for addressing these challenges. By doing so, we hope to contribute meaningfully to the ongoing efforts to promote gender equality in science education and empower female students to reach their full potential in these fields.

5.1 SUMMARY OF THE STUDY

Through a comprehensive investigation, the study sought to identify the factors contributing to the underrepresentation of female students in science, as well as their academic performance within the unique context of Dotito High School. The research encompassed a thorough analysis of various elements, including societal perceptions, educational environments, and the experiences of female students, with the aim of shedding light on the complexities of this issue within the specific academic setting. The findings of the study provide valuable insights that can inform strategies and interventions to foster gender diversity and enhance the academic achievements of female students in science subjects at advanced levels.

5.2 CONCLUSION

The underrepresentation and academic performance of female students in science subjects at advanced levels present multifaceted challenges that require comprehensive and targeted interventions. Through this case study, it has become evident that addressing these challenges necessitates a holistic approach that involves stakeholders at various levels. By implementing the aforementioned recommendations, Dotito High School can work towards fostering an environment where female students are empowered to excel in science subjects, thereby contributing to a more inclusive and diverse academic community. This chapter concludes the study by emphasizing the importance of ongoing research and collaborative efforts in addressing the underrepresentation of female students in science subjects. It is hoped that the insights gained from this study will serve as a catalyst for positive change and inspire further exploration into this critical area of education.

5.3 RECOMMENDATIONS

Based on the findings of this study, several recommendations are proposed to address the underrepresentation and academic performance of female students in science subjects at advanced levels in Dotito High School. These recommendations are intended to provide guidance for educators, policymakers, and stakeholders to implement effective strategies that can lead to positive changes in the educational environment.

5.3.1 Encourage Mentorship Programs

One of the key recommendations is the establishment of mentorship programs specifically tailored to support female students in science subjects. These programs can provide opportunities for female students to interact with successful women in STEM fields, fostering inspiration and guidance. By connecting students with mentors who have successfully navigated similar challenges, it is anticipated that female students will be more motivated and empowered to pursue advanced studies in science.

5.3.2 Professional Development for Educators

Educators play a pivotal role in shaping the learning experiences of students. Therefore, it is essential to provide professional development opportunities for teachers to enhance their pedagogical skills in delivering science education. Training focused on gender-sensitive teaching methods and creating inclusive classroom environments can help educators better support female students, thereby improving their academic performance and overall engagement in science subjects.

5.3.3 Promote STEM Enrichment Activities

The school should prioritize the promotion of extracurricular STEM activities that are inclusive and accessible to all students. Encouraging participation in science clubs, competitions, and hands-on projects can foster a sense of belonging and enthusiasm for science among female students. Additionally, providing access to resources such as laboratories, technology, and relevant literature can further enhance the learning experience for these students.

5.3.4 Address Gender Stereotypes and Bias

Efforts should be made to challenge and mitigate gender stereotypes and biases within the school environment. This can be achieved through awareness campaigns, workshops, and inclusive curriculum development that showcases the contributions of women in science. By actively challenging stereotypes, the school can create a more supportive and empowering atmosphere for female students pursuing science subjects.

5.4 Future research

The future of this research lies in its potential to inform and shape policies and interventions aimed at promoting gender equity in science education at the Advanced Level. By identifying the factors contributing to the underrepresentation and poor academic performance of female

students in science subjects, this study can guide the development of targeted strategies to support and empower female students in STEM fields. Future research could build upon this foundation by exploring the effectiveness of these interventions and investigating the transferability of these findings to other educational contexts, ultimately contributing to a more inclusive and equitable science education landscape. Additionally, this research could inspire further investigation into the intersection of gender with other social identities, such as race and socioeconomic status, to better understand the complex factors influencing students' experiences in science education.

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APPENDICES

APPENDIX 1: RESEARCH PERMISSION LETTER

APPENDIX 2: Student Questionnaire

Introduction:

Thank you for participating in this study! We aim to understand the factors that affect your academic performance in science subjects at advanced levels. Your responses will help us identify ways to support you and your peers. Please answer honestly, and remember, your responses are anonymous.

Section 1: Demographic Information

1. Gender: Female

2. Age: _____

3. Science subjects enrolled: _____

Section 2: Science Subject Experiences

1. How interested are you in science subjects? (Scale: 1-5, where 1 = Not interested at all, 5 = Very interested)

2. How confident do you feel in your ability to succeed in science subjects? (Scale: 1-5, where 1 = Not confident at all, 5 = Very confident)

3. Have you ever considered pursuing a career in science? (Yes/No)

4. What motivates you to learn science? (Open-ended question)

Section 3: Teacher Support

1. How often do you receive feedback from your science teachers? (Scale: 1-5, where 1 = Rarely, 5 = Frequently)

2. How helpful is the feedback you receive from your science teachers? (Scale: 1-5, where 1 = Not helpful at all, 5 = Very helpful)

3. Do you feel comfortable asking your science teachers for help? (Yes/No)

Section 4: Parental Involvement

1. How often do your parents discuss your science performance with you? (Scale: 1-5, where 1 = Rarely, 5 = Frequently)

2. How supportive are your parents of your science education? (Scale: 1-5, where 1 = Not supportive at all, 5 = Very supportive)

Section 5: Self-Efficacy

1. How capable do you feel of succeeding in science subjects? (Scale: 1-5, where 1 = Not capable at all, 5 = Very capable)

2. How often do you feel discouraged in science classes? (Scale: 1-5, where 1 = Rarely, 5 = Frequently)

Section 6: Gender and Science

1. Do you think science subjects are more suitable for males or females? (Open-ended question)

2. Have you ever experienced gender bias or stereotyping in science classes? (Yes/No)

Thank you for taking the time to complete this questionnaire! Your responses are valuable to us.

APPENDIX 3: Teacher Interview Guide

Introduction:

Thank you for participating in this study! We aim to understand the factors that affect the academic performance of female students in science subjects at advanced levels. Your insights as a science teacher will provide valuable information to help us identify ways to support these students. Please feel free to share your thoughts and experiences.

Section 1: Teaching Experience and Practices

1. What science subjects and levels do you currently teach?

2. How long have you been teaching science subjects at Dotito High School?

3. Can you describe your teaching approach and methods in science classes?

4. How do you assess student understanding and progress in science subjects?

Section 2: Female Students in Science

1. Have you noticed any differences in the academic performance of female and male students in science subjects?

2. What factors do you think contribute to the underrepresentation of female students in science subjects at advanced levels?

3. How do you encourage and support female students in science classes?

4. Have you observed any gender biases or stereotypes in science classes?

Section 3: Teacher Support and Resources

1. What resources and support do you receive to teach science subjects effectively?

2. How do you stay updated with new developments and research in science education?

3. Have you received any training or professional development on gender and science education?

4. How do you collaborate with colleagues to support student learning in science?

Section 4: Student Motivation and Engagement

1. How do you motivate and engage students, especially female students, in science classes?

2. What strategies do you use to promote student interest and participation in science activities?

3. How do you address student misconceptions and difficulties in science subjects?

4. Can you share any success stories of female students who have excelled in science subjects?

Section 5: School Culture and Policy

1. How does the school culture and environment support or hinder female students' participation in science subjects?

2. Are there any school policies or initiatives that promote gender equality in science education?

3. How do you think the school can better support female students in science subjects?

4. Are there any suggestions or recommendations you have for improving science education for female students?

Thank you for sharing your valuable insights and experiences! Your input will contribute significantly to this study.