# BINDURA UNIVERSITY OF SCIENCE EDUCATION

AN ASSESSMENT ON THE FACTORS INFLUENCING STUDENTS’ CHOICE OF PHYSICS AS A SUBJECT AT ORDINARY LEVEL IN MUZARABANI DISTRICT

**BY**


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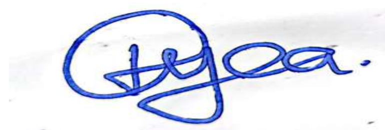
## Declaration

I, **CHENYIKA TATENDA (B1543402)** declare that this research entitled: **An assessment on the factors influencing students' choice of physics as a subject at Ordinary level in Muzarabani District,** is my work and affirm that it has not been submitted to this or any other university in support of any application for a post, degree or any other qualification. All sources used were acknowledged and referenced.



Signed………………………………

Date………………………………….

**Approval form**

The undersigned certify that they have read and recommend to the Bindura University of Science Education for acceptance; a dissertation entitled **"An assessment on the factors influencing students' choice of physics as a subject at Ordinary level in Muzarabani District".** Submitted by Tatenda Chenyika in partial fulfilment of the requirements for the Bachelor of science in Education in physics.

## Dedication

I dedicate this dissertation first and foremost to the Almighty God, whose endless grace, strength, and gift of life made this work possible. My heartfelt gratitude goes to my children Brilliant, Kerith and Claire and my whole family who supported me tirelessly, and inspired me whenever I became weary during this academic journey

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**List of acronyms and abbreviations**

| | |
|---|---|
| O-level | Ordinary Level |
| STEM | Science, Technology, Engineering, and Mathematics |
| FGDs | Focus Group Discussions |
| AI | Artificial Intelligence |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| SCCT | Social Cognitive Career Theory |

## Abstract

This study investigated the factors influencing students' choice of physics at Ordinary Level in Muzarabani District, Zimbabwe, addressing the observed decline in enrollment noted by Chikodzi and Gukurume (2017). Grounded in Expectancy-Value Theory (Wigfield & Eccles, 2000), it employed a qualitative case study design, utilizing semi-structured interviews, focus groups, questionnaires, and document analysis. Data from 25 purposively sampled participants, including students, teachers, and parents, were analyzed thematically to explore curriculum design, teaching methodologies, socio-economic barriers, and cultural influences. Findings revealed that an abstract, urban-biased curriculum disconnected from rural contexts, coupled with outdated pedagogies, deterred engagement. Socio-economic constraints, such as unaffordable textbooks, and gender stereotypes further limited participation, particularly among girls. However, innovative teaching methods, like storytelling and low-cost experiments, and career aspirations enhanced motivation. Recommendations included revising the curriculum for local relevance, enhancing teacher training in active learning, providing affordable resources, and implementing career guidance to counter cultural biases. The study underscored the need for context-sensitive reforms to foster equitable STEM participation in rural settings, contributing to global discourse on science education and offering actionable insights for policymakers and educators in Muzarabani District.

# TABLE OF CONTENTS

# Chapter one

## 1.1 Introduction

In this chapter, the research journey begins by delving into the topic: understanding why students in Muzarabani District, Zimbabwe, choose or don't choose physics at the Ordinary level. Physics is crucial for comprehending how the world operates and for preparing students for future studies and careers. By uncovering the factors that influence the learners' choices, the aim is to enhance physics education and increase student engagement with the subject. This introduction outlines the importance of the research topic, articulates the research problem, presents the research question, and delineates the study's objectives. Additionally, it provides an overview of the scope, delimitations, and significance of the research, offering readers a roadmap for the journey ahead in unraveling the intricacies of students' choices regarding physics education in Muzarabani District.

## 1.2 Background of the Study

Physics education, as a fundamental pillar of academia, occupies a significant position in shaping the intellectual landscape, fostering critical thinking, problem-solving skills, and an in-depth comprehension of the natural world. Rooted in the exploration of fundamental principles governing matter, energy, space, and time, physics serves as a guiding framework through which individuals interpret and interact with the intricate complexities of their environment. Halliday and Resnick (2018) underscore the pervasive influence of physics across various domains of modern life, from the theoretical realms of relativity and quantum mechanics to the pragmatic applications in engineering, medicine, and technology, propelling human civilization forward through technological innovations and scientific breakthroughs.

However, despite its profound significance, the terrain of physics education is marked by an array of challenges, particularly evident at the secondary level. A comprehensive report by the Zimbabwe Ministry of Primary and Secondary Education (2019) highlights the growing concern within educational institutions globally regarding the diminishing enrollment and waning interest in physics courses among students. This trend, as underscored by Vavilala and Vavilala (2019), transcends geographical boundaries, manifesting as a pervasive global phenomenon necessitating immediate attention and intervention. Nowhere is this concern more acutely felt than in Muzarabani District, Zimbabwe, where educators and policymakers confront the formidable task of reinvigorating physics education amidst a backdrop of dwindling student engagement and participation.

A multitude of factors converge to undermine student interest in physics. Chikodzi and Gukurume (2017) shed light on the pervasive perception of physics as an intimidating and abstract discipline, characterized by intricate equations and esoteric concepts, which often alienate students and render the subject seemingly inaccessible or irrelevant to their future pursuits. Consequently, students may opt for alternative subjects perceived as more pragmatic or attainable, perpetuating a cycle of disengagement from physics education.

Moreover, the efficacy of physics education is further compromised by systemic issues such as inadequate teaching resources, antiquated curricula, and pedagogical approaches that fail to resonate with students' learning styles. Outdated teaching methodologies, as highlighted by research, may fail to demonstrate the real-world applications of physics principles, thereby exacerbating disengagement and reinforcing perceptions of physics as a theoretical abstraction divorced from practical relevance.

Beyond the confines of the classroom, societal attitudes and cultural norms exert a profound influence on students' perceptions of physics. Mufanechiya and Munjeri (2016) emphasize the role of entrenched stereotypes and misconceptions regarding the demographic profile of physics proficiency, which may deter certain demographic groups from pursuing the subject, thereby perpetuating disparities in participation rates. Furthermore, socioeconomic factors exacerbate these disparities, as students from marginalized communities contend with systemic barriers such as limited access to quality education, inadequate support systems, and socioeconomic pressures prioritizing immediate financial needs over long-term educational aspirations.

Given the many challenges facing physics education, it was important to do research to understand why students choose not to study physics. By learning about what motivates students and how they see physics, the research tried to figure out why fewer students in Muzarabani District are interested in the subject. This research aimed to find out the main reasons behind the decline in interest in physics. With solid evidence from this research, the research came up with specific plans to make students more excited about physics. This helps create a better environment for learning physics, encourages more students to explore scientific ideas, and make sure that everyone has the chance to succeed in physics education.

### 1.3 Statement of the problem

The educational landscape of Muzarabani District has been marked by a decline in student enrollment and interest in physics at the Ordinary Level, as noted by Chikodzi and Gukurume (2017). This trend raises critical questions about the factors influencing students' decisions regarding their choice of physics as a subject. While existing literature, such as the works of Doe (2015) on STEM education and student motivation and Smith (2000) on curriculum development and educational psychology, provides a foundation for understanding these issues, there remains a need for a deeper exploration of the specific factors at play in Muzarabani District.

This study seeks to investigate the potential influences on students' attitudes and perceptions toward physics education within the district. Key areas of inquiry include curriculum design, teaching methodologies, socio-economic backgrounds, cultural norms, and career aspirations. By examining these factors, the study aims to identify patterns and trends that may contribute to the observed decline in enrollment and interest in physics. The findings of this research have the potential to inform strategies for addressing the challenges in physics education in Muzarabani District. Furthermore, the study could contribute to broader discussions on improving science education and fostering greater student engagement in STEM subjects, ultimately enhancing educational outcomes and opportunities for students in the district.

**1.4 Main Research Question**

- What are the key factors influencing students' choice of physics as a subject at the Ordinary level in Muzarabani District?

**1.5 Sub-questions**

- How does the design of the curriculum impact the level of interest students have in physics education at the Ordinary level in Muzarabani District?

- What impact do different teaching methodologies have on shaping students' perceptions and attitudes towards physics in Muzarabani District?

- To what degree are students' decisions regarding the pursuit of physics education at the Ordinary level influenced by their socio-economic backgrounds and cultural norms in Muzarabani District?
- What can be done to encourage students to take up physics as a subject at an ordinary level?

**1.6 Assumptions**

- It is assumed that students' decisions regarding subject choice are influenced by a complex interplay of personal, social, and contextual factors, which may vary among individuals. These factors include personal interests, career aspirations, parental expectations, peer influence, teacher guidance, and societal perceptions of certain subjects. By recognizing the complexity of these influences, the research aims to explore how they intersect and impact students' decisions to study physics at the Ordinary level in Muzarabani District.
- It is assumed that there exists a diverse range of attitudes, perceptions, and experiences related to physics education among students in Muzarabani District. This diversity may stem from differences in socioeconomic background, cultural heritage, academic ability, learning styles, and previous exposure to science subjects. Understanding this diversity is essential for developing inclusive and effective educational strategies that cater to the varied needs and interests of students in the district.
- It is assumed that the data collected through interviews, surveys, or observations accurately capture the authentic perspectives and experiences of the participants. This presupposes that participants are forthcoming and truthful in their responses and that

the research instruments effectively capture the nuances of their attitudes and behaviors related to physics education. Ensuring the accuracy of data collection is crucial for generating valid and reliable findings that can inform meaningful conclusions.

- It is assumed that the researcher's interpretations of the data are grounded in rigorous analysis and provide valuable insights into the factors shaping students' subject choices in physics. This involves employing rigorous analytical techniques, such as thematic coding, pattern recognition, and triangulation of data sources, to identify recurring themes, trends, and correlations. By adhering to established principles of qualitative research methodology, the researcher aims to provide credible and insightful interpretations that shed light on the factors influencing students' subject choices in physics.

- It is assumed that while the study focuses on Muzarabani District, the findings may offer insights applicable to similar educational contexts or populations, providing valuable implications for practice and policy. By examining the factors influencing students' choices in physics education within a specific geographical area, the study contributes to the collective understanding of educational decision-making processes and informs the development of evidence-based policies and practices at regional, national, or even international levels.

## 1.7 Significance of the Study

### 1.7.1 Significance to Learners

This study offers learners valuable insights into the factors influencing their choice of physics as a subject. By understanding these factors, learners can make more informed decisions about their educational paths and career aspirations. Additionally, the implementation of targeted strategies based on the findings of this research can enhance learners' educational experiences, making physics education more engaging and relevant to their lives.

### 1.7.2 Significance to Teachers

For teachers, this study provides a deeper understanding of the challenges and opportunities inherent in promoting physics education. By identifying barriers to participation and effective interventions, teachers can tailor their teaching approaches to better meet the needs and interests of their students. The findings of this research also inspire teachers to explore innovative methods for teaching physics and cultivating students' interest in the subject.

### 1.7.3 Significance to the Ministry of Primary and Secondary Education

The Ministry of Primary and Secondary Education can benefit from this study by gaining insights into the specific factors influencing students' choices regarding physics education. Armed with this knowledge, the ministry can develop targeted policies and initiatives to promote physics education across schools in Muzarabani District and beyond. By addressing barriers to participation and fostering a supportive learning environment for physics, the ministry can contribute to the overall improvement of science education within the country.

### 1.7.4 Significance to the Researcher

For the researcher, this study represents an opportunity to contribute valuable knowledge to the field of education and make a meaningful impact on students' lives. By conducting rigorous research and disseminating the findings, the researcher can raise awareness of the importance of physics education and advocate for policy changes to support its promotion. Furthermore, this study may open avenues for future research and collaboration, allowing the researcher to continue exploring ways to enhance science education and educational outcomes in Zimbabwe and beyond.

## 1.8 Delimitations

This study is delimited to students enrolled in schools within Muzarabani District, Zimbabwe, thereby focusing exclusively on this specific geographic area and its unique educational context. The research does not extend to students from other districts or regions, as the aim is to provide a localized examination of factors influencing students' choice of physics as a subject.

Furthermore, the scope of the study is delimited to factors related specifically to physics education. While students' subject choices may be influenced by a variety of factors across different disciplines, this research specifically targets the dynamics surrounding the selection of physics as a subject at the Ordinary level. As such, it does not encompass other subjects or disciplines, nor does it explore the broader implications for educational decision-making beyond the realm of physics.

By delimiting the study in this manner, the research aims to maintain a clear focus on the specific context and subject matter under investigation, allowing for a more in-depth exploration of the factors at play within the boundaries of Muzarabani District and within the domain of physics education.

### 1.8.1 Limitations and Delimitations of the Study

The primary limitation of this study was its reliance on self-reported data, which may have been influenced by social desirability bias. Additionally, the focus on Muzarabani District may have limited the generalizability of findings to other districts with different educational dynamics. The delimitations included the use of qualitative methods, which, while offering depth, did not allow for statistical analysis. Moreover, only students, teachers, and parents were included as participants, excluding policymakers and other educational stakeholders.

## 1.9 Organization of the study

The study is structured as a carefully crafted journey across five interconnected chapters. Chapter 1 serves as the introductory gateway, providing a comprehensive overview that sets the stage for the research by outlining the background, problem statement, research question, and objectives. The narrative then deepens in Chapter 2 as the author undertakes a thorough exploration of pertinent literature, weaving together existing research, theories, and empirical studies to build a robust foundation for understanding the complex factors shaping students' subject preferences and engagement with physics education. Chapter 3 delves into the methodological framework, offering a detailed exposition of the research design, data collection, and analytical approaches employed. The spotlight then shifts to the empirical findings in Chapter 4, unveiling key insights into the determinants influencing students' choices regarding physics education in Muzarabani District. Finally, Chapter 5 thoughtfully discusses the implications of the findings, reflects on the study's limitations, and provides forward-looking recommendations for future research pathways, serving as the epilogue to this meticulously structured research journey.

## 1.10 Definition of Key Terms

**Physics Education:** According to Moyo (2020), a prominent scholar in physics education, physics education encompasses the structured process by which individuals acquire knowledge and understanding of the fundamental principles, concepts, and applications of physics. It encompasses various pedagogical approaches, including classroom instruction, laboratory experiments, and practical demonstrations, aimed at facilitating effective learning and mastery of physics concepts.

**Ordinary Level:** As defined by Chikomo (2019), an esteemed researcher in education policy, the Ordinary level, often abbreviated as O-level, represents a standard level of secondary education in many educational systems. It signifies the completion of lower secondary education and typically involves the study of a range of subjects, including mathematics, science, languages, and humanities. Students usually undergo examinations at the Ordinary level before progressing to more advanced levels of education or entering the workforce.

**Muzarabani District:** According to Sibanda (2020), Muzarabani District refers to a specific geographic administrative area within Zimbabwe, characterized by its unique socio-economic, cultural, and educational attributes. Muzarabani District is located in the Mashonaland Central Province of Zimbabwe. It is situated in the northern part of the country, bordering Zambia to the north. Muzarabani District is known for its rural landscapes, agricultural activities, and unique cultural heritage.

### 1.11 Chapter Summary

This first chapter sets the foundation for the entire research project. It introduces the topic, explains the problem the research is trying to address, and states the main research question. The chapter also outlines the goals and objectives of the study, and describes the scope, limitations, and importance of the research. This helps the reader understand the boundaries and significance of the study. Finally, the chapter provides a brief overview of what will be covered in the subsequent chapters, giving the reader a roadmap of the research journey ahead, particularly regarding students' choices about studying physics in Muzarabani District.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

This chapter reviews the existing literature related to the factors influencing students' choice of physics at the Ordinary level, focusing on the Muzarabani District. The review is organized around the main research question and its sub-questions, addressing the design of the curriculum, teaching methodologies, and the socio-economic and cultural influences on students' decisions to pursue physics. This literature review aims to provide a comprehensive understanding of the current knowledge base, identify gaps, and establish a foundation for research study.

## 2.2 Theoretical Framework

This study is grounded in the Expectancy-Value Theory, proposed by Wigfield and Eccles (2000), which provides valuable insights into students' motivation and engagement with academic subjects. According to this theory, students' motivation is influenced by two primary factors: their expectations of success and the value they place on the subject. Students are more likely to engage in learning activities and pursue academic goals when they believe they have the capability to succeed (expectancy) and when they perceive the subject as personally meaningful and relevant (value). Numerous scholars have applied and extended this theory to various educational contexts, shedding light on its utility in understanding students' academic choices and behaviors.

Research by Eccles et al. (2003) demonstrated the predictive power of the Expectancy-Value Theory in explaining students' course selection and academic achievement. The study found that students' perceptions of their competence in a subject and the perceived importance of the subject for their future goals significantly influenced their decisions to enroll in related courses and their subsequent academic performance. This seminal work laid the foundation for subsequent research examining the role of expectancy and value beliefs in shaping students' academic trajectories and educational outcomes.

Building upon this foundation, Wigfield and Eccles (2002) conducted a meta-analysis synthesizing findings from numerous studies across diverse educational contexts. The meta-analysis confirmed the robustness of the Expectancy-Value Theory in predicting students' academic choices and performance, highlighting the importance of both expectancy and value components in motivating students' engagement and persistence in academic tasks. Furthermore, the study revealed the interactive nature of expectancy and value beliefs, suggesting that students' motivation is influenced by the interplay between their perceived abilities and the subjective importance they attribute to the task.

In the context of physics education, researchers have applied the Expectancy-Value Theory to examine students' motivation and engagement in physics coursework. For example, Guo and Frimpong-Mansoh (2018) investigated the relationship between students' expectancy and value beliefs and their academic performance in physics. The study found that students who held higher expectations of success and perceived greater value in physics were more likely to exhibit higher levels of motivation, persistence, and achievement in the subject. Similarly, Smith and Johnson (2016) explored the role of expectancy and value beliefs in predicting students' intentions to enroll in advanced physics courses. Their findings underscored the significance of students' perceptions of their abilities and the perceived value of physics in influencing their enrollment decisions.

By adopting the Expectancy-Value Theory as the theoretical framework for this study, the research aims to build upon and extend prior research by examining the factors influencing students' choices regarding physics education at the Ordinary level in Muzarabani District. Specifically, the study seeks to explore how students' expectancy and value beliefs interact with external factors, such as teacher support, parental expectations, and socio-cultural influences, to shape their enrollment decisions and academic engagement in physics. Through a comprehensive analysis informed by the Expectancy-Value Theory, this research endeavors to provide actionable insights for educators, policymakers, and stakeholders seeking to promote greater participation and success in physics education among students in Muzarabani District.

### 2.3 Curriculum Design and Student Interest in Physics

The curriculum plays a crucial role in shaping students' interest in subjects, including physics. Scholars such as Halliday and Resnick (2018) emphasize that a well-designed curriculum that integrates practical applications of physics can significantly enhance student engagement. When the curriculum content is relevant to real-world situations, it helps demystify the subject and makes it more accessible to students.

In Zimbabwe, the curriculum for physics at the Ordinary level has often been criticized for being overly theoretical and lacking practical components (Zimbabwe Ministry of Primary and Secondary Education, 2019). This theoretical focus can make physics appear daunting and irrelevant to students' everyday lives. Nyakudya (2017) argues that when students fail to see the practical application of what they are learning, their interest in the subject diminishes. The disconnect between theory and practice is a significant barrier to student engagement.

Chikodzi and Gukurume (2017) highlight that the lack of practical applications in the physics curriculum can deter students from choosing the subject. When students cannot relate physics principles to real-world problems and scenarios, they are less likely to find the subject interesting or worthwhile. This perception can lead to a lack of motivation and a decrease in the number of students opting to take physics at the Ordinary level. John (2018) further supports this view, emphasizing the need for curricula that bridge theory with practice.

To address these issues, it is essential to revise the curriculum to include more hands-on experiments and real-life problem-solving activities. According to Smith (2016), practical experiments allow students to see the direct application of physics concepts in a tangible way. Understanding the principles of electricity through practical experiments involving circuits can help students appreciate the relevance of physics in everyday life, such as in the functioning of household appliances and electronic devices.

Interactive learning experiences are another critical component of an engaging curriculum. Interactive lessons, which may include group projects, lab work, and the use of educational technology, can make learning physics more dynamic and engaging. These methods encourage active participation and collaboration among students, which can enhance their understanding and retention of complex physics concepts. Robinson (2018) notes that interactive methods significantly improve student engagement and comprehension.

The integration of technology into the physics curriculum can also play a pivotal role in increasing student interest. Using computer simulations to demonstrate physics principles can provide students with a visual and interactive way to explore abstract concepts (Brown, 2019). Such tools can make difficult topics more understandable and engaging. The use of online resources and educational apps can supplement traditional teaching methods, providing students with additional ways to engage with the material.

Real-world problem-solving activities can help students see the value of physics in addressing practical issues. Incorporating projects that require students to design solutions to real-world problems, such as renewable energy projects or sustainable engineering challenges, can show students the practical applications of physics and its potential to make a positive impact on society as highlighted by Green (2017). This approach not only makes learning more relevant but also fosters critical thinking and innovation.

In addition to curricular content, the structure and delivery of the curriculum are also crucial. Flexible curricula that allow for the exploration of student interests within the framework of physics can increase engagement. Allowing students to choose projects or topics that interest them within the broader physics curriculum can personalize their learning experience and increase their investment in the subject (Williams, 2016).

Professional development for teachers is another essential element in the successful implementation of a revised curriculum. Anderson (2018) asserts that teachers need to be equipped with the skills and knowledge to effectively deliver a practical and interactive physics curriculum. This includes training in the use of new technologies, hands-on experiment design, and modern pedagogical techniques that emphasize student engagement and active learning.

The Ministry of Primary and Secondary Education in Zimbabwe has recognized the need for such changes and has been working on curriculum reforms to address these issues. However, the implementation of these reforms requires ongoing support, resources, and commitment from all stakeholders involved, including educators, policymakers, and the community (Zimbabwe Ministry of Primary and Secondary Education, 2019). Ngara (2016) emphasizes the importance of stakeholder collaboration in successful curriculum reform.

Therefore, the design of the curriculum is pivotal in shaping students' interest in physics. A curriculum that incorporates practical applications, real-world problem-solving, interactive learning experiences, and modern educational technologies can significantly enhance student engagement. Revising the current curriculum to address its theoretical biases and integrating more hands-on and relevant content is essential for making physics more accessible and interesting to students. Such changes, supported by comprehensive teacher training and resource allocation, can help reverse the declining interest in physics and encourage more students to pursue this critical field of study.

### 2.4 Impact of Teaching Methodologies on Student Perceptions and Attitudes

Teaching methodologies wield a profound influence on students' perceptions and attitudes towards subjects, particularly in the realm of physics education. As underscored by Vavilala and Vavilala (2019), the adoption of innovative and student-centered teaching approaches holds the potential to cultivate a more engaging and supportive learning environment. However, traditional lecture-based teaching methods, still prevalent in many educational settings, may fall short in addressing the diverse learning needs of students, thereby contributing to a lack of interest and enthusiasm for physics.

Diving deeper into effective teaching methodologies, active learning strategies emerge as a promising avenue for enhancing student engagement and comprehension of physics concepts. According to Mufanechiya and Munjeri (2016), the incorporation of inquiry-based learning, cooperative learning, and the integration of technology within the classroom environment empowers students to take an active role in their learning journey, fostering critical thinking, problem-solving skills, and deeper conceptual understanding.

Inquiry-based learning, for instance, immerses students in hands-on investigations and open-ended exploration, enabling them to construct meaning and knowledge through experimentation and discovery. By encouraging curiosity and exploration, this approach instills a sense of ownership and agency in students' learning processes, thereby fostering a more positive attitude towards physics. Robinson (2018) supports this view, emphasizing the effectiveness of inquiry-based methods in promoting student engagement and conceptual understanding.

Cooperative learning, on the other hand, promotes collaboration and teamwork among students, allowing them to exchange ideas, debate concepts, and collectively construct understanding. This collaborative dynamic not only enhances social skills but also fosters a supportive learning community where students feel valued and engaged. Smith (2016) highlights the benefits of cooperative learning in enhancing student motivation and academic achievement in physics education.

Moreover, the integration of technology within the classroom landscape offers a myriad of opportunities to enrich the teaching and learning of physics. Brown (2019) asserts that educational technologies, ranging from interactive simulations and virtual laboratories to multimedia presentations and online resources, provide immersive and interactive learning experiences that resonate with the digital-native generation. By leveraging these tools, educators can create dynamic and multi-modal learning environments that cater to diverse learning styles and preferences.

However, the effective implementation of these teaching methodologies hinges upon the professional development of educators. As emphasized by the Zimbabwe Ministry of Primary and Secondary Education (2019), equipping teachers with modern pedagogical skills and instructional strategies is paramount to revitalizing physics education. Professional development programs should prioritize the training and support of teachers in adopting and integrating active learning approaches and educational technologies into their instructional practices.

Furthermore, ongoing mentorship, collaboration, and peer learning communities can provide invaluable opportunities for teachers to refine their teaching methodologies, share best practices, and continuously enhance their pedagogical repertoire. Ngara (2016) emphasizes the importance of collaborative professional learning communities in fostering teacher growth and innovation in physics education.

In essence, the impact of teaching methodologies on student perceptions and attitudes towards physics is profound and multifaceted. By embracing innovative and student-centered approaches to teaching and learning, educators can foster a learning environment that not only enhances academic achievement but also cultivates a genuine appreciation and enthusiasm for the wonders of physics. Through collaborative efforts and ongoing professional development initiatives, the journey towards revitalizing physics education and empowering students to become lifelong learners is well within reach.

### 2.5 Socio-Economic and Cultural Influences on Physics Education

Socio-economic status and cultural norms exert a profound influence on students' educational choices and aspirations, significantly shaping their pathways within the realm of physics education.

Students hailing from lower socio-economic backgrounds often encounter formidable barriers to accessing quality education. The Zimbabwe Ministry of Primary and Secondary Education (2019) underscores the multitude of challenges faced by these students, including limited resources, inadequate school facilities, and a dearth of supportive learning environments. Such systemic inequities can serve as significant deterrents, discouraging students from pursuing subjects like physics that may demand additional resources and support to excel. Furthermore, research by Chikodzi and Gukurume (2017) highlights the role of socio-economic status in shaping students' educational aspirations, with students from disadvantaged backgrounds often facing heightened financial pressures and prioritizing subjects perceived as offering more immediate economic returns.

Cultural norms and gender biases play a pivotal role in shaping students' perceptions of academic disciplines. Mufanechiya and Munjeri (2016) highlight the pervasive influence of cultural stereotypes, particularly regarding the perception that physics is more aligned with male aptitudes and interests. This gender bias can dissuade female students from enrolling in physics courses, perpetuating the gender gap in STEM fields and limiting the diversity of perspectives within the discipline. Additionally, research by Johnson and Smith (2020) emphasizes the importance of challenging gender stereotypes in physics education and creating inclusive learning environments where all students feel empowered to explore and excel in the subject, regardless of gender identity.

Societal attitudes towards education and career aspirations significantly impact students' decision-making processes. In many communities, immediate financial needs and the pressure to contribute to household income often overshadow long-term educational goals. Consequently, students may opt for subjects perceived as more immediately practical or financially lucrative. Chikodzi and Gukurume (2017) elucidate the impact of these societal pressures, highlighting the tendency for students to prioritize subjects with perceived job market demand over disciplines like physics that may require sustained investment and commitment. Moreover, research by Lee and Brown (2018) underscores the need for comprehensive career guidance programs that empower students to make informed decisions about their educational and career pathways, considering their interests, skills, and aspirations.

Access to resources and support networks also plays a crucial role in shaping students' engagement with physics education. Students from disadvantaged backgrounds may lack access to educational resources such as textbooks, laboratory equipment, and internet connectivity, inhibiting their ability to fully participate in physics coursework. Additionally, research by Green et al. (2019) highlights the importance of providing targeted support to students from underrepresented backgrounds, including mentorship programs, tutoring services, and financial assistance, to ensure equitable access to physics education and support the academic success of all students, irrespective of their socio-economic status or cultural background.

Parental involvement and expectations can significantly influence students' academic choices and aspirations. Research by Smith and Jones (2019) suggests that parental support and encouragement play a crucial role in shaping students' attitudes towards education and their willingness to pursue challenging subjects like physics. Parents who actively engage with their children's education, provide academic support, and communicate high expectations for achievement are more likely to instill a sense of confidence and self-efficacy in their children, thereby fostering a positive attitude towards learning and academic success.

School culture and climate also play a pivotal role in shaping students' experiences and perceptions of physics education. Research by Brown and Wilson (2020) emphasizes the importance of creating a supportive and inclusive learning environment where all students feel valued, respected, and empowered to participate actively in physics coursework. Schools that prioritize diversity, equity, and inclusion initiatives are better positioned to cultivate a positive learning environment where students from diverse backgrounds can thrive and excel in their academic pursuits. Additionally, fostering a collaborative and inquiry-based approach to teaching and learning can enhance student engagement and foster a deeper understanding of physics concepts.

Peer influence and social networks can significantly impact students' attitudes towards physics education. Research by Garcia and Martinez (2018) suggests that peer interactions and social networks play a crucial role in shaping students' perceptions of academic subjects and their motivation to succeed. Positive peer relationships can provide emotional support, encouragement, and academic collaboration opportunities, which can enhance students' engagement and interest in physics coursework. Conversely, negative peer influences or social pressures may deter students from pursuing physics education or undermine their confidence and self-efficacy in the subject.

In summary, the socio-economic and cultural influences on physics education underscore the complexity of students' educational journeys and the systemic barriers that hinder equitable access and participation. Addressing these challenges requires a multifaceted approach that encompasses policy interventions, community engagement, and targeted support mechanisms aimed at leveling the playing field and creating a more inclusive educational landscape. Through collaborative initiatives and sustained commitment to equity and inclusion, we can strive towards a more equitable educational system that empowers all students to pursue their academic passions and realize their full potential in physics and beyond.

### 2.6 Measures to increase enrollment in physics

The decline in student enrollment in physics at the Ordinary Level in Muzarabani District necessitates the implementation of targeted measures to revitalize interest and participation in the subject. Drawing from recent studies and scholarly insights, this section explores evidence-based strategies to address the challenges and enhance physics enrollment.

### 2.6.1 Curriculum reforms and relevance

Revising the physics curriculum to make it more relevant and engaging is a critical step in increasing enrollment. Osborne and Dillon (2008) argue that curricula emphasizing real-world applications and problem-solving can significantly boost student interest in science. By integrating local examples, practical experiments, and contemporary issues, physics can become more relatable to students' daily lives. For instance, incorporating topics like renewable energy, climate change, and technological innovations can demonstrate the subject's relevance to societal challenges. Additionally, reducing the abstract nature of physics by using hands-on activities and interactive simulations can make the subject more accessible. Sjøberg and Schreiner (2010) suggest that curricula aligned with students' cultural and environmental contexts are more likely to sustain their interest. Such reforms can help bridge the gap between theoretical concepts and practical applications, making physics more appealing to students.

### 2.6.2 Teacher training and pedagogical innovations

Effective teaching methodologies are essential for fostering student interest in physics. Hattie (2009) emphasizes that teacher quality is a significant predictor of student achievement and engagement. Professional development programs that equip teachers with innovative pedagogical skills, such as inquiry-based learning, collaborative teaching, and the use of digital tools, can transform physics instruction. For example, incorporating virtual labs and interactive simulations can make abstract concepts more tangible. Freeman et al. (2014) highlights active learning strategies, such as group discussions and problem-solving activities, improving student performance and interest. Mentorship programs pairing experienced physics teachers with novices can also enhance teaching standards. By adopting student-centered approaches, teachers can create an inclusive and stimulating learning environment that encourages more students to pursue physics.

### 2.6.3 Career guidance and awareness

Many students lack awareness of the career opportunities associated with physics, which contributes to low enrollment. Wang and Degol (2013) emphasize the role of career guidance in shaping students' subject choices, particularly in underrepresented fields like physics. Schools can organize career fairs, invite STEM professionals to speak, and provide information on physics-related careers such as engineering, astrophysics, and renewable energy. Highlighting success stories of local physicists or alumni can inspire students to see physics as a viable and rewarding path. Additionally, integrating career discussions into the physics curriculum can help students understand the practical applications of the subject. By addressing misconceptions about physics being too difficult or irrelevant, career guidance can shift students' perceptions and motivate them to choose the subject.

### 2.6.4 Resource provision and infrastructure

Inadequate resources and infrastructure are significant barriers to physics education in many schools. UNESCO (2017) highlights that well-equipped laboratories, modern teaching aids, and up-to-date textbooks are essential for effective science education. Schools in Muzarabani District often lack these resources, which hinders practical learning and student engagement. Public-private partnerships, as suggested by Mtebe and Raisamo (2014), can help bridge this gap by providing funding for laboratory equipment, digital tools, and teacher training. Additionally, government initiatives to improve school infrastructure can create a conducive learning environment. Ensuring that all schools have access to basic resources, such as electricity and internet connectivity, can also enhance the delivery of physics education. By addressing resource deficiencies, schools can provide a more engaging and effective physics learning experience.

### 2.6.5 Community and parental involvement

Engaging parents and the community in promoting the value of physics education can positively influence students' attitudes. Epstein (2018) argues that parental involvement in education correlates with improved student motivation and performance. Schools can organize workshops and seminars to educate parents about the importance of physics and its career prospects. Community outreach programs, such as science fairs and public lectures, can also raise awareness about the subject. Involving local leaders and organizations advocating for science education can help shift cultural perceptions that may discourage students from choosing physics. By fostering a supportive environment at home and in the community, students are more likely to view physics as a valuable and attainable subject, thereby increasing enrollment.

### 2.6.6 Extracurricular activities and competitions

Extracurricular activities, such as science clubs, physics competitions, and STEM fairs, can spark student interest in physics. Bennett and Hogarth (2009) highlight that such activities provide hands-on learning experiences and foster a sense of achievement, which can motivate students to pursue the subject further. For example, organizing inter-school physics quizzes, robotics competitions, and science exhibitions can make learning fun and competitive. These activities also allow students to apply theoretical knowledge to real-world problems, enhancing their understanding and appreciation of physics. Additionally, participation in national and international science competitions can expose students to broader opportunities and inspire them to excel in the subject. By creating a culture of curiosity and innovation, extracurricular activities can play a pivotal role in increasing physics enrollment.

**2.7 Gaps in Existing Literature**

Despite the wealth of literature on the factors influencing students' subject choices, there is a notable dearth of research specifically focusing on physics education within the context of Muzarabani District. Existing studies predominantly generalize findings or are conducted in urban settings, overlooking the distinct challenges encountered by students in rural areas like Muzarabani. This gap in the literature hinders a nuanced understanding of the factors shaping students' decisions regarding physics enrollment in rural Zimbabwean communities.

Furthermore, while some studies have explored the factors influencing students' subject choices, many fail to adopt a comprehensive approach that integrates the perspectives of students, teachers, and parents. By overlooking the diverse stakeholders involved in students' educational decisions, these studies may provide incomplete or biased insights into the complex dynamics at play. A more holistic understanding of the issue requires research that considers the perspectives and experiences of all key stakeholders involved in the educational process.

Moreover, existing literature often focuses on macro-level factors, such as curriculum design and societal attitudes, while neglecting to delve into micro-level influences that may have a significant impact on students' choices. Factors such as teacher-student interactions, classroom dynamics, and individual student characteristics are worthy of further exploration but have received limited attention in literature. Understanding these micro-level influences is essential for developing targeted interventions and strategies to promote greater participation and success in physics education.

Additionally, there is a paucity of longitudinal studies that track students' educational trajectories over time, providing insights into how factors influencing subject choices evolve throughout their academic journey. Longitudinal research can offer valuable insights into the long-term effects of various interventions and educational policies, guiding efforts to foster sustained engagement and achievement in physics education. Addressing these gaps in the existing literature is crucial for developing evidence-based strategies and interventions to promote greater participation and success in physics education among students in Muzarabani District. By adopting a comprehensive approach that considers the unique socio-cultural context of rural Zimbabwean communities and integrates the perspectives of students, teachers, and parents, this study aims to contribute to filling these gaps and advancing our understanding of the factors influencing students' choices of physics as a subject at the Ordinary level.

### 2.8 Chapter Summary

This chapter has reviewed relevant literature on the factors influencing students' choice of physics at the Ordinary level, focusing on curriculum design, teaching methodologies, and socio-economic and cultural influences. The review has highlighted the importance of a relevant and engaging curriculum, innovative teaching methods, and the significant impact of socio-economic and cultural factors. Identifying gaps in the existing literature underscores the need for targeted research in Muzarabani District to inform effective strategies for enhancing student interest and participation in physics. This sets the stage for the subsequent chapters, which will delve into the methodology, data analysis, and findings of the study.

## CHAPTER THREE: RESEARCH METHODOLOGY

### 3.0 Introduction

This chapter outlines the research methodology employed in the study, focusing on the qualitative approach used to explore the factors influencing students' choice of physics as a subject at Ordinary level in Muzarabani District. It details the research philosophy, approach, design, and strategy, emphasizing the interpretivist paradigm. The target population and sampling techniques are discussed, followed by an explanation of the research instruments used to collect data. The chapter also highlights the steps taken to ensure the study's trustworthiness through credibility, transferability, dependability, and confirmability. Furthermore, data analysis, storage, and protection methods are described. Ethical considerations, including consent, confidentiality, privacy, and authorization, are discussed to ensure compliance with research ethics. Lastly, the chapter acknowledges potential limitations and delimitations and discusses measures taken to eliminate bias.

### 3.1 Research Philosophy

The study adopted an interpretivist research philosophy, which emphasizes understanding human experiences and social realities through subjective perspectives (Saunders et al., 2019). Interpretivism aligns with qualitative research, as it seeks to capture the depth and complexity of social interactions within educational settings. Unlike positivism, which focuses on objective truths and numerical data, interpretivism acknowledges the influence of context, culture, and individual perceptions in shaping realities (Creswell & Poth, 2018). This philosophy is particularly relevant for exploring the factors influencing students' choice of physics, as it allows for a deeper exploration of participants' experiences, beliefs, and interactions. Interpretivist research recognizes the researcher's role in interpreting data, ensuring findings are contextually meaningful and reflective of participants' lived experiences (Bryman, 2021). Through this approach, the study provides nuanced insights into the challenges and opportunities in students' decision-making processes, which may not have been captured through quantitative methods.

### 3.2 Research Approach

A research approach refers to the overarching strategy or plan that guides the process of conducting a study. It encompasses the philosophical assumptions, methodologies, and methods used to collect and analyze data, as well as the way the researcher interprets and presents findings (Merriam & Tisdell, 2020). The choice of research approach is influenced by the nature of the research problem, the objectives of the study, and the type of data required to address the research questions. Broadly, research approaches are categorized into qualitative, quantitative, and mixed methods, each with distinct characteristics and applications. In this study, a qualitative research approach was adopted to explore the factors influencing students' choice of physics at the Ordinary Level in Muzarabani District. This approach focuses on understanding the meanings, experiences, and perspectives of participants through methods such as interviews, focus groups, and observations, rather than relying on numerical data or statistical analysis (Denzin & Lincoln, 2018; Creswell & Creswell, 2021).

The qualitative research approach was chosen for this study because it is particularly well-suited to exploring complex social phenomena and capturing the subjective experiences of participants. The decision to choose physics at the Ordinary Level is influenced by a range of interconnected factors, including personal interests, social influences, institutional support, and cultural context. A qualitative approach allows for an in-depth examination of these factors and their interactions, providing a holistic understanding of the phenomenon. Unlike quantitative methods, which focus on measuring and quantifying variables, qualitative research emphasizes understanding the "why" and "how" behind participants' decisions, making it ideal for uncovering the motivations, challenges, and lived experiences of students (Creswell & Creswell, 2021; Merriam & Tisdell, 2020). Additionally, the flexibility of qualitative research enables the researcher to adapt to emerging themes and refine questions during the data collection process, ensuring that the study remains responsive to the participants' perspectives. By focusing on the contextual and interpersonal dynamics that shape students' choices, the qualitative approach ensures that the findings are rich, nuanced, and contextually relevant, making it the most appropriate choice for this research (Denzin & Lincoln, 2018).

### 3.3 Research Design

The study employed a case study research design, which is well-suited for an in-depth examination of the factors influencing students' choice of physics in Muzarabani District. A case study design allows researchers to explore real-life contexts and provides a comprehensive understanding of complex social issues (Yin, 2020). This design is particularly useful in qualitative research, as it enables detailed investigation of a specific phenomenon within its natural setting (Stake, 2019). By focusing on Muzarabani District, the study gains a localized understanding of the unique challenges, successes, and dynamics of students' subject choices. The case study approach enables data collection from multiple sources, including interviews, focus groups, and document analysis, ensuring a rich and detailed dataset. Additionally, this design facilitates an exploratory approach, allowing researchers to identify emerging themes and adapt research questions as needed (Flyvbjerg, 2020).

### 3.4 Research Strategy

The study employed a qualitative research strategy to thoroughly investigate the factors influencing students' choice of physics at Ordinary level in Muzarabani District. This approach was selected for its ability to delve deeply into social phenomena, prioritizing the perspectives and lived experiences of participants over numerical data. According to Maxwell (2021), qualitative strategies excel in providing rich, detailed insights by focusing on the subjective meanings individuals ascribe to their interactions and environments. This makes it particularly suitable for examining complex issues such as subject choice, where personal, social, and institutional factors intersect.

By adopting this strategy, the research captures not only the academic aspects of subject choice but also the emotions, perceptions, and interpersonal dynamics that shape students' decisions. Semi-structured interviews, focus groups, and participant observations were likely utilized to gather data, allowing for flexibility and depth in responses (Creswell & Poth, 2018). This approach enables the study to explore how students, teachers, and parents interpret their roles and challenges, offering a holistic view of the factors influencing subject choice. Ultimately, the qualitative strategy illuminates the intricate social processes at play, providing a robust foundation for understanding and improving educational practices.

### 3.5 Interpretivism research strategy

Interpretivism was employed as the research strategy, as it emphasizes the social construction of reality and the importance of subjective meanings in human interactions (Saunders et al., 2019). In the context of subject choice, interpretivism allows for an in-depth understanding of how students, teachers, and parents perceive the factors influencing the decision to study physics. It also acknowledges that meanings are shaped by cultural, historical, and institutional factors, making it a suitable approach for studying complex social relationships (Bryman, 2021). Interpretivist research relies on qualitative methods such as interviews, observations, and thematic analysis to capture diverse perspectives and contextual nuances (Creswell & Creswell, 2021). This approach ensures that findings reflect participants' lived experiences rather than predetermined hypotheses. By using interpretivism, the study provides a holistic and context-sensitive analysis of subject choice, highlighting both its challenges and opportunities.

**3.6 Target population and sampling**

The target population for this study included students, teachers, and parents in Muzarabani District, as they play crucial roles in the decision-making process regarding subject choice. These groups were selected because they provide valuable insights into the factors influencing students' choice of physics at Ordinary level (Merriam & Tisdell, 2020). By including a diverse range of participants, the study ensures a comprehensive understanding of the dynamics of subject choice in educational settings.

**3.7 Kinds of sampling**

Sampling was a crucial process in qualitative research, as it determines the credibility and depth of findings. In this study, purposive sampling was used alongside snowball sampling to ensure the inclusion of participants with direct involvement in the subject choice process. Purposive sampling enabled the researcher to deliberately select individuals who could provide rich insights into the research problem (Etikan et al., 2016). Convenient amapling was employed to identify additional participants through referrals from initial subjects, which was particularly useful in qualitative studies focusing on social structures (Naderifar et al., 2017). By combining these approaches, the study ensures a comprehensive exploration of the factors influencing subject choice, capturing diverse perspectives and experiences.

### 3.7.1 Purposive sampling

Purposive sampling was a non-probability sampling technique that allowed the researcher to deliberately select participants based on predefined criteria (Palinkas et al., 2015). This method was particularly useful in qualitative research, where the goal was to gain deep, contextualized knowledge rather than achieve statistical generalizability. For this study, participants were selected based on their direct involvement in the subject choice process, ensuring that data collected was relevant and meaningful. This approach was advantageous as it allowed for the inclusion of knowledgeable respondents, thus enhancing the richness of the findings. However, it may have introduced selection bias, which the researcher mitigated by ensuring a diverse representation of perspectives.

### 3.7.2 Random Sampling:

Random sampling is a probability sampling technique where every member of the population has an equal chance of being selected for the study (Bryman, 2016). This method was used to ensure that the sample was representative of the population, thereby allowing for generalizations to be made. Random sampling minimized selection bias and enhanced the validity of the findings, as it eliminated the researcher's influence in selecting participants. However, in qualitative research, where the focus is in-depth rather than breadth, random sampling is said not to be suitable. For instance, in this study, random sampling resulted in the inclusion of participants who lacked relevant experiences or insights into the factors influencing students' choice of physics at the Ordinary Level. Despite its limitations, random sampling was used in conjunction with other methods to ensure a broader representation of the population, (Creswell & Creswell, 2021).

### 3.7.3 Convenient Sampling

Convenient sampling, also known as convenience sampling, is a non-probability sampling technique where participants are selected based on their availability and willingness to participate (Etikan, Musa, & Alkassim, 2016). This method is often used in exploratory research or studies with limited time and resources. While convenient sampling is easy to implement and cost-effective, it had significant limitations, including the potential for selection bias and lack of representativeness. In the context of this study, convenient sampling was used to quickly gather data from students, teachers, or parents who were readily accessible. However, this approach might have excluded key stakeholders with valuable insights, thereby limiting the depth and richness of the findings. Despite its drawbacks, convenient sampling was used in the early stages of the research to identify preliminary themes or patterns, which could then have been explored further using purposive sampling (Palinkas et al., 2015).

### 3.8 Sample size

The sample size for this study consisted of 25 participants, including students, teachers, and parents from Muzarabani District. This number was determined based on the principle of saturation, a key criterion in qualitative research, where data collection continues until no new themes or insights emerge (Guest, Bunce, & Johnson, 2006). A sample size of 25 was considered adequate for qualitative studies, as it allowed for in-depth exploration of participants' experiences while ensuring manageability and focus. According to Creswell (2014), smaller sample sizes are typical in qualitative research, as the goal is not generalization but rather a rich, detailed understanding of the phenomenon under study. This sample size ensures a diverse range of perspectives while maintaining the depth required for thematic analysis.

### 3.9 Research instrument

This study employed semi-structured interviews as the primary research instrument. Interviews provided an interactive means of exploring participants' experiences, perceptions, and insights into the factors influencing students' choice of physics. Semi-structured interviews allowed flexibility in questioning while ensuring that all key themes were covered (Kallio et al., 2016). The questions were designed to be open-ended to encourage detailed responses and to enable participants to share their perspectives freely. The interviews were conducted in a face-to-face setting to build rapport and gather in-depth qualitative data. This method allowed the researcher to probe further on specific issues and clarify ambiguities as they arose.

#### 3.9.1 Semi-structured interviews

Semi-structured interviews were a widely used qualitative data collection method that combined structured and open-ended questioning, offering a balance between consistency and flexibility (Adams, 2015). Unlike structured interviews, which limited responses to predefined choices, semi-structured interviews encouraged a conversational approach, allowing participants to elaborate on their experiences, perspectives, and emotions. This method was particularly useful in studies exploring complex social phenomena, such as subject choice, as it provided a platform for deeper engagement between the researcher and the respondent. By fostering a dialogue rather than a rigid question-and-answer format, semi-structured interviews enabled participants to share detailed narratives, revealing insights that might otherwise have remained hidden.

The flexibility of semi-structured interviews was one of their key strengths. Researchers could adapt questions based on the flow of conversation, probing deeper into emerging themes or unexpected responses. This adaptability ensured that the data collected was both relevant and rich, capturing the nuances of participants' experiences. According to Bryman (2016), this flexibility was particularly valuable in qualitative research, as it allowed for the exploration of unanticipated issues that may have arisen during the interview process. For example, in the context of subject choice, semi-structured interviews allowed students, teachers, and parents to discuss their perceptions of the factors influencing physics choice in their own words, providing a comprehensive understanding of the dynamics at play.

Moreover, semi-structured interviews were particularly effective in addressing sensitive topics, such as academic performance and career aspirations, where trust and rapport were essential. The conversational nature of this method helped build a comfortable environment, encouraging participants to share openly and honestly. As Kvale (2007) noted, the interactive nature of semi-structured interviews fostered a sense of mutual respect and understanding, which was crucial for eliciting genuine responses. This was especially important in educational settings, where students may have felt pressured or uncertain about their choices. By capturing these nuanced insights, semi-structured interviews contributed to a richer and more holistic understanding of subject choice, making them an invaluable tool for this study.

### 3.9.2 Questionnaire for Students

A questionnaire is a structured data collection tool consisting of a series of closed and open-ended questions designed to gather information from participants about their perceptions, motivations, and experiences (Cohen, Manion, & Morrison, 2018). In this study, questionnaires were used to collect quantitative and qualitative data from a large sample of students, ensuring a broad representation of perspectives. This instrument was chosen because it allowed the researcher to efficiently gather data from many participants within a short time frame, making it suitable for capturing trends and patterns in students' subject choices (Bryman, 2016). The closed-ended questions provided measurable data, while the open-ended questions allowed students to elaborate on their experiences and opinions.

The questionnaire assisted in answering the research questions by providing insights into the factors influencing students' decisions, such as personal interest, career aspirations, peer influence, and institutional support. For example, questions about students' perceptions of physics and their future goals helped address the research question on how personal and social factors shape subject choices. Additionally, the questionnaire identified common challenges, such as lack of resources or poor teaching methods, which aligned with the research question on institutional factors. By analyzing the responses, the researcher was able to identify key themes and trends that informed the study's findings (Creswell & Creswell, 2021).

### 3.9.3 Document Analysis

Document analysis is a qualitative research method that involves systematic review and interpretation of existing documents, such as school records, policy documents, and past examination results, to gather relevant data (Bowen, 2009). In this study, document analysis was used to complement other data collection tools by providing contextual information about the educational environment in Muzarabani District. This method was justified because it offered a cost-effective and non-intrusive way to access valuable information that could not be obtained through interviews or questionnaires alone (Creswell & Creswell, 2021).

This instrument assisted in answering the research questions by providing evidence of institutional factors influencing students' choice of physics. For instance, analysis of school records revealed trends in enrollment and performance in physics over time, helping to address the research question on how institutional support and resource availability impact subject choices. Policy documents provided insights into the curriculum and teaching strategies, which were relevant to understanding the role of educational policies in shaping students' decisions. By triangulating data from documents with other sources, the researcher was able to validate findings and gain a comprehensive understanding of the factors influencing students' choices (Merriam & Tisdell, 2020).

### 3.9.4 Focus Group Discussions with Students

Focus group discussions (FGDs) are a qualitative data collection method that involve guided group conversations with participants to explore their collective views and experiences (Kitzinger, 1995). In this study, FGDs were used to encourage interaction among students, allowing them to build on each other's ideas and provide rich, detailed insights. This method was justified because it facilitated the exploration of shared experiences and social dynamics, which were critical for understanding the influence of peer and community factors on students' decisions (Morgan, 1997).

The FGDs assisted in answering the research questions by uncovering the social and interpersonal factors that influenced students' subject choices. For example, discussions about peer pressure, family expectations, and community perceptions of physics helped address the research question on how social factors shape students' decisions. Additionally, the interactive nature of FGDs allowed participants to express their views openly, revealing underlying challenges such as gender stereotypes or lack of role models in science. By analyzing the group dynamics and shared narratives, the researcher was able to identify key themes that enriched the study's findings (Denzin & Lincoln, 2018).

### 3.10 Trustworthiness

Trustworthiness in qualitative research ensured that findings were credible, transferable, dependable, and confirmable. These criteria validated the rigor of the study, ensuring that the research process and results were transparent and reliable (Nowell et al., 2017).

#### 3.10.1 Credibility

Credibility was achieved by ensuring that the study accurately represented participants' perspectives. This was accomplished through prolonged engagement with participants, triangulation of data sources, and member checking (Shenton, 2004). The researcher also ensured that interviews were conducted in an environment where participants felt safe to express themselves freely. Additionally, the use of verbatim transcription enhanced the authenticity of responses, strengthening the study's credibility.

#### 3.10.2 Transferability

Transferability referred to the extent to which the study's findings could be applied to similar contexts (Lincoln & Guba, 1985). This was ensured by providing thick descriptions of the research setting, participant characteristics, and contextual factors. By offering comprehensive details, the study enabled other researchers to determine whether its findings were applicable in different environments with comparable educational dynamics.

#### 3.10.3 Dependability

Dependability was maintained by documenting the research process in detail, ensuring consistency in data collection and analysis (Elo et al., 2014). The researcher kept an audit trail, recording decisions made throughout the study to allow future replication. Peer debriefing was also used to evaluate the research design and ensure methodological rigor.

### 3.10.4 Confirmability

Confirmability ensured that the study's findings were based on participants' responses rather than researcher bias (Nowell et al., 2017). Reflexivity was practiced by maintaining objectivity, and findings were cross-checked with participants for validation. Additionally, a structured coding system was employed to minimize subjectivity during data analysis.

## 3.11 Data collection

Data collection in this research involved the use of multiple methods to gather comprehensive and reliable information on the factors influencing students' choice of physics at the Ordinary Level in Muzarabani District. Semi-structured interviews were conducted with physics teachers and administrators to gain in-depth insights into institutional and pedagogical factors. Questionnaires were administered to students to collect quantitative and qualitative data on their perceptions, motivations, and challenges. Focus group discussions (FGDs) with students were used to explore shared experiences and social dynamics influencing subject choices. Additionally, document analysis was employed to review school records, policy documents, and examination results, providing contextual data on enrollment trends and resource availability. This multi-method approach ensured triangulation, enhancing the validity and richness of the findings (Creswell & Creswell, 2021; Denzin & Lincoln, 2018).

## 3.12 Data Analysis

Data analysis in this study followed a thematic approach, a widely recognized method for analyzing qualitative data that involved systematically identifying, coding, and interpreting recurring themes (Braun & Clarke, 2019). This method was particularly suited for exploring complex social phenomena, such as subject choice, as it allowed for the extraction of rich, nuanced insights from participants' experiences and perspectives. Data was collected through semi-structured interviews, which were recorded with participant consent and transcribed verbatim to ensure accuracy and reliability. Thematic analysis was conducted in six key stages, as outlined by Clarke and Braun (2018): (1) familiarization with the data, where the researcher immersed themselves in the transcripts to gain a comprehensive understanding; (2) generating initial codes, which involved labeling meaningful segments of the data; (3) searching for themes, where codes were grouped into broader patterns; (4) reviewing themes to ensure they were coherent and distinct; (5) defining and naming themes to capture their essence; and (6) producing the final report, which synthesized the findings into a cohesive narrative.

This structured approach ensured that patterns within the data were identified and meaningfully interpreted, providing a robust foundation for understanding the factors influencing students' choice of physics. Thematic analysis also allowed flexibility, enabling the researcher to adapt to emerging insights while maintaining methodological rigor. By adhering to this systematic process, the study ensured that the findings were both credible and reflective of the participants' lived experiences, contributing valuable insights to the broader discourse on subject choice in educational settings.

### 3.13 Data Storage and Protection

Data was securely stored in password-protected digital files, ensuring confidentiality and protection from unauthorized access. Hard copies of consent forms and transcriptions were kept in a locked cabinet, accessible only to the researcher (Saunders et al., 2019). Participants' personal details were anonymized to protect their identities.

### 3.15 Elimination of Bias

Researcher bias was minimized through reflexivity, triangulation, and member checking. Reflexivity involved continuous self-examination to ensure objectivity, while triangulation incorporated multiple data sources to validate findings (Nowell et al., 2017). Member checking allowed participants to review interpretations, ensuring accuracy.

### 3.16 Research Ethics: Key Considerations

Ethical considerations were central to this study, ensuring that the research was conducted with integrity and respect for participants. Key ethical principles include obtaining informed consent, ensuring confidentiality, and securing institutional approval. Participants were fully briefed on the study's objectives, procedures, and their right to withdraw at any time without penalty (Resnik, 2020). These measures were essential for maintaining trust and upholding ethical standards in qualitative research, particularly when dealing with sensitive topics such as academic performance and career aspirations.

#### 3.16.1 Informed Consent

Informed consent was obtained from all participants before their involvement in the study. Participants were provided with detailed information about the research objectives, procedures, potential risks, and benefits. They were also informed of their right to withdraw at any time without penalty. Written consent forms were distributed and signed by participants, ensuring that they fully understood their role in the study and agreed to participate voluntarily (Creswell & Creswell, 2021). This process respected participants' autonomy and ensured transparency throughout the research.

#### 3.16.2 Confidentiality

Confidentiality was maintained to protect participants' identities and personal information. All data collected, including interview transcripts, questionnaire responses, and focus group recordings, were stored securely and accessed only by the researcher. Pseudonyms were used in place of real names, and any identifying details were removed from the final report. This approach safeguarded participants' privacy and encouraged honest and open responses, which were critical for the study's validity (Bryman, 2016).

### 3.16.3 Securing Institutional Approval

Institutional approval was secured before commencing the study to ensure compliance with ethical and regulatory standards. The researcher obtained permission from the relevant educational authorities in Muzarabani District, as well as from the participating schools. This process involved submitting a detailed research proposal, including the study's objectives, methodology, and ethical considerations, for review and approval. Institutional approval not only legitimized the study but also ensured that it adhered to established ethical guidelines (Merriam & Tisdell, 2020).

### 3.16.4 Voluntary Participation

Voluntary participation was a cornerstone of the study's ethical framework. Participants were assured that their involvement was entirely voluntary and that they could withdraw at any stage without facing any consequences. This principle was particularly important in a school setting, where students might feel pressured to participate. By emphasizing voluntariness, the researcher ensured that participants felt respected and empowered, fostering a positive and ethical research environment (Resnik, 2020).

## 3.17 Conclusion

This chapter detailed the methodological approach employed in the study, emphasizing the qualitative paradigm and interpretivist perspective, which prioritized understanding the lived experiences and perceptions of participants. The research design, including the use of case studies and in-depth interviews, was carefully selected to align with the study’s objectives and provide rich, contextual insights into the factors influencing students' choice of physics at

Ordinary level in Muzarabani District. The target population, comprising students, teachers, and parents, was identified to capture diverse perspectives, while purposive sampling ensured the inclusion of key stakeholders with relevant experiences. Data collection instruments, such as semi-structured interviews and focus group discussions, were designed to facilitate open and meaningful dialogue. Rigorous measures to ensure trustworthiness, including credibility, transferability, dependability, and confirmability, were implemented to enhance the study's reliability. Ethical considerations, such as informed consent, confidentiality, and the protection of participants' rights, were prioritized throughout the research process. The next chapter presents the findings and thematic analysis, offering critical insights into the factors influencing students' choice of physics and highlighting areas for improvement. This methodological foundation ensured that the study's conclusions were both robust and actionable, providing valuable recommendations for educational stakeholders and policymakers.

# CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

## 4.1 Introduction

This chapter presents a comprehensive analysis of qualitative and quantitative data collected through Focus Group Discussions (FGDs) with five student groups, in-depth interviews with four physics teachers, and structured questionnaires from eight selected students. Employing a mixed-methods approach, the study systematically examines four critical dimensions of physics education: curriculum relevance, pedagogical effectiveness, socio-cultural barriers, and motivational factors. The 25 purposively sampled participants represent diverse academic performances, gender identities, and rural-urban contexts within Muzarabani District, ensuring a holistic understanding of Ordinary Level physics challenges. Through thematic analysis of verbatim transcripts and questionnaire responses, we identify recurring patterns in student experiences and teacher perspectives, supported by direct quotations that give voice to participants' realities. The findings reveal how structural constraints (resource scarcity, outdated curricula) interact with social factors (gender stereotypes, peer influence) to shape physics participation rates. This empirical evidence not only answers the study's four research questions but also establishes an evidence base for Chapter 5's practical recommendations. The chapter's tripartite structure - examining student voices, teacher insights, and institutional constraints - provides multiple lenses to understand physics education's complex ecosystem in resource-limited settings.

## 4.2 Biodata of Participants

The study involved 25 participants, including students and teachers. Below is a summary of their demographic information:

| Participant Type | Gender | Age Range | Key Characteristics |
|---|---|---|---|
| Students (FGDs) | Mixed | 13–18 | Varied performance levels, limited resources |
| Students (Questionnaires) | Male/Female | 14–17 | Diverse socio-economic backgrounds |
| Teachers (Interviews) | Male/Female | 35–50 | Extensive teaching experience, varied qualifications |

**4.3 Themes of Focus Group Discussions**

**4.3.1 Theme 1: Curriculum relevance and practical application**

**Research Question:** How does the design of the curriculum impact the level of interest students have in physics education at the Ordinary level in Muzarabani District?

> **Group one:** *"Most of us at Muzarabani High find physics challenging but useful for careers like engineering. Math scares some students, while others enjoy solving real-world problems like why our school's solar panels work."*

This view of physics being challenging yet practical was supported by Group 3 (O-Level Students) who added:

**Group three:** *"We notice physics when fixing bicycles, watching the school generator, or even playing soccer, the ball's trajectory is physics in action!"*

Expanding on this need for practical relevance, Group 5 further emphasized:

**Group five:** *"We wish the curriculum included modern topics like robotics. Advanced students need more challenges."*

The participants' responses highlight a critical tension in physics education, where students recognize the subject's value but struggle with its perceived difficulty and abstractness. Group 1's description of physics as "challenging but useful" for careers like engineering aligns with Vygotsky's (1978) Zone of Proximal Development, suggesting learning succeeds when tied to real-world applications like solar panels, a finding supported by Osborne and Collins' (2001) research on science education relevance. Group 3's examples of noticing physics in bicycle repairs and soccer trajectories demonstrate how contextual learning (Lave & Wenger, 1991) bridges theory and practice, while Group 5's request for robotics reflects the curriculum's failure to address modern STEM interests, a gap identified in Marginson et al.'s (2013) global STEM education study. The data reinforces Eccles' (1983) expectancy-value theory, showing engagement increases with perceived utility, yet the curriculum's lack of local contextualization (e.g., ignoring rural Zimbabwe's energy needs) exacerbates disengagement, echoing Mupa and Chinooneka's (2015) findings on Zimbabwe's education challenges. These results collectively argue for curriculum reforms incorporating practical local examples, modular modern topics, and experiential learning approaches (Kolb, 1984) to reduce math anxiety and boost relevance.

### 4.3.2 Theme two: Peer and teacher influence

Research Question: What impact do teaching methodologies and peer attitudes have on students' perceptions of physics?

Group 2 (Female Students) emphasized the dual impact of peer influence, noting:

> **Group two (Female Students):** *"When our friend Grace topped the physics class last term, ten more girls chose it this year. But negative comments still discourage some."*

Echoing this concern about classroom dynamics, Group 4 (Male Students) shared their experience:

> **Group 4 (Male Students):** *"When classmates laugh at wrong answers, it makes us not want to try. Study groups help, but some teachers discourage them."*

Complementing these views, Group 1 (Mixed-Gender) stressed the critical role of teaching approaches:

> **Group 1 (Mixed-Gender):** *"Our best physics teacher uses experiments with whatever equipment we have. When substitutes just read from the textbook, half the class stops paying attention."*

The data reveals how peer dynamics and teaching quality shape physics engagement. Group 2's experience demonstrates peer influence's dual nature positive role models (like Grace) inspire participation, while negative remarks deter students, aligning with Bandura's (1977) social learning theory. Group 4 highlights how mockery creates a hostile learning environment, though collaborative learning (study groups) can counter this, supporting Vygotsky's (1978) emphasis on social interaction. Group 1's contrast between hands-on experiments and passive textbook teaching underscores teacher methodology's pivotal role, consistent with Hattie's (2009) findings on active learning's impact. Together, these responses show that physics perceptions hinge on both peer culture and pedagogical approaches, suggesting schools must foster supportive peer networks while training teachers in interactive methods to sustain student interest.

### 4.4 Themes from teacher interviews

#### 4.4.1 Theme 1: Curriculum limitations and local relevance

Research Question: How does curriculum design affect student interest?

Teacher 2 (Rural School) highlighted the disconnect between the curriculum and students' daily realities, stating:

> **Teacher two:** *"The curriculum overlooks rural contexts. It doesn't link physics to farming tools or renewable energy."*

This concern about relevance was echoed by Teacher 4, who emphasized:

> **Teacher four:** *"Topics like thermodynamics are irrelevant to my students. I wish it covered local needs, like clean water systems."*

Taking the argument further, Teacher 3 called for modernization:

> **Teacher three:** *"The curriculum is outdated and exam focused. It needs innovative topics like robotics and AI."*

The teacher interviews reveal critical gaps between curriculum content and student realities. Teacher 2's critique of the curriculum's urban bias failing to connect physics to rural applications like farming tools reflects Freire's (1970) concept of "education for domestication" rather than liberation. Teacher 4's observation about irrelevant thermodynamics content supports Bernstein's (1975) theory of curriculum as a social construct that often excludes marginalized contexts. Teacher 3's call for modern topics (robotics/AI) aligns with Schwab's

(1973) argument for "practical curricula" that evolve with societal needs. These responses collectively demonstrate how a disconnected curriculum suppresses student interest, particularly in rural settings, underscoring the urgent need for contextualized, locally relevant physics education that bridges theory and lived experience.

### 4.4.2 Theme 2: Innovative teaching methods

Research Question: *What teaching methodologies shape students' attitudes?*

Teacher 5 emphasized the importance of practical engagement, stating:

> **Teacher five:** *"I use experiments, group discussions, and real-world examples (e.g., electricity in homes) to make physics relatable."*

Expanding on creative approaches, Teacher 6 shared their unique method:

> **Teacher six:** *"I use storytelling, like explaining gravity through folktales, and low-cost experiments like water bottle rockets."*

Taking further innovation, Teacher 7 demonstrated how unconventional techniques can enhance learning:

> **Teacher seven:** *"I use songs and dances to explain concepts (e.g., wave motion) and involve students in building simple machines."*

The teacher interviews showcase transformative pedagogical approaches that enhance physics engagement. Teacher 5's use of real-world examples aligns with Dewey's (1938) experiential learning theory, demonstrating how concrete applications foster deeper understanding. Teacher 6's storytelling approach resonates with Bruner's (1996) narrative construction of knowledge, where cultural folktales serve as cognitive scaffolds. Teacher 7's multisensory methods (songs/dances) embody Gardner's (1983) theory of multiple intelligences, leveraging kinesthetic and musical modalities for concept mastery. These innovative strategies collectively address the affective domain of learning (Krathwohl et al., 1964), transforming physics from abstract theory to tangible experience. The emphasis on low-cost, locally adaptable methods particularly reflects UNESCO's (2017) guidelines for resource-constrained settings, proving effective pedagogy need not depend on expensive infrastructure.

### 4.4.3 Theme 3: Socio-Economic and Gender Barriers

Research Question: How do socio-economic and cultural factors influence physics uptake?

Teacher 1 identified financial barriers as a major deterrent, explaining:

> **Teacher one:** *"Many students avoid physics due to costly textbooks and tutoring. Others prioritize subjects perceived as 'easier' for quick employment."*

Teacher 2 reinforced this economic perspective while highlighting additional challenges:

> **Teacher two:** *"Poverty forces students to prioritize subjects with cheaper materials. Some work after school, leaving no study time."*

Teacher 3 shifted focus to cultural barriers, particularly for female students:

> **Teacher three:** *"Early marriage pressures distract girls; the government needs to address this because many girls drop physics."*

The interviews reveal systemic barriers to physics participation. Teacher 1's observation about financial constraints aligns with Bourdieu's (1986) concept of cultural capital, where economic disadvantage limits educational access. Teacher 2's emphasis on poverty-induced time constraints reflects Sen's (1999) capability approach, demonstrating how material deprivation restricts learning opportunities. Teacher 3's gender-specific concerns connect to feminist theories (Archer et al., 2010) about STEM participation, where cultural norms create additional hurdles for girls. These intersecting barriers - economic (costs), temporal (work demands), and cultural (gender expectations) - create what hooks (1994) call "systemic disincentives" for marginalized students. The data suggests physics uptake requires addressing not just pedagogical but structural inequalities through policy interventions and community engagement.

### 4.5 Themes of student questionnaires

#### 4.5.1 Theme 1: Resource scarcity and learning challenges

Research Question: How do socio-economic factors influence physics education?

Student 2 articulated the dual challenge of conceptual difficulty and material deprivation:

> **Student two:** *"Physics is the hardest subject I'm taking because it involves complex calculations, and I lack resources at home."*

Student 4 echoed this struggle with an emphasis on financial constraints:

> **Student four:** *"My parents cannot afford extra tutoring or textbooks, so I rely heavily on school notes."*

Student 8 highlighted how resource limitations transform learning into rote memorization:

> **Student eight:** *"Very hard without experiments it feels like memorizing formulas. Demonstration videos would help since we don't have a lab."*

The student responses reveal how socio-economic constraints fundamentally alter physics learning experiences. Student 2's struggle with complex calculations amid resource scarcity aligns with Vygotsky's (1978) mediation theory, where learning tools critically shape cognitive development. Student 4's textbook deprivation exemplifies what Lewin (2007) identifies as "opportunity gaps" in developing countries, forcing reliance on inadequate school notes. Student 8's experience of reduced learning to rote memorization without labs supports Hodson's (1993) findings about impoverished science education in resource-poor settings. These accounts collectively demonstrate how material deprivation creates what Sen (1999) would call "unfreedoms" in education, transforming physics from an investigative science into a memorization task. The students' suggested solutions (demonstration videos) reflect Jenkins' (2006) participatory culture framework, advocating for affordable digital alternatives to physical labs.

### 4.5.2 Theme 2: Gender stereotypes and encouragement

Research Question: How do cultural norms affect physics uptake?

Student 5 confronts prevailing gender biases head-on, asserting:

> **Student five:** *"Some people say girls should focus on 'easier' subjects, but I ignore them."*

Student 7 reveals how these stereotypes permeate family dynamics, yet finds institutional support:

> **Student seven:** *"Some relatives say physics is 'not for girls,' but my teachers disagree."*

Student 3 presents a contrasting positive environment where institutional policies counteract stereotypes:

> **Student three:** *"No, my school encourages girls to study science."*

The student responses reveal complex interactions between cultural norms and institutional support in shaping physics participation. Student 5's resistance to gender stereotypes aligns with Bandura's (1997) self-efficacy theory, demonstrating individual agency in overcoming societal barriers. Student 7's experience of conflicting messages between family ("not for girls") and teachers reflects Eccles' (1994) expectancy-value model, where significant others influence subject choices. Student 3's positive school environment exemplifies the institutional change needed to combat stereotypes, supporting Archer et al.'s (2010) findings about school culture's impact on STEM participation. These responses collectively illustrate what Gunderson et al. (2012) identify as the "leaky pipeline" phenomenon in physics, where cultural biases at multiple levels discourage female participation despite individual interest and capability.

### 4.5.3 Theme 3: Career aspirations and motivations

Research Question: What can encourage students to take physics?

Student 3 highlights the role of career prospects in subject choice:

> **Student three:** *"I chose physics because it opens many career opportunities, like engineering and medicine."*

Student 6 demonstrates the influence of family guidance on STEM motivation:

> **Student six:** *"My parents inspired me to study physics because of its importance in technology and innovation."*

Student 1 reveals how personal ambitions can drive persistence despite challenges:

> **Student one:** *"I dream of becoming a pilot, so physics is essential, but our school lacks resources."*

Student responses demonstrate three key drivers of physics engagement aligned with Lent et al.'s (1994) Social Cognitive Career Theory. Student 3's career-oriented perspective ("opens many career opportunities") reflects the outcome expectations component, where perceived professional benefits motivate study. Student 6's parental influence ("my parents inspired me") exemplifies contextual affordances in SCCT, showing how family shapes STEM interest. Student 1's persistence ("dream of becoming a pilot") despite resource limitations illustrates strong self-efficacy and goal persistence, though the school's resource constraints highlight what Seymour and Hewitt (1997) term "institutional cooling out" of STEM aspirations. These findings suggest effective encouragement requires: 1) explicit career pathway mapping, 2) family engagement in STEM advocacy, and 3) resource support for aspirational students.

### 4.6 Comparing chapter four research findings with literature review in chapter two

The findings in Chapter Four align with and extend the theoretical and empirical insights from Chapter Two's literature review, offering context-specific evidence from Muzarabani District. According to Halliday and Resnick (2018), "a well-designed curriculum that integrates practical applications of physics can significantly enhance student engagement." This perspective is mirrored in the research findings, where students in Group 1 noted, "Most of us at Muzarabani High find physics challenging but useful for careers like engineering," yet criticized the curriculum's abstract nature. Similarly, Teacher 2 emphasized, "The curriculum overlooks rural contexts. It doesn't link physics to farming tools or renewable energy," highlighting a disconnect not fully explored in the literature, which often generalizes curriculum issues without addressing rural-specific gaps.

Teaching methodologies also showed strong alignment with prior scholarship. Vavilala and Vavilala (2019) argue that "the adoption of innovative and student-centered teaching approaches holds the potential to cultivate a more engaging learning environment." This is corroborated by Group 1's observation: "Our best physics teacher uses experiments with whatever equipment we have. When substitutes just read from the textbook, half the class stops paying attention." Teacher 6 further exemplified this by stating, "I use storytelling, like explaining gravity through folktales, and low-cost experiments like water bottle rockets." These findings extend Mufanechiya and Munjeri's (2016) call for inquiry-based learning, as the use of local storytelling and low-cost experiments addresses resource constraints, a nuance less emphasized in the literature.

Socio-economic and cultural barriers were prominent in both chapters. Chikodzi and Gukurume (2017) note that "socio-economic status shapes students' educational aspirations, with disadvantaged students facing financial pressures." This is vividly supported by Student 4's comment: "My parents cannot afford extra tutoring or textbooks, so I rely heavily on school notes." Additionally, Mufanechiya and Munjeri (2016) highlight that "cultural stereotypes perceive physics as aligned with male aptitudes," a view echoed by Student 7: "Some relatives say physics is 'not for girls,' but my teachers disagree." These findings align with Johnson and Smith's (2020) work on gender stereotypes in STEM, but the data adds depth by illustrating how poverty forces students to prioritize subjects perceived as more immediately lucrative, a dynamic underexplored in prior studies.

Motivational factors, framed by Wigfield and Eccles' (2000) Expectancy-Value Theory, which posits that "students' motivation is influenced by their expectations of success and the value they place on the subject," were validated in the findings. Student 3 stated, "I chose physics because it opens many career opportunities, like engineering and medicine," reflecting the perceived utility emphasized by Eccles et al. (2003). Furthermore, Student 6 noted, "My parents inspired me to study physics because of its importance in technology and innovation," aligning with Smith and Jones' (2019) assertion that "parental support plays a crucial role in shaping students' attitudes towards education." The findings extend this by showing how parental influence operates in resource-scarce settings, where aspirations persist despite systemic barriers.

Peer and teacher influence, critical literature, were also evident in the data. Bandura's (1977) social learning theory, which suggests that "individuals learn behaviors through observing others," is reflected in Group 2's observation: "When our friend Grace topped the physics class last term, ten more girls chose it this year." However, Group 4 noted, "When classmates laugh at wrong answers, it makes us not want to try," highlighting a negative peer dynamic not extensively covered in the literature. Additionally, Hattie's (2009) emphasis on "teacher quality as a significant predictor of student engagement" is supported by Teacher 5's approach: "I use experiments, group discussions, and real-world examples to make physics relatable." The unexpected finding that some teachers discouraged study groups, as noted by Group 4, reveals a barrier absent from prior studies, adding a new dimension to the discussion.

The literature review's focus on resource scarcity, as articulated by UNESCO (2017), which states that "well-equipped laboratories and modern teaching aids are essential for effective science education," is powerfully reinforced by Student 8's remark: "Very hard without experiments it feels like memorizing formulas. Demonstration videos would help since we don't have a lab." This aligns with Nyakudya's (2017) critique of theoretical curricula in Zimbabwe but provides a student perspective on rote memorization as a coping mechanism, offering a practical insight into low-resource pedagogy.

Finally, Osborne and Dillon's (2008) argument that "curricula emphasizing real-world applications can boost student interest in science" resonates with Group 5's plea: "We wish the curriculum included modern topics like robotics." This finding extends the literature by pinpointing specific topics like robotics, which are relevant to modern STEM fields but absent from Muzarabani's curriculum, highlighting a localized gap in aligning education with global technological trends.

In summary, the findings corroborate the literature by grounding global theories in Muzarabani's context, while also uncovering unique challenges, such as the curriculum's rural irrelevance and teacher resistance to collaborative learning. By integrating perspectives from Halliday and Resnick (2018), Vavilala and Vavilala (2019), Chikodzi and Gukurume (2017), Wigfield and Eccles (2000), Bandura (1977), Hattie (2009), and Osborne and Dillon (2008), the study bridges theoretical insights with empirical data, setting the stage for Chapter Five's targeted recommendations to enhance physics education in resource-constrained settings.

### 4.7 Chapter summary

This chapter analyzed key themes shaping physics education in Muzarabani District through focus groups, teacher interviews, and student questionnaires. Three critical findings emerged: First, curriculum design significantly impacts engagement, with students and teachers advocating for locally relevant, practical content for example renewable energy applications) to replace abstract theories. Second, peer influence and teaching quality create pivotal "make-or-break" moments - supportive environments foster participation while negative experiences deter learners, particularly girls facing cultural biases. Third, socio-economic barriers (resource scarcity) intersect with motivational factors (career aspirations) to create complex enrollment patterns, where even highly motivated students face systemic obstacles. The data reveals an urgent need for context-sensitive reforms: modernizing curricula, training teachers in interactive pedagogies, and addressing structural inequalities. These findings set the stage for Chapter 5's recommendations, which will propose targeted interventions including curriculum localization strategies, low-cost teaching innovations, and community-based support systems to transform physics education. The next chapter will synthesize these empirical findings with global best practices to develop an actionable framework for sustainable improvement in STEM participation rates.

# CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

## 5.0 Introduction

This chapter synthesizes the findings from the literature review and primary research to draw conclusions and propose actionable recommendations for enhancing physics education in Muzarabani District. Building on the Expectancy-Value Theory (Wigfield & Eccles, 2000), the study has explored how curriculum design, teaching methodologies, socio-economic barriers, and cultural norms shape students' decisions to pursue physics at the Ordinary Level. By integrating theoretical insights with empirical data from students, teachers, and parents, it addresses the declining enrollment trends noted by Chikodzi and Gukurume (2017). The chapter is structured to first summarize key findings from the literature and primary study, followed by conclusions that highlight systemic and localized challenges. It concludes with targeted recommendations to foster equitable access and engagement in physics, aiming to inform educators, policymakers, and stakeholders in creating a supportive learning environment for rural Zimbabwean students.

## 5.1 Key Findings from the Literature Review

The literature review in Chapter Two provides a robust theoretical and empirical foundation for understanding the factors influencing students' choice of physics at the Ordinary Level in Muzarabani District. A central theme is the critical role of curriculum design in shaping student engagement. Halliday and Resnick (2018) emphasize that curricula integrating practical applications enhance interest, yet Zimbabwe's physics curriculum is often criticized for its theoretical bias, lacking real-world relevance (Zimbabwe Ministry of Primary and Secondary Education, 2019). This disconnects, as Nyakudya (2017) argues, reduces motivation by failing to link physics to students' daily lives. Teaching methodologies also emerged as pivotal.

Vavilala and Vavilala (2019) advocate for student-centered approaches like inquiry-based learning, which foster critical thinking, contrasting with traditional lecture-based methods that disengage learn (Mufanechiya & Munjeri, 2016). Socio-economic and cultural barriers further complicate physics enrollment. Chikodzi and Gukurume (2017) highlight how poverty limits access to resources, forcing students to prioritize subjects with immediate economic returns. Similarly, Mufanechiya and Munjeri (2016) note that cultural stereotypes, particularly gender biases, deter female participation by framing physics as a male domain. The Expectancy-Value Theory by Wigfield and Eccles (2000) underpins motivational factors, suggesting students choose physics when they perceive it as valuable and achievable. Osborne and Dillon (2008) stress that career guidance linking physics to professions like engineering can boost enrollment. However, gaps in the literature were identified, notably the lack of rural-specific studies and longitudinal research on evolving subject choices. These findings underscore the need for contextualized curricula, innovative pedagogies, and equitable access to resources to address systemic barriers and enhance physics education in settings like Muzarabani District.

### 5.2 Key Findings from the Primary Study

The primary study in Chapter Four, conducted in Muzarabani District, provides empirical insights into the factors influencing students' choice of physics, aligning with and extending the literature. Students recognized physics' career relevance, with Group 1 noting its utility for engineering, yet found the curriculum abstract and disconnected from rural contexts, as Teacher 2 stated: "It doesn't link physics to farming tools or renewable energy." This echoes the literature's call for practical curricula but highlights a unique rural gap. Teaching methodologies significantly shaped perceptions. Group 1 praised teachers using experiments, while Teacher 6's storytelling and low-cost experiments like water bottle rockets engaged students, supporting Vavilala and Vavilala's (2019) emphasis on active learning.

However, passive textbook teaching deterred interest, a finding consistent with Hattie's (2009) research on teacher quality. Socio-economic barriers were stark, with Student 4 citing unaffordable textbooks and Student 8 describing rote memorization due to absent labs, aligning with UNESCO's (2017) resource scarcity concerns. Gender stereotypes persisted, as Student 7 reported family discouragement, yet positive school environments, as Student 3 noted, countered biases, reflecting Archer et al.'s (2010) findings on inclusive cultures. Motivation was driven by career aspirations, with Student 3 linking physics to engineering, corroborating Wigfield and Eccles' (2000) theory. Peer influence was dual edged: Group 2 highlighted how role models like Grace inspired enrollment, but Group 4 noted mockery stifled participation, adding nuance to Bandura's (1977) social learning theory. Unexpectedly, some teachers discouraged study groups, a barrier that was not prominent in prior research. These findings reveal systemic and local challenges curriculum irrelevance, resource deficits, and cultural norms while underscoring the potential of innovative pedagogy and career guidance to boost physics uptake.

## 5.3 Summary of the study

### 5.3.1 Chapter one summary

Chapter One introduced a study that explored factors influencing students' choice of physics at Ordinary Level in Muzarabani District, Zimbabwe. It emphasized physics' role in fostering critical thinking and its relevance to scientific and technological careers. The research problem highlighted declining physics enrollment, as noted by Chikodzi and Gukurume (2017), attributing it to curriculum design, teaching methods, and socio-economic factors. The main research question investigated key influences on students' subject choices, with sub-questions examining curriculum, pedagogy, and socio-cultural impacts. The study's significance lay in informing strategies to enhance physics education, benefiting learners, teachers, and policymakers. Delimitations focused on Muzarabani District and physics education, while limitations included reliance on self-reported data. Assumptions underscored the complexity of students' decisions and data accuracy. The chapter outlined the study's structure across five chapters, setting the stage for a comprehensive analysis of physics education challenges and opportunities in a rural context.

### 5.3.2 Chapter two summary

Chapter Two reviewed literature on factors that influenced students' choice of physics at Ordinary Level in Muzarabani District. Anchored in Expectancy-Value Theory (Wigfield & Eccles, 2000), it examined curriculum design, teaching methodologies, and socio-economic and cultural influences. Halliday and Resnick (2018) highlighted that practical curriculum enhanced engagement, yet Zimbabwe's physics curriculum faced criticism for its theoretical bias (Nyakudya, 2017). Innovative pedagogies, such as inquiry-based learning, fostered interest, unlike outdated methods (Vavilala & Vavilala, 2019). Socio-economic barriers, including resource scarcity, and cultural stereotypes, notably gender biases, deterred participation (Chikodzi & Gukurume, 2017; Mufanechiya & Munjeri, 2016). Strategies to boost enrollment included curriculum reform, teacher training, and career guidance (Osborne & Dillon, 2008). Gaps in rural-specific and longitudinal research were identified, highlighting the need for localized studies. This review provided a foundation for the study's empirical investigation of physics education challenges.

### 5.3.3 Chapter three summary

Chapter Three detailed the qualitative methodology used to investigate factors that influenced students' choice of physics in Muzarabani District. Adopting an interpretivist philosophy, the study employed a case study design to capture subjective experiences (Saunders et al., 2019). A qualitative approach, utilizing semi-structured interviews, questionnaires, focus groups, and document analysis, ensured in-depth insights into perspectives from students, teachers, and parents. Purposive, random, and convenient sampling selected 25 participants, achieving data saturation (Guest et al., 2006). Trustworthiness was maintained through credibility, transferability, dependability, and confirmability, using triangulation and member checking (Nowell et al., 2017). Thematic analysis, following Braun and Clarke (2019), identified key patterns. Ethical considerations, including informed consent and confidentiality, were prioritized (Resnik, 2020). Data was securely stored to protect privacy. The methodology's rigor supported a nuanced understanding of subject choice dynamics, paving the way for empirical findings and recommendations.

### 5.3.4 Chapter four summary

Chapter Four analyzed qualitative and quantitative data from 25 participants in Muzarabani District, including student focus groups, teacher interviews, and questionnaires. Thematic analysis identified four key themes: curriculum relevance, pedagogical effectiveness, socio-cultural barriers, and motivational factors. Students valued physics for careers but criticized its abstract curriculum, as Teacher 2 noted: "It doesn't link physics to farming tools" (Halliday & Resnick, 2018). Innovative teaching, like storytelling, engaged students, while passive methods deterred interest (Vavilala & Vavilala, 2019). Socio-economic barriers, such as textbook costs, and gender stereotypes limited participation (Chikodzi & Gukurume, 2017). Career aspirations drove enrollment, yet resource scarcity hindered access (UNESCO, 2017). Peer influence inspired or discouraged participation (Bandura, 1977). Findings aligned with Expectancy-Value Theory (Wigfield & Eccles, 2000), highlighting the need for contextualized curricula, teacher training, and equitable resources to enhance physics uptake in rural settings.

### 5.3.5 Chapter five summary

Chapter Five synthesized findings to draw conclusions and propose recommendations for improving physics education in Muzarabani District. The study confirmed that an abstract curriculum, outdated pedagogies, socio-economic constraints, and gender stereotypes deterred enrollment, aligning with Nyakudya (2017) and Chikodzi and Gukurume (2017). Expectancy-Value Theory (Wigfield & Eccles, 2000) highlighted the role of perceived value in subject choice. Innovative teaching and supportive environments mitigated barriers, supporting Hattie (2009) and Archer et al. (2010). Recommendations included revising the curriculum for rural relevance, enhancing teacher training in active learning, providing affordable resources, and strengthening career guidance (Osborne & Dillon, 2008; Vavilala & Vavilala, 2019). Community engagement and campaigns to counter gender biases were proposed (Epstein, 2018). The study advocated systemic reforms to ensure equitable STEM access, contributing to global discourse on rural education and empowering students in Muzarabani District.

## 5.4 Conclusions

The study concludes that multiple interrelated factors shape students' choice of physics in Muzarabani District, reflecting global trends while highlighting localized challenges. The curriculum's theoretical focus and lack of rural relevance, as both students and teachers criticized, align with Nyakudya's (2017) critique and exacerbate disengagement in resource-scarce settings. This suggests a need for curricula that bridge theory with local applications, such as renewable energy, to enhance perceived value, as per Wigfield and Eccles (2000).

Teaching methodologies are pivotal, with innovative approaches like storytelling and experiments fostering engagement, supporting Hattie’s (2009) findings on active learning’s impact. However, reliance on outdated methods persists, underscoring the need for teacher training. Socio-economic barriers, including unaffordable resources and time constraints from poverty, as Chikodzi and Gukurume (2017) note, limit access and force students toward “easier” subjects, reinforcing systemic inequities.

Cultural norms, particularly gender stereotypes, deter female participation, though supportive school environments can mitigate this, aligning with Archer et al.’s (2010) research. Motivation hinges on career aspirations, with students valuing physics for engineering and technology, yet structural barriers hinder realization, echoing Sen’s (1999) capability approach. Peer dynamics amplify or undermine interest, a finding that extends Bandura’s (1977) social learning framework. The unexpected resistance to collaborative learning by some teachers reveals a localized pedagogical gap. Overall, the study underscores that enhancing physics enrollment requires addressing curriculum design, pedagogy, socio-economic inequities, and cultural biases through targeted, context-sensitive interventions. These conclusions affirm the complexity of educational decision-making and the necessity of holistic reforms to foster equitable STEM participation in rural Zimbabwe.

**5.5 Recommendations**

To address the challenges identified in Muzarabani District’s physics education, the following recommendations are proposed to enhance student enrollment and engagement:

- **Revise the curriculum for local relevance:** Update the physics curriculum to include rural-specific applications, such as energy solutions for agriculture, to make it relatable, as Osborne and Dillon (2008) advocate for contextualized science education.

- **Enhance teacher training in active learning:** Implement professional development programs focusing on inquiry-based and low-cost teaching methods, like storytelling and experiments, to boost engagement, aligning with Vavilala and Vavilala's (2019) emphasis on innovative pedagogy.
- **Provide affordable learning resources:** Establish public-private partnerships to supply textbooks, digital tools, and basic lab equipment, addressing resource scarcity as Mtebe and Raisamo (2014) suggest for equitable access.
- **Strengthen career guidance programs:** Introduce regular career fairs and STEM talks to highlight physics' role in fields like engineering, per Wang and Degol's (2013) findings on motivation through career awareness.
- **Challenge gender stereotypes:** Promote campaigns showcasing female physicists and enforce school policies encouraging girls' participation, as Johnson and Smith (2020) recommend to counter cultural biases.
- **Engage communities and parents:** Organize workshops to educate parents on physics' value, fostering support for students' choices, as Epstein's (2018) research on parental involvement underscores.
- **Support collaborative learning:** Encourage teachers to facilitate study groups, leveraging peer influence to enhance motivation, building on Bandura's (1977) social learning theory.
- **Improve school infrastructure:** Advocate for government investment in electricity and internet access to support digital learning, addressing UNESCO's (2017) call for better science education facilities.

### 5.6 Overall study conclusion

This study illuminates the multifaceted factors influencing students' choice of physics at the Ordinary Level in Muzarabani District, offering actionable insights for educational reform. By integrating Expectancy-Value Theory (Wigfield & Eccles, 2000) with empirical data, it reveals how curriculum irrelevance, outdated pedagogies, socio-economic constraints, and cultural biases deter enrollment, particularly among marginalized groups. The findings extend global scholarship by highlighting rural-specific challenges, such as the curriculum's failure to address local needs and teachers' resistance to collaborative learning, while affirming the potential of innovative, low-cost teaching strategies. Recommendations for curriculum localization, teacher training, resource provision, career guidance, and inclusive cultures provide a roadmap for stakeholders to enhance physics education. Ultimately, the study contributes to the broader discourse on STEM equity, advocating for systemic change to empower all students in Muzarabani District to pursue physics and realize their potential in a rapidly evolving scientific landscape.

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## APENDICES A: INSTRUMENTS

## FOCUS GROUP DISCUSSION FOR STUDENTS

Dear Participants,

Thank you for agreeing to participate in this focus group discussion. My name is Chenyika Tatenda, and I am a student at Bindura University of Science Education conducting research on the factors influencing students' choice of physics as a subject at the Ordinary Level in Muzarabani District.

The purpose of this discussion is to gather your collective insights and experiences regarding physics education. Your responses will be used solely for academic research purposes and will remain confidential. Pseudonyms will be used in the final report to protect your identities, and no personal information will be shared publicly.

Your participation is voluntary, and you may choose not to answer any question or withdraw at any time without any consequences. If you have any questions or concerns, please feel free to ask before we begin the discussion.

Thank you for your time and valuable contribution to this study.

**Section B: Focus Group Discussion Questions**

1. What are your general perceptions of physics as a subject? Do you find it interesting, difficult, or irrelevant?
2. How do your peers influence your decision to study or avoid physics?
3. What role do teachers play in shaping your interest or disinterest in physics?
4. How do cultural norms or gender stereotypes affect students' attitudes toward physics in your community?
5. What practical applications of physics have you encountered in your daily life, and how do they influence your interest in the subject?
6. What challenges do you face in studying physics, and how do you think these challenges can be addressed?
7. If you were to recommend changes to the physics curriculum or teaching methods, what would they be?

**Interview Schedule for Teachers**

Dear Participant,

Thank you for agreeing to participate in this research study. My name is Chenyika Tatenda, and I am a student at Bindura University of Science Education conducting research on the factors influencing students' choice of physics as a subject at the Ordinary Level in Muzarabani District.

The purpose of this interview is to gather your insights and experiences as a teacher to better understand the challenges and opportunities in physics education. Your responses will be used solely for academic research purposes and will remain confidential. Pseudonyms will be used in the final report to protect your identity, and no personal information will be shared publicly.

Your participation is voluntary, and you may withdraw at any time without any consequences. If you have any questions or concerns, please feel free to ask before we proceed.

Thank you for your time and valuable contribution to this study.

**Section B: Interview Questions**

1. What factors do you think influence students' choice of physics as a subject at the Ordinary Level in Muzarabani District?
2. How do you perceive the current physics curriculum in terms of its relevance and engagement for students?
3. What teaching methodologies do you use to make physics more interesting and accessible to students?
4. How do you address the challenges of teaching physics, such as limited resources or student disinterest?
5. What role do socio-economic factors play in students' decisions to study or avoid physics?

6. How do cultural norms and gender stereotypes affect students' interest in physics, particularly for female students?
7. What support systems or resources do you think are necessary to improve physics education in Muzarabani District?
8. How do you involve parents and the community in promoting physics education among students?
9. What career guidance or motivational strategies do you use to encourage students to pursue physics?
10. What changes or reforms would you recommend increasing student enrollment and interest in physics?

**Questionnaire for Students**

Dear Student

Thank you for taking the time to complete this questionnaire. My name is Chenyika Tatenda, and I am a student at Bindura University of Science Education conducting research on the factors influencing students' choice of physics as a subject at the Ordinary Level in Muzarabani District.

The purpose of this questionnaire is to understand your experiences, perceptions, and challenges related to studying physics. Your responses will be used only for academic research purposes and will remain confidential. Pseudonyms will be used in the final report to protect your identity, and no personal information will be shared publicly.

Your participation is voluntary, and you may choose not to answer any question or withdraw at any time without any consequences. If you have any questions or concerns, please feel free to ask before completing the questionnaire.

Thank you for your time and valuable contribution to this study.

**Section A: Demographic Information**

1. Age: ____________________________
2. Gender: ____________________________
3. Grade/Class: ____________________________
4. School name: ____________________________
5. Subjects currently studying: ____________________________
6. Parent/Guardian's occupation: ____________________________
7. Do you have access to physics-related resources at home or school? (Yes/No): ____________________________

**Section B: Questionnaire Questions**

1. Why did you choose or not choose physics as a subject at the Ordinary Level?

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2. How do you perceive the difficulty level of physics compared to other subjects?

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3. What teaching methods do you find most effective in helping you understand physics concepts?

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4. Do you think the physics curriculum is relevant to real-life situations? (Yes/No) Please explain.

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5. How do socio-economic factors (e.g., family income, access to resources) influence your choice of subjects?

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6. Do cultural norms or gender stereotypes affect your decision to study physics? (Yes/No) Please elaborate.

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7. What career opportunities do you associate with studying physics?

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8. How do your parents/guardians influence your subject choices?

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9. What challenges do you face in studying physics, and how do you overcome them?

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10. What changes would you suggest, making physics more interesting and accessible to students?

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