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MISMATCHES BETWEEN THE INTENDED AND IMPLEMENTED LEARNER CENTERED METHODOLOGIES IN MATHEMATICS AT SECONDARY SCHOOL LEVEL

BY

SHONHIWA TELLMORE HAZVINEYI

B226288A

SUPERVISOR Z. NDEMO

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RELEASE FORM

NAME OF AUTHOR: SHONHIWA TELLMORE HAZVINEYI

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Supervisor……Date…….

Permanent address **6735 ZIMRE PARK RUWA**

DECLARATION

I, Shonhiwa Tellmore Hazvineyi declare that this research project for an Honors Bachelor of Science Education in Mathematics degree at Bindura University is my own design and execution. I further certify that the document has not previously been submitted to this or any other University in support of an application for a post, degree or any other qualification.

Signature:

Date: 27th of November 2024

Witness

Date 27th of November 2024

ABSTRACT

Despite the growing emphasis on learner-centered education, secondary school mathematics teachers often face challenges in implementing these approaches effectively. This qualitative study explores the mismatches between intended and implemented learner-centered methodologies in secondary school mathematics education. Through a combination of teacher interviews, lesson observations, and document analysis, this research identifies the factors that contribute to these mismatches, including external pressures, insufficient resources, and teacher mathematical pedagogical content knowledge. The study also examines the implications of these mismatches for student learning outcomes, teacher professional development, and educational equity in mathematics education. The findings of this study provide insights into the complexities of implementing learner-centered methodologies in secondary school mathematics education and highlight the need for sustained support and professional development for mathematics teachers. Ultimately, this research aims to inform the development of more effective learner-centered mathematics education policies and practices.

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DEDICATION

To my family, son and daughter whose unwavering love and support have been a constant source of inspiration and motivation throughout my academic journey.

To my supervisor, colleagues, and friends, whose guidance, encouragement, and camaraderie have helped shape my research and scholarly pursuits.

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APPROVAL FORM

The undersigned certified that they have supervised and recommended Bindura University of Science Education for acceptance of dissertation entitled:

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Student name Shonhiwa Tellmore Hazvineyi

Signed 

Date: 27/11/2024

Name of supervisor. Z. Ndemo

Signed ……

Date: 30/11/2024

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1.0 INTRODUCTION

The main purpose of mathematics lessons at ordinary level in Zimbabwe is to gain problem solving skills, reasoning, providing relationships Baykul (2009) as well as communication MOPSE (2016). Doing mathematics is a process which includes: to develop methods, to solve the problems, to practice the methods, to test whether these methods give results and to test reliability of the given answers. Mathematics has been understood conceptually and operationally. Understanding mathematics has been described as meaning quantity and quality of the connections of any idea with the others Van De Walle et al (2012). Conceptual understanding is perception about the basic idea and relations as regards to a topic Skemp (2002).Mathematics education has been a vital component of the curriculum, aiming to equip students with problem-solving skills, critical thinking, and logical reasoning. However, the teaching methods employed in mathematics education have been a subject of debate among educators and researchers. The traditional approach, emphasizing procedural fluency and memorization, has been widely criticized for neglecting deeper understanding and conceptual development. In contrast, reform-oriented approaches, such as inquiry-based learning and problem-solving, focus on promoting conceptual understanding, critical thinking, and collaboration.

1.1 MOTIVATION AND CONTEXT

The shift towards learner-centered methodologies in education has been a significant focus in contemporary pedagogical discourse (Wigfield 2006). This approach emphasizes the role of students as active participants in their learning processes, fostering critical thinking, collaboration, and self-directed learning. However, there remains a notable gap between the intended and implemented practices in secondary schools.

My interest in this topic is deeply rooted in my personal experiences as both a student and a teacher. During my time in secondary school, I often found myself disengaged during lessons that adhered strictly to traditional teaching methods. The emphasis on rote memorization and passive learning left little room for exploration or creativity. It wasn't until I encountered a few exceptional teachers who employed learner-centered strategies—such as project-based learning and collaborative group work—that I truly engaged with the material. These experiences ignited my passion for education and highlighted the transformative potential of learner-centered approaches.

As an educator, I have strived to implement these methodologies in my own classroom. However, I have frequently encountered challenges that hinder effective execution. For instance, while I aim to create an interactive and inclusive environment, constraints such as standardized testing pressures, curriculum rigidity, and limited resources often compel me to revert to more traditional methods. This dissonance between my intentions and the reality of classroom dynamics has prompted me to investigate the factors contributing to these mismatches.

The literature surrounding learner-centered education underscores its benefits, including enhanced student motivation, improved academic performance, and the development of lifelong learning skills Weimer,(2013) Prince & Felder,(2006). However, numerous studies indicate

that the actual implementation of these methodologies often falls short of expectations. Research by Hattie (2009) emphasizes that while the principles of learner-centered education are well understood, translating them into practice is fraught with obstacles.

For instance, a study by O'Neill and McMahon (2005) highlights how systemic factors—such as institutional culture, teacher training, and assessment methods—can significantly impede the adoption of learner-centered practices. Additionally, the disconnect between policy intentions and classroom realities is evident in various contexts worldwide Bishop & Verger (2018). This body of literature reveals a pressing need to explore the specific barriers educators face when attempting to align their teaching practices with learner-centered ideals.

The shift towards learner-centered education has gained momentum globally, aiming to enhance student engagement, autonomy, and academic achievement. However, the successful implementation of learner-centered methodologies remains a concern. Research suggests that discrepancies between intended and implemented educational practices can hinder effective teaching and learning. This study investigates the mismatches between implemented and intended learner-centered methodologies at secondary school level.

1.2 STATEMENT OF THE PROBLEM

Despite the growing emphasis on learner-centered teaching methodologies, many educators continue to rely on traditional, instructor-led approaches that may not effectively engage students or promote deep learning. Research indicates that while strategies such as inductive and deductive reasoning can enhance understanding, their application in the classroom often remains inconsistent Prince & Felder (2006). Furthermore, the gap between pedagogical theory and practice suggests that educators may lack the necessary training or resources to implement these innovative methods effectively Weimer (2013).

As highlighted by Hattie (2009), the visibility of learning processes and outcomes is crucial for student achievement, yet many institutions struggle to create environments that foster this visibility. Additionally, O'Neill and McMahon (2005) point out that both students and lecturers may have differing perceptions of what student-centered learning entails, leading to potential misalignments in teaching practices and learning expectations.

Given these challenges, it is essential to investigate the challenges educators face in adopting learner-centered approaches and to explore how these barriers impact student engagement and learning outcomes. Addressing this problem is critical for enhancing educational practices and ensuring that all students receive a meaningful and effective learning experience.

1.3 RESEARCH QUESTIONS:

The research will be guided by the following questions:

1. What sort of mismatches exist between intended and implemented learner-centered methodologies?

2.What factors contribute to mismatches between intended and implemented learner-centered methodologies?

3. How can the disparities be accounted for**?**

1.4 OBJECTIVES

The major objectives of this research are;

1. To Identify gaps between policy intentions and classroom practices.

2. To Understand factors contributing to these mismatches.

3. To suggest strategies for improved implementation and teacher support.

1.5 SIGNIFICANCE OF THE STUDY:

This study will assist policy makers in Zimbabwe and the world over, strategic planners of the educational curriculum, mathematics teachers, the researcher herself and students in various ways. To curriculum planners, the outcome of this research may contribute to them with regards to implementing learner centred methodologies as a way of assisting the learners in the improving their mastery of mathematics concepts as this is in line with new curriculum of 2015-22. . . To the policy planners in the ministry of education, this research may assist them in crafting better policies which may support mathematics as a core subject at ordinary level. This may be in line with Nziramasanga Commission (2001)'s perception that mathematics and science are the cornerstone of technological advancement which Zimbabwe yearns to achieve in this ever changing environment. To the students, Kirkby (2012) this study can identify specific areas where teaching practices diverge from educational goals, leading to improved instructional methods that better support student engagement and understanding in mathematics. By addressing the mismatches, the study aims to enhance student learning outcomes. Ball (2001) when learner-centered methodologies are effectively implemented, students are more likely to develop critical thinking skills, problem-solving abilities, and a deeper understanding of mathematical concepts, Graham (2006) ultimately leading to better academic performance. The findings can provide valuable insights for policymakers and educational leaders. Understanding the barriers to effective implementation can inform curriculum development, teacher training programs, and resource allocation, ensuring that educational policies align more closely with learner-centered methodologies The study can highlight the need for targeted professional development for teachers. By identifying gaps in knowledge or skills related to learner-centred methodologies, educational institutions can develop training programs that equip teachers with the necessary tools to implement these approaches effectively. Recognizing and addressing

mismatches can encourage a culture of collaboration among educators. Sharing best practices and strategies for successful implementation can foster a supportive community focused on continuous improvement in teaching methodologies. This study adds to the existing body of research on learner-centered education, specifically in the context of mathematics. By documenting the challenges and successes associated with implementation, it can serve as a reference for future studies and contribute to ongoing discussions about effective teaching practices. This study holds significant potential for advancing educational practices in mathematics at the secondary school level by bridging the gap between intended and implemented methodologies, ultimately aiming for a more effective, inclusive, and engaging learning environment for all students.To the researcher, the study is a requirement for the attainment of a Bbachelor of Science Education in mathematics honours degree.

1.6 DELIMITATIONS

Chikoko and Mhloyi (2015) state that the delimitation of a research problem is the precise limit of the issues the researcher is to cover when it starts and end. The research will focus exclusively on secondary school mathematics education, excluding other subjects to maintain a concentrated analysis.

The research will focus on qualified teachers with teaching experience. And limited to secondary school teachers from 3 schools in Murewa district Mashonaland East. The study includes a sample of 8 mathematics teachers from St Paul's Musami High School, Beta secondary school and Chemhondoro High school. The research will primarily investigate perceptions and experiences related to learner-centered methodologies, rather than directly measuring academic outcomes. The study relies on documented analysis, classroom observations, and interviews and excludes other data collection methods. The study is conducted

over a period of 8 months, from May to December 2024.The study does not intend to generalize the findings to other subjects

These delimitations clarify the boundaries of the study and help define its focus, ensuring that the research remains manageable while addressing specific aspects of learner-centered methodologies in secondary mathematics education.

1.7 ASSUMPTIONS OF THE STUDY

The research will be guided by the following assumptions

1. Learner-centered methodologies are effective in improving Mathematics education.

2. School context and resources impact implementation of learner-centered methodologies.

3. Observational data accurately represent classroom practices

4. Students are representative of the larger population.

5. Participants respond honestly and accurately.

6. Rural high schools face unique challenges such as limited resources, teacher shortages and geographical isolation.

7. Mathematics education is critical for future success.

8. Mismatches between intended and implemented methodologies affect learning outcomes.

9. Participants share similar characteristics.

By acknowledging these assumptions, the study recognizes potential limitations and strives to mitigate them through rigorous methodology and data analysis.

1.8 LIMITATIONS

The research has the following limitations:

1. 8.1 The study may be limited by a small or non-representative sample size, which could affect the generalizability of the findings to broader populations of secondary schools. Limited generalizability due to rural focus

1.8.2 Qualitative data collection methods, such as interviews or observations, may introduce researcher bias, impacting on the reliability and validity of the findings to minimize these l intend to do pilot testing, data triangulation and member checking to ensure interpretations accurately reflect their experiences and perspectives.

1.8.3 Limited geographic scope as it is limited to rural schools in Murewa district Mashonaland East.

1.8.4 The study may focus exclusively on mathematics education, potentially overlooking insights from other subjects that could provide a more comprehensive understanding of l8earner-centered methodologies.

1.8.5 Some teachers may resist adopting learner-centered methodologies due to entrenched practices or beliefs, which could skew the data towards negative experiences or perceptions.

1.8.6 The observations may not reflect the actual outcome as the teacher was under observation.

These limitations highlight the complexities involved in studying the implementation of learner-centered methodologies and suggest areas for future research to build on the findings of this study.

1.9 DEFINITION OF TERMS

1.9.1 CURRICULUM

According to Wiggins & McTighe (2005) curriculum is the blueprint for learning, outlining what students should know, understand, and be able to do "Curriculum is the combination of educational experiences, both formal and informal, that students have during their time in school." Marsh & Willis (2007, 5) Schubert (2010) defines curriculum as not just a document, but a living, breathing entity that evolves over time, shaped by societal, cultural, and educational contexts. Curriculum refers to the planned and intentional learning experiences, content, and assessments designed to achieve specific learning objectives and outcomes. It encompasses the formal and informal educational experiences, including knowledge, skills, and values, that student encounter in educational institutions.

1.9.2 INTENDED CURRICULUM

Pinar (2004) propounds the intended curriculum consists of the formal statements of what students are expected to learn, as articulated in educational standards and frameworks. Marsh & Willis (2007) state that the intended curriculum is the official curriculum that is prescribed by educational authorities, representing the goals and content that should be taught. "Intended learning outcomes are statements of what students are expected to know, understand, and be able to do upon completion of a course or program." Biggs & Tang, (2011, 10).The intended curriculum therefore refers to the official educational plans and objectives set by educational authorities, institutions, or educators. It outlines what is expected to be taught and learned and how that content is expected to be taught.

1.9.3 IMPLEMENTED CURRICULUM

Fullan (2007) defines the implemented curriculum as what teachers actually do in the classroom, which may differ from the intended curriculum due to various factors such as resources, teacher

beliefs, and student needs. Schmidt & Prawat (2006) assert that the implemented curriculum reflects the intersection of the intended curriculum with the teacher's interpretation and the learning environment. “Implemented curriculum refers to the actual educational experiences that students encounter in the classroom, reflecting the enacted intentions of teachers and educators." Schubert (2010, 25).The implemented curriculum refers to the actual delivery of the intended curriculum in educational settings. It encompasses the teaching methods, instructional strategies, and classroom practices that educators use to convey the planned curriculum to students. This phase reflects how the intended curriculum is realized in practice.

1.9.4 TEACHING METHODOLOGIES

Joyce et al (2009) state that teaching methodologies encompass the practices, techniques, and strategies that teachers use to create an environment conducive to learning. Wiggins & McTighe (2005) concur ,teaching methodologies involve the deliberate selection and application of instructional strategies to achieve specific learning objectives .Hmelo-Silver et al.(2013, 5) , "Teaching methodologies include a range of approaches, from traditional lecturing to student-centered and project-based learning, that facilitate active engagement and meaningful learning. Therefore teaching methodologies refer to the systematic and intentional approaches, techniques, and strategies used by educators to facilitate student learning, promote academic achievement, and support cognitive, social, and emotional development.

1.10 SUMMARY

This chapter looked at the background of the study and its significance to the teaching and learning process. In addition to that the research outlined the limitations and the delimitations of the study as well as the definition of the main terms in the study. The next chapter will be focusing on the literature review on mismatches between implemented and intended learner centered methodologies in Mathematics at secondary school level.

CHAPTER 2: LITERATURE REVIEW

2.0 THEORETICAL FRAMEWORK

In this section, the general theoretical framework of the study is presented. Under the constructivist learning theory knowledge is constructed through interaction with the environment, and learning is a process of making sense of experiences.In a learner-centered approach, students actively engage in problem-solving and critical thinking rather than passively receiving information. Artz et al., (2008) assert that students interact in ways that both support and challenge one another's strategic thinking. This framework emphasizes the importance of creating a classroom environment where students can construct their understanding of mathematical concepts..Sociocultural Theory: Learning is inherently social and influenced by cultural contexts. Vygotsky's concept of the Zone of Proximal Development (ZPD) highlights the potential for learning through social interaction.Vygotsky (1978)This perspective helps to analyze how classroom dynamics, peer interactions, and teacher-student relationships can either facilitate or hinder the implementation of learner-centered methodologies. The diffusion of Innovation theory explains how new ideas and practices spread within an educational context. Factors influencing adoption include perceived benefits, compatibility with existing values, simplicity, trialability, and observable results. Emphasis is on understanding how teachers adopt learner-centered methodologies can reveal mismatches between what is intended by educational policy and what is actually implemented in practice.The Ecological Systems Theory . was proposed by Bronfenbrenner, this theory emphasizes the multiple layers of influence on an individual's development, including micro (classroom), meso (school), exo (community), and macro (societal) systems.This framework can be used to analyze how various factors at different levels (e.g., curriculum design, teacher training, parental involvement) impact the successful

implementation of learner-centered approaches in mathematics education Deci & Ryan,(2000). Change Theory where Change in educational practices often involves overcoming resistance and addressing barriers. Kotter's model of change outlines steps for successful implementation.This theory can guide an analysis of the challenges faced by educators in shifting from traditional to learner-centered methodologies, including resistance from teachers, lack of resources, or insufficient professional development.This theoretical framework provides a comprehensive lens through which to examine the complexities surrounding the implementation of learner-centered methodologies in secondary school mathematics. By integrating various educational theories, it allows for a nuanced understanding of the factors that contribute to mismatches between intention and practice.Fullan (2007)

2.1 WHAT IS MATHEMATICS

Mathematics is viewed in different phenomena around the world. Hesrh (2006) views Mathematics as the science of patterns and relationships. Many people viewed the discipline of learning area of Mathematics as a practical thing which needs more of hands on than reading.

Mathematics is viewed as a discipline which is used in the day to day life. For instance in our culture it is considered the educated and uneducated ones used to acquire Mathematics in their personal life. Due to the importance of Mathematics the learners should be well equipped with all the necessary skills and facts so that they will enjoy it rather than having attitudes towards it as a learning area. Since Mathematics is viewed as a practical learning area which needs more concentration and cooperation. Most learners especially in secondary schools view it as a difficult subject hence they have attempted the subject not serious which leads some challenges in solving Mathematical concepts.Sconnerhed (2009) is of the view that, mathematics includes the study of such topics as quantity, structure space, and change. Mathematics relies on logic of

shapes, facts and creativity which includes them at times, as postulated by Ellerton and Clements (2011). From the definitions above, it can be concluded that mathematics is the science of structures, order and relation that has evolved from counting, measuring and describing the shapes of objects. Mathematics is a formal area of teaching and learning which was developed about five thousand years ago by the Sumerians.

Mathematics is a discipline which is applicable in every-day life situation. In Zimbabwean education system, a person without 'O' level Mathematics is considered not to have a full 'O' level certificate. In this regard, all students should be equipped with all Mathematical skills so that they find joy in the learning of Mathematics. Science, technology and engineering cannot thrive without a firm foundation in mathematics.

Mathematics learning refers to the process through which individuals acquire mathematical knowledge, skills, and understanding. It encompasses various cognitive, social, and emotional dimensions, influenced by teaching methods, curricular design, and individual student characteristics.

2.1.2 KEY ASPECTS OF MATHEMATICS LEARNING

Mathematics learning involves cognitive processes such as problem-solving, reasoning, and critical thinking. Piaget's theory of cognitive development posits that children move through stages of understanding, impacting how they learn mathematical concepts Piaget (1970). Constructivist theories emphasize that learners construct their own understanding and knowledge of mathematics through experiences and reflection Bruner (1966) Vygotsky (1978). This approach encourages active participation and exploration. Learning is influenced by social interactions and cultural contexts. Vygotsky's concept of the Zone of Proximal Development (ZPD) highlights the importance of social interaction in learning Vygotsky (1978).Student

motivation plays a crucial role in mathematics learning. Research indicates that students who are more engaged and motivated tend to perform better in mathematics Deci & Ryan (2000).Effective mathematics instruction incorporates a variety of pedagogical strategies that promote understanding and application of mathematical concepts. Research suggests that learner-centered approaches can enhance student outcomes Hattie (2009).

2.2 LEARNER-CENTERED TEACHING AND LEARNING INSTRUCTION

According to Quintana (2001) learner-centered teaching and learning are instructional approaches that prioritize the needs, interests, and active participation of students in the learning process. This method contrasts with traditional teacher-centered approaches, where the instructor is the primary source of knowledge and authority.Bonwell & Eison (2012) Students are actively involved in their learning through discussions, problem-solving, group work, and hands-on activities. This engagement fosters deeper understanding and retention of material.Instruction is tailored to meet the diverse needs, interests, and learning styles of students. Tomlinson (2001) Teachers may offer choices in assignments or projects to allow students to explore topics that resonate with them.Emphasis is placed on collaborative learning environments where students work together, share ideas, and learn from one anotherJohnson & Johnson (2019). This builds communication skills and encourages a sense of community.Learner-centered approaches encourage students to think critically, analyze information, and solve real-world problems. Facione (2011. This often involves inquiry-based learning or project-based learning.Hattie & Timperley (2007) Continuous feedback is integral to the process, allowing students to reflect on their understanding and progress. Self-assessment and peer assessment are common practices in this approach.Teachers act as facilitators or guides rather than authoritative figures. Weimer (2013) They support students in their learning journey by providing resources, asking guiding questions, and fostering a supportive environment.Schunk & Zimmerman (2008) students are

encouraged to set their own learning goals, which promotes ownership of their educational experience and motivates them to take responsibility for their learning.

2.2.1 BENEFITS OF LEARNER-CENTERED APPROACHES

Students are more motivated when they have a say in their learning. There is active engagement which leads to deeper comprehension of material. Skills such as collaboration, critical thinking, and self-regulation are nurtured. Learner-centered environments can adapt to various educational contexts and student needs. Learner-centered teaching and learning create a dynamic and inclusive educational environment that empowers students to take an active role in their education. By focusing on the individual learner's needs and fostering collaboration, this approach prepares students for success both academically and in their future.

2.3 LEARNER CENTRED METHODOLOGIES

Learner-centered methodologies prioritize the needs, interests, and experiences of students in the educational process.

1. Project-Based Learning

Students engage in projects that require critical thinking, collaboration, and problem-solving. They explore real-world issues and create tangible outcomes.

2. Inquiry-Based Learning

This approach encourages students to ask questions, conduct investigations, and build knowledge through exploration and discovery.

3. Collaborative Learning

Students work together in groups to achieve shared learning goals. This fosters communication, teamwork, and peer learning.

4. Flipped Classroom

Traditional lecture content is delivered outside of class (e.g., via videos), allowing class time for interactive activities, discussions, and hands-on work.

5. Experiential Learning

Learning through experience, where students engage in activities that require reflection and application of knowledge in real-life contexts.

6. Differentiated Instruction

Tailoring teaching methods and resources to accommodate diverse learners' needs, preferences, and readiness levels.

7. Problem-Based Learning

Students learn by solving complex, real-world problems, which enhances critical thinking and application of knowledge.

8. Socratic Method

A form of dialogue where students explore ideas through questioning and discussion, promoting deeper understanding and critical thinking.

9. Peer Teaching and Tutoring

Students take on teaching roles to help their peers understand concepts, reinforcing their own learning while fostering collaboration.

10. Game-Based Learning

Incorporating games into the learning process to enhance engagement, motivation, and skill development.

11. Self-Directed Learning

Encouraging students to take initiative in their learning by setting goals, selecting resources, and assessing their progress.

12. Learning Stations or Centers

Different areas in the classroom where students can engage with various activities or subjects at their own pace.

13. Reflective Practice

Encouraging students to reflect on their learning experiences to deepen understanding and improve future performance.

These methodologies create an engaging and supportive learning environment that promotes active participation, critical thinking, and personal growth among students.

2.3.1 HISTORICAL PERSPECTIVE

The evolution of learner-centered methodologies can be traced through various educational movements and philosophies over the centuries. Here's a historical perspective on how these methodologies have developed:

Socrates (470-399 BCE): Emphasized dialogue and questioning, laying the groundwork for the Socratic Method, which encourages critical thinking through discussion.Confucius (551-479 BCE): Advocated for education that considers the moral and ethical development of individuals, highlighting the importance of relationships in learning. Renaissance Humanism (14th-17th Century) Focused on the study of classical texts and the development of critical thinking. Education began to shift from rote memorization to fostering individual thought and creativity. Enlightenment (17th-18th Century) Thinkers like John Locke and Jean-Jacques Rousseau emphasized experiential learning and the importance of the learner's experience. Rousseau's work, particularly in "Emile," advocated for education that is natural and aligned with children's developmental stages.John Dewey's Progressive Education (1916): Emphasized student-centered learning, experiential education, and democratic values.

Montessori's Self-Directed Learning (1907) Focused on child-centered education, hands-on activities, and individualized instruction.Progressive Education Movement (Late 19th - Early 20th Century) Led by figures such as John Dewey, this movement emphasized experiential learning, democracy in education, and the importance of student interests. Dewey argued that education should be relevant to students' lives and promote critical thinking. Constructivism (Mid-20th Century)

Influenced by theorists like Piaget and Vygotsky, constructivism posits that learners construct knowledge through experiences and social interactions. This approach laid the foundation for many modern learner-centered methodologies, emphasizing active engagement and collaboration. Carl Rogers' Student-Centered Learning (1951) Advocated for learner autonomy, empathy, and genuineness in teaching.Abraham Maslow's Hierarchy of Needs (1943) Highlighted the importance of self-actualization and personal growth.Cognitive Revolution

(1960s-1980s)The rise of cognitive psychology shifted focus to how learners process information. This period saw the development of teaching strategies that account for individual learning styles and cognitive development. Technological Advancements (Late 20th Century)The introduction of computers and the internet transformed educational practices Howard Gardner's Multiple Intelligences (1983) National Education Association (NEA) emphasized student-centered learning, teacher facilitation, and collaborative learning: The Learner-Centered Movement (1987) , challenged traditional notions of intelligence and advocated for diverse learning approaches.. The flipped classroom model emerged, leveraging technology to enhance student engagement and autonomy.21st Century LearningEmphasis on skills such as critical thinking, collaboration, communication, and creativity has led to the adoption of methodologies like project-based learning and inquiry-based learning in contemporary classrooms. Global PerspectivesInternational educational frameworks, such as the International Baccalaureate (IB) and various competency-based education models, have incorporated learner-centered approaches that promote global citizenship and real-world problem-solving. The other theories are, Lev Vygotsky's Social Constructivist Theory (1978): Emphasized social interaction, language, and culture in shaping learning. Jean Piaget's Constructivist Theory (1954): Focused on active learning, schema formation, and adaptive learning.

The historical evolution of learner-centered methodologies reflects a growing recognition of the importance of student agency, engagement, and relevance in education. Each movement has contributed to a more nuanced understanding of how people learn, leading to diverse approaches that cater to individual needs and promote deeper understanding. Today, these methodologies

continue to evolve in response to changing societal needs, technological advancements, and educational research.

2.3.2 CHARACTERISTICS OF LEANER CENTERED METHODOLOGIES

Learner-centered methodologies are defined by several key characteristics that prioritize the needs, interests, and active participation of students in the learning process. Some of the main characteristics are that students engage in hands-on activities, discussions, and problem-solving tasks rather than passively receiving information. Bonwell & Eiso (2012). Instruction is tailored to meet the diverse needs, interests, and learning styles of individual students, allowing for differentiated learning experiences.Emphasizes teamwork and peer-to-peer interaction, fostering a sense of community and shared responsibility in learning.Learners work together to achieve common goals Johnson & Johnson (2019)Encourages students to analyze, evaluate, and create, promoting higher-order thinking skills rather than rote memorization.Students have a voice in their learning process, making choices about topics, projects, and methods of assessment.Learners take responsibility for their learning Deci & Ryan, (2000) .it encourages self directed learning where according to Knowles (2015) Learners set goals and pace their own learning . Learning experiences are connected to real-world contexts, making education relevant and applicable to students' lives.Learning connects to real-life situations Bransford et al., (2019).Students are encouraged to reflect on their learning experiences, fostering self-awareness and a deeper understanding of their own learning processes. Learners explore questions and problems Hmelo-Silver (2004) Continuous feedback is provided to help students understand their progress and areas for improvement, promoting a growth mindset. Assessment adapts to individual learners' needs Wiggins & McTighe (2005).Teachers act as guides or facilitators rather than traditional authoritative figures, supporting students in their exploration and discovery. Teachers guide and support rather than lecture Rogers (2011). Flexible learning

environments where classrooms are designed to support various learning activities, often incorporating technology and different seating arrangements to enhance collaboration and engagement.There is an emphasis on Skills development which Focuses on developing essential skills such as communication, collaboration, creativity, and critical thinking, preparing students for future challenges.

These characteristics collectively create a dynamic and engaging learning environment that empowers students to take ownership of their education and prepares them for lifelong learning..

2.3.3 MANAGEMENT OF LEARNER-CENTERED METHODOLOGIES

Managing learner-centered methodologies effectively requires careful planning, flexibility, and ongoing assessment. This approach emphasizes student engagement, collaboration, and active participation, which can transform traditional classroom dynamics. A positive learning atmosphere is crucial for the success of learner-centered methodologies. Teachers should establish norms that promote respect, collaboration, and open communication. McCombs & Miller (2007) , by fostering a culture of trust where students feel safe to express their ideas and take risks and using icebreakers and team-building activities to build rapport among students. Curriculum design must accommodate diverse learning styles and interests.Tomlison (2001) A flexible curriculum allows for differentiation and personalized learning paths by implementing project-based learning that align with student interests, enabling them to take ownership of their learning Thomas (2000) and using formative assessments to gauge understanding and adapt instruction accordingly Black & Wiliam, (2008).Active learning is central to learner-centered methodologies. Educators should employ a variety of instructional strategies that promote engagement and participation Prince (2004) by incorporating cooperative learning activities where students work in groups to solve problems or complete tasks and utiilize technological

tools such as discussion forums and collaborative platforms to enhance interaction Garrison & Vaughan (2008) Empowering students to take responsibility for their learning is essential in a learner-centered approach. This autonomy fosters intrinsic motivation and engagement Deci & Ryan (2000) by allowing students to set personal learning goals and reflecting on their progress, providing choices in assignments and projects to cater for individual interests and strengths.Continuous assessment is vital for monitoring student progress and adjusting instructional strategies. Feedback should be constructive and timely to guide student improvement Hattie & Timperley (2007) by using peer assessments and self-assessments to encourage reflection and critical thinking and Implementing regular check-ins or feedback sessions to discuss challenges and successes.The effective management of learner-centered methodologies involves creating a supportive environment, designing flexible curricula, facilitating active learning, encouraging student autonomy, and implementing ongoing assessment. By adopting these strategies, educators can enhance student engagement and foster a deeper understanding of content.

2.3.4 APPROPRIATENESS OF LEARNER CENTRED METHODOLOGIES

Learner-centered methodologies are particularly appropriate in various educational contexts, emphasizing the active participation of students in their learning processes. These methodologies are beneficial in fostering critical thinking, collaboration, and a deeper understanding of content. They can be used in classrooms with students from varied backgrounds and learning styles, learner-centered approaches can be tailored to meet individual needs Tomlinson (2001).They can also be used for complex subjects that require higher-order thinking, such as science and humanities, learner-centered methods encourage exploration and inquiry-based learning Bransford, Brown, & Cocking (2000).They can also be used when the goal is to develop critical skills such as problem-solving, collaboration, and communication, these methodologies provide

opportunities for practice in real-world contexts Hattie & Timperley (2007)We can use them to motivate students , learner-centered approaches are effective in engaging students who may be disinterested or disengaged from traditional teaching methods Deci & Ryan (2000).

These methodologies can be used by incorporating techniques like group discussions, case studies, and role-playing to promote active engagement Prince (2004). Designing projects that allow students to explore topics of interest deeply, fostering autonomy and ownership of their learning Thomas (2000). Using formative assessments that provide ongoing feedback rather than relying solely on high-stakes testing Black & Wiliam (2008). This encourages a growth mindset among students. Leveraging digital tools that facilitate collaborative learning and provide diverse resources for students to explore Garrison & Vaughan (2008). Encouraging students to reflect on their learning experiences through journals or discussions, which can help deepen their understanding and self-awareness Moon (2004)

Learner-centered methodologies are most appropriate in diverse and complex learning environments where student engagement and skill development are priorities. By incorporating active learning strategies, project-based learning, flexible assessments, technology integration, and reflective practices, educators can create a dynamic classroom environment that fosters meaningful learning experiences Prince (2004).

2.4 CONSTRUCTIVIST LEARNING THEORIES

Constructivism and its corollary theories of the concept image and concept definition form the theoretical framework. The constructivist theories as cited in Battacharya and Han (2001) have a history of starting in the 18th century with the philosophies of Immanuel Kant and Giambattista Vico. Cognitive constructivism, a division of the constructivist theories rooted in its origin in the work of Piaget (1968) will be used to explain learner's misconceptions. The cognitive

constructivist theory of learning Piaget (1968) Von Glasserfeld (2000) Hatano (2006) Smith, Disessa & Roschelle (2003) Siegler (2005) is useful to explain and predict how learners conceive mathematical ideas and their misconceptions Luneta & Makonye (2013).

Constructivism holds that learning involves learner's reconstruction of knowledge in their minds by giving meaning to ideas existing outside themselves and internalising them Luneta & Makonye (2013). Hatano (2006) viewed constructivism as each person constructing knowledge by himself/herself through a cognising mind driven by self- regulation. Cognitive conflict is a state of perturbation which results when individuals encounter circumstances at variance with their current understanding and this drives individuals to explore the problem in relation to their prior understanding. By thinking systematically and carefully to deal with the cognitive conflict, reconciliation will result in learning.

Von Glasserfeld (2009) asserted that constructivism knowledge is not transferred from teachers to learners, it is actively constructed by a thinking student and students adapt and re-organise the experienced world with his/her mind Luneta & Makonye (2013). Furthermore Von Glasserfeld points out that with the constructivism theory, learning is viewed as the capability of an individual to change his/her conceptual structure in response to perturbation Luneta & Makonye (2013). The teacher should assist the learner by providing physical or mental models on which the learner can impose and abstract mathematical meaning. At its tenet is the argument that knowledge cannot be transferred undigested from teacher to learners but must be restructured and re-organised by each individual learner to construct meaning.

The learner is viewed as an active participant in the construction of his own knowledge. This construction activity involves the interaction of a childs existing ideas and new ideas are

interpreted and understood in the light of that learners own current knowledge as cited in Olivier (2009). Knowledge is organised and structured into large units of interrelated concepts. The unit of interrelated ideas in the learners mind is called a schema. A schema is the mental representation of an associated set of ideas and/or actions. A schema can be discrete and specific, or sequential and elaborate. It is invoked on encounter with the concept. Learning involves interaction between the existing schema and new ideas. According to Siegler (2005) social factors though important are peripheral to the learning process in cognitive constructivism. Key mechanisms for learning are assimilation, accommodation, and equilibration Luneta & Makonye (2013).

In assimilation, Olivier (2009) a new idea is encountered and incorporated directly into an existing schema that is very much likes the new idea. The new idea is interpreted or recognised in terms of an existing schema. Existing concepts are expanded by the new idea and new distinctions are formed through differentiation. In accommodation Olivier (2009) the existing schema needs to be re-constructed and re-organised as it is relevant but inadequate to assimilate the new idea which is quite different. Accommodation involves changing pre-existing schemata to adapt to a new situation. Internal mental structures are changed to provide consistency with external reality. Existing schemas or operations are modified or new schemas are created to account for the new experience. Such reconstruction leaves previous knowledge intact, as part or subset or special case of the new modified schema. The previous knowledge is never erased.

Assimilation is an active incorporation of an experience into a representation already available to the learner. Misconceptions often occur in assimilation through over-generalisation. When a

learner meets a new mathematical object, he/she might think that the mathematical object belongs to a class which he/she already has and operates on it as he does, an object in that class Luneta & Makonye (2013). Cobb and Bauersfeld (2005) argued that a learner's construction of knowledge is through the use of prior mathematical knowledge and social interaction that generates contradictions. Social interaction such as discussion with other individuals or reading something that does not fit into ones conceptual structure give rise to a state of disequilibrium which leads learners to question their beliefs and to try out new ideas. As learners try to resolve these conflicts they become aware of their activity and construct increasingly sophisticated systems of thought. In this way cognitive structures accommodate experience which results in learning. Piaget (1968), Hatano (2006), Sfard (2002) pointed out that learners acquire mathematical knowledge through construction of more powerful mental structures, concepts, or logical structures Luneta & Makonye (2013). A cognitive conflict, a state of mental unbalance or disequilibrium occurs when new information does not fit or is contradictory with the existing knowledge is encountered. To return to a state of equilibrium, the construction of new cognitive structures is needed and this process is called equilibration. This state must be present for cognitive development and learning to take place. Equilibration involves both assimilation and accommodation, Bhattacharya and Han (2001).

Constructivism is an appropriate perspective in the study, as errors and misconceptions are the natural result of individual learners cognitive efforts of their own sense-making in the face of new mathematical challenges. It explains how and why errors occur. It is important to understand the nature of misconceptions in order to minimise or repair the barriers and misconceptions represented in the learning of mathematical concepts and in this way lasting solutions can be found to the mathematics learning problems Luneta & Makonye, (2013).

Smith et al (2023) and Nesher (2007) argued that there is a strong link between constructivism and learners mathematical misconceptions as propounded by Luneta & Makonye (2013). Ernest (2001) wrote Constructivism accounts for the individual idiosyncratic construction of meaning, for systematic errors, misconceptions, and alternative conceptions in the learning of mathematics (p. 2). Confrey (2000) also argued that teachers do not teach learners the misconceptions they make, rather learners make the misconceptions by themselves. Constructivism explains errors and misconceptions learners make when they think about concepts. Confrey summed it up as; Misconceptions are taken as the strongest piece of evidence for the constructive nature of knowledge acquisition, because it is highly unlikely that learners have acquired them by being taught (p.201).

Constructivism accounts for partially remembered and distorted rules as they are caused by rote teaching Olivier (2009). Ideas are memorised in rote learning as the learner fails to link a new idea to an existing schema. The idea is so different from an available schema such that assimilation and accommodation are impossible. Such isolated knowledge is difficult to remember. In order to understand an idea it must be incorporated into an appropriate existing schema. Constructivism help to explain that learners are consistent in their formulation of misconceptions as there is a pattern in their thinking and the pattern may not be immediately apparent to the teacher. Analysis of learners work helps to reveal that pattern Luneta & Makonye (2013).

According to Olivier (2009) a learner can fail to solve a problem because he may not possess the schema that is needed or he may possess an appropriate schema but the retrieval mechanism cannot locate it. Other causes are that the retrieved schema is flawed or incomplete or an

inappropriate schema is retrieved. Constructivism also helps to explain malrules as learners often degenerate into distorting rules to overcome an obstacle.

2.4.1 SOCIAL CONSTRUCTIVIST THEORY

Social Constructivist Theory posits that knowledge is constructed through social interactions and experiences, emphasizing the role of culture, language, and social context in the learning process. This theory builds upon the foundational ideas of constructivism, primarily associated with theorists like Jean Piaget, but extends them by focusing on the social aspects of learning as articulated by Vygotsky (1978)

Vygotsky (1978) argued that social interaction is fundamental to cognitive development. He believed that learning occurs first in a social context before it is internalized by the individual. This idea is encapsulated in his concept of the "Zone of Proximal Development" , which refers to the difference between what a learner can do independently and what they can achieve with guidance from a more knowledgeable other. Vygotsky emphasized the importance of cultural tools, such as language, symbols, and technology, in shaping thought processes. Language, in particular, serves as a primary medium for social interaction and cognitive development Vygotsky (1986).Social constructivism advocates for collaborative learning environments where students work together to solve problems, share knowledge, and construct understanding. This approach fosters deeper engagement and promotes critical thinking skills Johnson & Johnson (2019). Learning is viewed as a contextualized process influenced by the cultural and social environment. This perspective underscores the importance of situating learning experiences within real-world contexts to enhance relevance and meaning Brown et al (2009).The teacher's role in a social constructivist framework, teachers act as facilitators or guides rather than traditional transmitters of knowledge. They create opportunities for students to engage in

meaningful dialogue, collaborate with peers, and reflect on their learning experiences Bruscia, (2005).Assessment practices should align with social constructivist principles by emphasizing formative assessments that provide feedback on collaborative projects and peer interactions rather than solely focusing on individual performance on standardized tests Black & Wiliam, (2008).

Curricula should be designed to promote inquiry-based learning, encouraging students to explore topics of interest through group work and discussions. This approach allows learners to construct knowledge collectively while developing critical thinking skills Kukla (2000). Social Constructivist Theory highlights the significance of social interactions in the learning process, emphasizing that knowledge is co-constructed through collaboration and cultural mediation. By understanding and applying these principles in educational settings, educators can create more engaging and effective learning environments.

2.5 RELATED STUDIES

Examining the gap between intended and implemented learner-centered methodologies reveals insights into educational practices. Below are several studies that illustrate this dynamic.

1. The Impact of Dialogue in Learning

Researchers observed classrooms where teachers employed dialogic teaching techniques. They recorded classroom interactions and analyzed the quality of dialogue and its effects on student learning outcomes. The strengths were improved student understanding and retention of material , a fostered sense of community and belonging among students.The limitations were that teachers required extensive training to effectively facilitate dialogue, which may not always be

feasible Alexander (2008) and variability in student participation could affect overall learning experiences.

2. The Implementation of Inquiry-Based Learning

Researchers studied the implementation of inquiry-based learning in science classrooms across multiple schools. They compared teachers' intended IBL practices with actual classroom observations and student feedback. Griffiths (2004) Although the curriculum emphasized inquiry-based learning, many teachers reverted to direct instruction due to lack of training and support. Students reported a desire for more hands-on, inquiry-based activities.

3. Cultural Context in Learning

A qualitative study examined how culturally responsive teaching practices influenced student engagement in a diverse classroom. Interviews with students and teachers were conducted alongside classroom observations.The strengths highlighted the importance of connecting learning to students' cultural backgrounds and increased student motivation and relevance of the curriculum.Foe the limitations implementation required significant time and effort from educators to adapt materials and teaching styles Gay (2010).There was also potential for resistance from students unfamiliar with culturally responsive methods.

4. The Role of Professional Development in Learner-Centered Education

This longitudinal study examined the impact of professional development on teachers' abilities to implement learner-centered strategies. Data were collected through surveys, classroom observations, and interviews over three years. While professional development aimed to promote learner-centered methodologies, many teachers reported difficulty in translating these strategies into practice due to time constraints and lack of administrative support Timperley (2008)

5. Collaborative Learning in Higher Education

This study involved implementing collaborative learning strategies in a university setting. Students were grouped to work on projects, and their performance was assessed through peer evaluations and final project grades.The strengths were that it increased student engagement and motivation and enhanced critical thinking and problem-solving skills through peer interactions.The limitations were , group dynamics could lead to unequal participation, where some students dominated discussions while others remained passive Boud, Cohen, & Sampson, (2001)There were difficulties in assessing individual contributions.

6 Student-Centered Learning in Higher Education

This study analyzed the implementation of student-centered learning in higher education institutions through surveys and focus groups with both students and faculty. Faculty intended to adopt student **centered** learning often reverted to traditional lecturing due to large class sizes and perceived student resistance to active learning methods. Students expressed a preference for more interactive learning experiences, Entwistle (2009)

7. Challenges in Implementing Project-Based Learning

A case study explored the implementation of project-based learning in middle school settings. Researchers observed classrooms and conducted interviews with teachers and students.While the curriculum was designed around projects based learning principles, Hmelo-Silver (2004) many teachers felt unprepared to facilitate projects effectively, leading to a mismatch between intended outcomes and actual classroom experiences.

8. Scaffolding Techniques in Mathematics

This experimental study involved two groups of students learning mathematics—one receiving traditional instruction and the other receiving scaffolded support through guided practice. Assessments measured student performance and understanding. Students receiving scaffolding

demonstrated significantly higher achievement levels.Scaffolding promoted independent problem-solving skills over time. However scaffolding requires ongoing assessment and adjustment, which can be resource-intensive Wood et al. (2006) and teacher training and experience vary widely, affecting implementation quality.

Examining studies related to learner-centered methodologies and their alignment with social constructivist principles can provide valuable insights into both their strengths and limitations.

2.6 SUMMARY

This chapter provided a comprehensive examination of existing literature on learner-centered methodologies and the discrepancies between intended and implemented practices in educational settings. The review highlighted several key themes this literature review underscores the complexity of implementing learner-centered methodologies in education. It highlights the need for ongoing support and systemic changes to ensure that educational practices align with the principles of learner-centered education, ultimately fostering better learning outcomes for students.

Chapter 3: RESEACH METHODOLOGIES

3.0 INTRODUCATION

This chapter outlines the research methodology employed to investigate the mismatches between implemented and intended learner-centered methodologies in Mathematics at secondary school level. The study aims to explore the gaps between the intended curriculum and actual teaching practices, shedding light on the factors influencing these discrepancies. A mixed-methods approach was adopted to provide a comprehensive understanding of the phenomenon.

3.1 RESEARCH DESIGN

According to Sharp (2002), a research design is a specific plan or protocol for conducting a study. Recosy (2010) says a research design is a basic tool that a researcher uses in order to conduct a research. Therefore, a research design is a plan or structure for an investigation. It is a step by step approach used by a researcher to conduct a scientific study and includes various methods and techniques to conduct research so that a research problem can be handled efficiently. The research design also informs the data collection instruments and data analysis techniques of the study. The research design should always be based on four characteristics, namely: neutrality, reliability, validity and generalization Rocosy (2010). There are basically about twelve types of research design and in this study, the case study was used.A case study is a research design, which is used for the in-depth and detailed study of a subject. It is used to narrow down a big problem into small discrete easily researchable problems. Fisher (2000) underscores that a case study is an effective way of explaining a specific situation and provides answers to the questions, why and how things happen the way they do. In this research a case study was used to find the reasons teachers at selected schools in Musami Cluster in Murewa do not make use of learner-centered methodologies to teach Mathematics at secondary school level.

This study also employed a concurrent triangulation design, combining both quantitative and qualitative data collection and analysis methods. The quantitative component involved surveys and questionnaires to gather data from a larger sample, while the qualitative component comprised interviews, observations, and document analysis to provide in-depth insights.

This chapter addresses the following research questions:

1. What sort of mismatches exist between intended and implemented learner-centered methodologies?

2. What factors contribute to mismatches between intended and implemented learner-centered methodologies?

3. How can the disparities be accounted for?

The study's methodological framework is grounded in the pragmatic paradigm, emphasizing the importance of practical application and problem-solving. The research questions as stated require an ethnographic study because ethnography provides a detailed, nuanced understanding of the cultural and social contexts of Mathematics classrooms. Ethnography is well-suited for exploring complex, multifaceted issues like mismatches between intended and implemented learner-centered methodologies. Hammersley (2013) Ethnography considers the broader social, cultural, and historical contexts influencing teaching practices. Ethnography prioritizes the voices and experiences of teachers, students, and administrators. Ethnography involves prolonged observation, providing rich data on classroom interactions. Ethnography allows for adjustments in data collection and analysis as the study unfolds. By employing ethnography, this study will provide a comprehensive, contextualized understanding of the mismatches between intended and implemented learner-centered methodologies in Mathematics classrooms.

3.2 POPULATION AND SAMPLING

Population is defined by Chiromo (2009) as all the people, things, units, or events that were considered for a certain study. According to Key (2016), population refers to the entire group of individuals or items that a researcher is interested in studying. This can be a group of people, animals, plants, or any other entities that share a common characteristic or are of interest to the researcher. According to Creswell (2014) a population is the entire set of individuals or elements that meet the sampling criteria for research study. The participants in this study were the mathematics educators who work in secondary schools in the Murewa District as stakeholders in the teaching and learning process.

Eight mathematics teachers from three rural secondary schools were selected as participants. Each teacher brought a unique blend of experience and passion to their role. For instance, Mr. G a veteran educator with over 15 years of teaching experience is deeply interested in integrating technology into his lessons. He often spends his spare time exploring educational software and online resources, seeking innovative ways to engage his students. Mr. M on the other hand, is relatively new to the profession but is fervently committed to promoting mathematical literacy in his community. In his free time, he volunteers at local youth clubs, where he conducts math tutoring sessions and organizes math competitions to spark interest among younger students.

The social settings of the three rural secondary schools involved in the study vary significantly, reflecting the diverse backgrounds of their student populations. School A, located in a small agricultural village, has a close-knit community feel, where families often have deep roots in farming. The teachers at this school frequently collaborate with local farmers to create real-world math problems that resonate with students' daily lives. Conversely, School B is situated near a mining area, attracting a transient population of workers and their families. This dynamic creates

challenges for teachers like Ms S , who is passionate about creating a stable learning environment but often faces disruptions due to students' fluctuating attendance. Finally, School C serves a more urbanized area with a mix of socioeconomic backgrounds. Mr N , teacher at this school, is particularly interested in addressing the educational disparities among his students and often spends his weekends organizing community outreach programs that promote math education.The teachers also engage in various hobbies, including gardening, cooking, or playing musical instruments. They often spend their free time mentoring students, attending professional development workshops, or participating in school committees.

Despite their different environments, all eight teachers share a common goal: to foster a learner-centered approach in their classrooms. However, they encounter various challenges in implementing these methodologies effectively. The rural setting often presents limitations such as inadequate resources and professional development opportunities. Teachers frequently express frustration over the lack of access to modern teaching tools and materials that could enhance their pedagogical strategies. In their spare time, many of them engage in informal discussions with colleagues or attend regional workshops to share best practices and seek solutions to these challenges. This collaborative spirit reflects their commitment not only to their professional growth but also to the educational advancement of their students within the constraints of their rural contexts.

3.2.1 PURPOSIVE SAMPLING

According to Pilot et al. (2001), a sample is a subset of the population that is utilised to obtain the necessary data on the topic being studied. According to Cohen et al. (2007), the relationships within the sample that are picked to produce the necessary data are more important than the total number of individuals chosen for information gathering. The study's sample size increased the

likelihood of reliable results, which were crucial for the investigation. Purposive sampling was used in the sample process which selects subjects based on accessibility Sekeran and Bougie, (2009).

Purposive sampling allows researchers to select participants who possess specific characteristics or experiences relevant to the study's focus. According to Patton (2002), this method is particularly effective when the goal is to gain in-depth insights from a particular subset of individuals. In this study, the eight mathematics teachers were chosen specifically for their experience and engagement with learner-centered methodologies, ensuring that the sample would provide rich, relevant data.As Creswell (2014) notes, qualitative research often seeks to explore complex phenomena deeply. By selecting teachers who are actively involved in implementing learner-centered approaches, the research can uncover nuanced perspectives and experiences that might not be captured through random sampling. This depth is crucial for understanding the specific challenges and successes faced by educators in rural settings.The unique social and educational contexts of the three rural secondary schools necessitate a sampling strategy that highlights these differences. According to Miles and Huberman (2014) purposive sampling enables researchers to focus on cases that are information-rich and contextually relevant. By selecting teachers from varied backgrounds and experiences, the study can explore how different contexts influence the implementation of learner-centered methodologies.Purposive sampling supports comparative analysis among participants. As noted by Cohen, Manion, and Morrison (2011), this approach allows researchers to identify patterns and divergences across different cases. In this study, examining teachers from diverse rural schools facilitates a comparative understanding of how local factors impact teaching methodologies.In rural settings, access to a larger pool of participants may be limited. Purposive

sampling is a practical choice in such scenarios, as it allows researchers to maximize the utility of available resources by focusing on those who are most likely to contribute valuable insights Babbie (2010). Purposive sampling was justified in this study as it enabled targeted selection of knowledgeable participants, facilitated in-depth understanding of complex issues, ensured contextual relevance, allowed for comparative analysis, and addressed practical constraints in rural settings. This methodological choice aligns with qualitative research principles aimed at gaining comprehensive insights into specific educational phenomena.

3.3 DATA COLLECTION INSTRUMENTS

Fyfe, McNeil, & Borjas, (2015) refer to the whole process of collecting data called 'instrumentation'. In the research, data gathering tools or instruments are the means used to collect information. Fyfe, McNeil, & Borjas, (2015) further assert that instrumentation does not only involve the selection or design of the instruments. It also involves the conditions under which the information will be administered. The researcher used questionnaires and interviews as instruments to collect data. Akungu (2014) Ottmar & Landy (2017) concurred with the idea that research instruments are the equipments which are used to collect or gather data or information.

3.3.1 QUESTIONNAIRE

A questionnaire as defined by Chiromo (2006) as a data gathering technique that contains compiled and organised questions that are sent to participants in the study. Borg and Gall (2001) say that a questionnaire is a list of questions that aim at revealing particular information. Cooper and Schindler (2013), further cement that the questionnaire is a research instrument, a form with blank spaces to be filled by the respondents. It consists of open ended and guided questions to be answered and is a technique for elicitation, recording and gathering of data and its preference is

that conceivable data can be gathered from an extensive bit of a gathering. The questionnaires were administered to teachers who teach mathematics.

3.3.2 THE ADVANTAGES OF QUESTIONNAIRES

Questionnaires allow researchers to gather data from many respondents efficiently. It is a cost-effective method of data collection, particularly when compared to conducting individual interviews. Again they provide a standardised set of questions, ensuring that every respondent is asked the same questions in the same format. This facilitates data comparison and analysis, as well as ensures consistency in responses. Also questionnaire is easy to construct, they are portable and they can be used to gather data from a large number of people in a very short period. Cooper and Schindler (2013), postulate that the responses can be collected in a short period of time. The researcher does not need to be present when the questionnaires are being completed. Respondents often feel more comfortable answering sensitive or personal questions in a questionnaire format, as it provides them with anonymity. This can increase the likelihood of obtaining honest and accurate responses.

Furthermore, the respondents would be granted time to consider the questions. A questionnaire is suitable for the study as it provides respondents with a clear layout and easy flow of questions. The nature and wording of the questions asked as data collection method, the format of the questionnaire is also important Borg and Gall (2001). Data they gather can be processed and analysed relatively easily compared to spoken data which has to be recorded and transcribed before analysis.

3.3.3 THE DISADVANTAGES OF A QUESTIONNAIRE

Borg and Gall (2001), highlight a low rate of return and bias due to no responses as disadvantages of a questionnaire. Questionnaires typically focus on collecting quantitative data

and may not allow for in-depth exploration of respondents' perspectives or experiences. They may not capture the richness of qualitative data that can be obtained through interviews or focus groups. To overcome these challenges, the researcher, analyse non-response rates and bias to understand potential limitations Merriam (2009). Again the researcher also made questionnaires engaging, relevant and concise to encourage participation. After implementing these strategies, the researcher enhanced the effectiveness of questionnaires and mitigate their limitations.

3.3.4 DOCUMENT ANALYSIS

Document analysis was used because it is a qualitative research method that involves systematic examination of documents to extract meaningful information and insights. This method is particularly suitable as it allows researchers to access a wealth of contextual data, including curriculum guides, lesson plans, teacher reflections, and policy documents. These materials provide insight into the intended methodologies as well as the actual practices employed in classrooms Bowen (2009).By comparing official documents outlining intended learner-centered approaches with classroom observations or teacher reports, researchers can identify discrepancies between what is planned and what is executed. This is essential for understanding the barriers to effective implementation Flick (2018). Analyzing historical documents can reveal how learner-centered methodologies have evolved over time and how past practices influence current implementations. This longitudinal perspective can help identify persistent challenges and successes Merriam Tisdell (2015). Document analysis is often more cost-effective than other qualitative methods such as interviews or focus groups, especially when accessing large volumes of existing documentation. This efficiency allows for a broader scope of analysis Creswell (2013).Combining document analysis with other methods, such as interviews or observations, enhances the validity of the findings. This triangulation helps to confirm the accuracy of the data collected and provides a more comprehensive understanding of the

implementation process Denzin (2017). Document analysis is non-intrusive, allowing researchers to study practices without affecting the educational environment. This is particularly beneficial when examining sensitive issues related to teaching methodologies Rosenberg (2018).

The researcher analyzed the documents and observed a lesson which was delivered taking note of students' active involvement in discussions, group work, and hands-on activities,the extent to which learners express their ideas and opinions. Opportunities for peer-to-peer learning and teamwork. Adaptations are made to meet diverse learning needs and styles and the use of varied instructional strategies to cater for individual learning styles.

3.3.5 OBSERVATION SCHEDULE

An observation schedule provides a systematic framework for collecting data. It allows educators and researchers to focus on specific behaviors, interactions, and teaching strategies that characterize learner-centered approaches. This structured approach ensures that important aspects are not overlooked.It can be designed to target specific indicators of learner-centered practices, such as student engagement, collaboration, and autonomy. This focus helps in identifying strengths and areas for improvement in teaching methodologies.Teachers can use the data gathered from observation schedules to reflect on their practices. By identifying patterns and trends, educators can make informed decisions about how to enhance their learner-centered strategies and can serve as a tool for professional development by highlighting effective practices and areas where teachers may need additional support or training. This can lead to targeted interventions that improve instructional quality.The researcher used an observation scheduleas it is a valuable tool for assessing learner-centered methodologies. It provides structure, consistency, and a comprehensive understanding of classroom dynamics, ultimately supporting

educators in enhancing their teaching practices and improving student outcomes.As follow up to the observations the researcher used follow up interviews.

3.3.6 INTERVIEWS

Interviews are a qualitative research method involving face-to-face, phone, or online conversations between a researcher and participant(s) to gather in-depth, detailed information about their experiences, perceptions, and opinions Bernard (2013).

The researcher will use interviews because interviews allow researchers to delve into teachers' understanding and experiences with learner-centered methodologies Cohen et al (2018). They provide rich, nuanced data about school contexts, policies, and practices influencing learner-centered implementation Merriam & Tisdell (2016). Interviews can reveal how teachers facilitate learner-centered approaches and interactions with students Hmelo-Silver (2004). Interviews help identify obstacles to implementing learner-centered methodologies and potential solutions Bogdan & Biklen (2007).

3.3.7 ADVANTAGES OF INTERVIEWS

Interviews help to build relations between the researcher and the respondents as there is a greater need to confide in each other, especially when dealing with sensitive information Saunders, Lewis and Thornhill (2015). This implies that apart from allowing the researcher an immense opportunity for screening inter-personal relations between the interviewer and interviewees, the relationship improves tremendously. The researcher preferred information about personal knowledge and perceptions. Another advantage of an oral interview is that it allows for soliciting of sensitive information from respondents Best and Kahn (2013) and the respondents' own words are recorded and ambiguities can be clarified. Respondents are able to give reasons for their

responses. Interviews are not influenced by others in the groups. Again the researcher can record information directly from the participants for example their emotions.

3.3.8 DISADVANTAGES OF INTERVIEWS

However, Best and Kahn, (2013) argue that oral interviews are disadvantageous in that they may be subjective and biased and they are time consuming especially when dealing with very large populations. Probes should be neutral and the interviewer must allow sufficient time for the respondents to answer questions and should stop anticipating and cuing potential answers. Again, with interviews respondents may feel uneasy and adopt avoidance tactics if the questioning is too long, sensitive or deep. To mitigate this disadvantage, the interviewer should build trust and rapport with respondents therefore making it possible to obtain information that the individual probably would not reveal by any other data collection method.

3.4 DATA ENTRY AND CLEANING

McMillan and Schumacher (2005), describe data analysis as a systematic organisation and synthesis of data that involves application of one or more statistical techniques. Data analysis is a means to give meaning to the collected data and affords the researcher tools to answer the research questions. Data from questionnaires was presented on tables and frequency tables to illustrate the numerical form of responses so that deductions and conclusions were easily drawn.

3.5 DATA ANALYSIS

Data analysis involved a multi-stage process, integrating findings from document analysis, interviews, and questionnaire responses Cohen et al., (2011). Initially, document analysis of curriculum documents, lesson plans, and policy documents was conducted to identify the intended learner-centered methodologies Bowen (2009). Next, observational data from lessons was analyzed to identify the implemented methodologies Merriam (2009). Follow-up interviews with teachers were then conducted to gain deeper insights into the mismatches between intended

and implemented methodologies Kvale (2007). Questionnaire responses from teachers provided quantitative data, which was analyzed using descriptive statistics and thematic analysis Braun & Clarke (2006). The data was then triangulated to identify patterns, themes, and relationships between the intended and implemented learner-centered methodologies Denzin (2009).

3.6 RELIABILITY AND VALIDITY

Validity is the extent to which an instrument can measure what is intended to measure Grounlund (2005). Leedy (2013) defines that, validity as a subjective judgment of researcher on an instrument to ascertain whether the instrument is performing as per expectation. Validity, therefore, defines how sound and effective a research instrument or test such as a questionnaire is. This therefore implies that, validity is a measure against the instruments performance in the process of gathering data.

In order to enhance validity, there was an expert construction of questionnaire. The instruments were made brief and this enable the researcher to obtain only essential data. The items on the questionnaire were made clear and attempted by all means to avoid ambiguity which means that respondents would understand the items the same way as the researcher understood them. Questions set were issues already known to the teachers. The researcher carried out a pilot study to pretest the questionnaires schedule. Two teachers were randomly selected from the 8 participants and these were issued with instruction to respond to and comment on the items to enable the researcher to adjust the items in terms of construction and content. The questionnaires were collected and results collated. Comments were put to use and a new questionnaire was drafted and given to the same teacher. The results were almost the same.

The pre -test enable the researcher to determine the suitability and relevancy of the questionnaire and check on the language usage, concern, and clarity. Comments of teachers were factored in

the questionnaire and this paved way for some improvements which were then modified in readiness of full investigation.

Reliability refers to the consistency and dependability of research findings Creswell (2014). In this study reliability can be measured through multiple observers or raters evaluate teacher practices to minimize subjective bias. Verifying that research instruments measure the theoretical constructs underlying learner-centered methodologies Cohen et al (2018).By addressing reliability and validity concerns, researchers can increase confidence in their findings and contribute meaningful insights to the study

3.7 ETHICAL CONSIDERATIONS

Ethics refers to moral guidelines and principles that guide a person's behavior. Ethics has turned out to be a base for carrying out effective and meaningful research. Ethical considerations involve privacy, anonymity, autonomy and justice to be assured by the researcher to the research respondents Kasomo (2010). Cooper and Shrindler (2014) explain ethical consideration as the dissemination of important information by a researcher to respondent, ensuring voluntary participation is practised and there is no coercion to get responses. The main aim of ethical procedures in educational research is to ensure that the researcher demonstrates acceptable conduct to protect the research participants, the researcher and the profession at large, . The participants were guaranteed protection of their identities by making sure that none were asked to provide their names during the data collection process.

The researcher first sought a clearance letter from Bindura University of Science Education. The clearance letter enabled the researcher to get permission from the heads of the selected schools and District Schools Inspector. In order to abide by research ethics, the following were taken into consideration during this study .when the researcher arrived at the researchers site (school) she

seeked permission from school authority and briefed them on the value of the research and the procedure used . The researcher assured the administrators that participation by staff will be voluntary . As a way of maintaining confidentiality, the teachers' names will not be revealed rather teacher 1 to teacher 8 and school will be called by serial letters X, Y and Z to avoid recognition. Further, participants were assured that data obtained will not be disclosed to any person.

These precautions were taken to ensure that teachers gave correct information without any fear that they would be trace out later. The mentioned ethical considerations were in accordance with code of ethics of American Sociology Association (ASA2000) which stipulates that researcher must maintain scientific objectivity to ensure that every person is entitled to the right of privacy and dignity of treatment ,ensure that confidential by research subject must be held in strict confidentiality by the researcher, ensure that all the research should avoid causing harm to the subject used in the research and ensure that research findings should presented honestly without distortion.

SUMMARY

This chapter outlines the methodology for investigation. A mixed-methods approach was employed, combining surveys, classroom observations, interviews, and document analysis. Eight mathematics teachers participated across 3 case study schools. Data analysis involved descriptive statistics, content analysis, and case study analysis. Rigor and trustworthiness were ensured through pilot-testing, inter-rater reliability checks, and member checking. Ethical considerations, including informed consent and confidentiality, were prioritized. This methodology provides a comprehensive framework for exploring the research question, yielding valuable insights into the gaps between intended and implemented learner-centered practices in mathematics education.

CHAPTER 4: PRESENTATION OF RESULTS

4.0 INTRODUCTION

This chapter presents the findings of an investigation into the mismatches between intended and implemented learner-centered methodologies in Mathematics at secondary school level. Building on the theoretical foundations and methodological framework outlined in previous chapters, this study sought to explore the extent to which teachers' intended learner-centered approaches align with their actual instructional practices.

The research questions guiding this study were:

1. What sort of mismatches exist between intended and implemented learner-centered methodologies?

2. What factors contribute to mismatches between intended and implemented learner-centered methodologies?

3. How can the disparities be accounted for ?

This chapter reports on the analysis of data collected from 8 Mathematics teachers across secondary schools, using a mixed-methods approach integrating a questionnaire, classroom observations, and interviews. The researcher presents the results according to research questions. The first question asked was ;

1. What do you understand about learner-centered methodologies?

Teachers' responses

Teacher 1 *Teaching methods that are learner centered*.

Teacher 2 *Learner-centered methodologies prioritize students' needs, interests, and experiences, shifting the focus from teacher-centered instruction to student-led learning. Key principles*.

Teacher 3 *Encouraging learners to take ownership of their learning*.

Teacher 4 *Active learning while engaging students in hands-on, experiential activities*.

Teacher 5 *Collaborative learning by fostering peer-to-peer interaction and teamwork.*

Teacher 6 *Tailoring instruction to suit individual needs and interests*.

Teacher 7 *Teaching methods where the learner is at the core*.

Teacher 8 *Play based or hands on activities* .

4.0.1 COMMENTS

From all the teachers' responses it clearly shows that they understand learner-centered methodologies as a transformative approach to education, shifting the focus from teacher-centric instruction to student-driven learning. By empowering learners to take ownership of their educational journey, these methodologies foster a deeper sense of engagement, motivation, and autonomy. As learners are encouraged to explore, investigate, and create, they develop essential skills such as critical thinking, problem-solving, and collaboration. This, in turn, enables them to become more effective, self-directed learners, better equipped to navigate the complexities of the 21st century. As educators transition from a traditional, didactic approach to a more facilitative, supportive role, they must develop new skills, knowledge, and dispositions. This includes learning to design and implement learner-centered lesson plans, using technology to enhance instruction, and creating inclusive, supportive learning environments. By embracing learner-

centered methodologies, educators can revitalize their teaching practices, leading to more effective, engaging, and student-centered instruction.

This was followed by the research questions,

4.1 RESEARCH QUESTION 1

1. What sort of mismatches exist between intended and implemented learner-centered methodologies in Mathematics at secondary school level?

Document analysis and analysis of data from observation guides led to the uncovering of the following mismatches

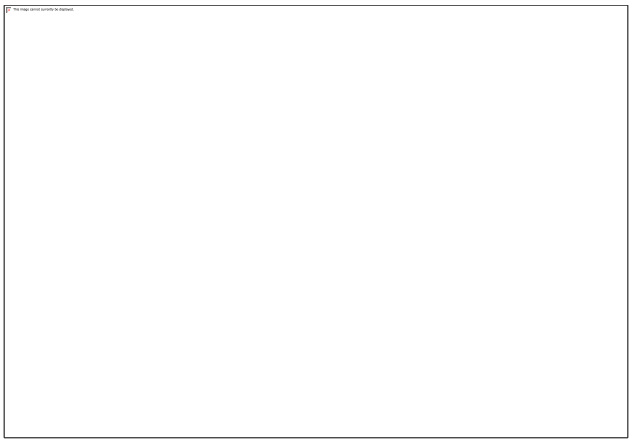

Figure 1.Extract from a schemes of work

The above is a scheme of work for a lesson observed; Teacher 1 did not follow the activities planned.

Teacher 1 *I intend to use learner-centered methodologies but often revert to lectures due to time constraints and pressure to cover curriculum content.*

Teacher 2 *I want to encourage student autonomy, but struggle to balance freedom with ensuring students meet learning objectives.*

Teacher 3 *Limited resources and outdated textbooks hinder implementation*.

Teacher *4 layout and technology limitations make group work challenging*.

Teacher 5 *Classroomeent pressures lead me to focus on standardized test prep rather than authentic, project-based assessments*.

Teacher 6 *Despite training, I still struggle to integrate technology effectively to support learner-centered practices.*

Teacher 7 *Inclusive practices are essential, but I find it challenging to adapt learner-centered methods for students with diverse needs*.

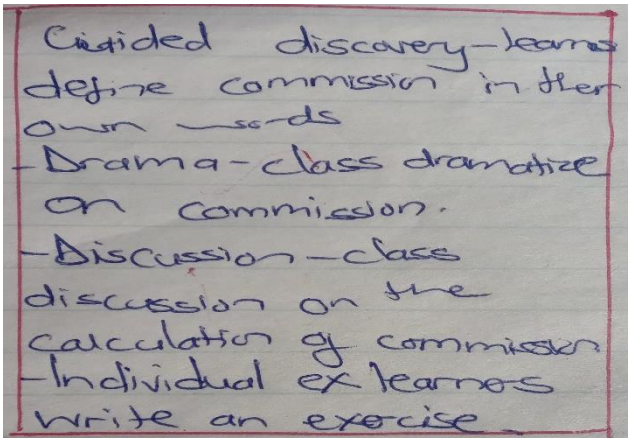

Figure 2. Extract from a schemes of work

Teacher 8 with the above schemes of work ,did not use learner-centered methodologies as planned .

Teacher 8 *Administrative expectations for lesson plans and curriculum coverage often conflict with my desire for flexible, student-led exploration.*

4.1.2 OVERALL COMMENTS

Fig 1.The analysis reveals a stark discrepancy between the intended learner-centered approach espoused in curriculum guidelines and the predominantly teacher-centered practices observed in mathematics classrooms, underscoring a significant mismatch between policy and practice.The responses from the educators reveal a range of mismatches between their intended and implemented learner-centered methodologies. Some educators, such as teacher 1 and teacher 8 , struggle with the tension between flexibility and structure, finding it challenging to balance the need for student autonomy with the pressure to cover curriculum content. Others, like teacher 2 and teacher 7 grapple with the challenge of adapting learner-centered methods to meet the diverse needs of their students.

Despite these variations, a dominant mismatch emerges from the responses: the tension between intended flexibility and implemented structured lesson plans. Several educators, including teacher 1, teacher 8 and teacher 6 , express frustration with the constraints imposed by administrative expectations, curriculum requirements, and limited resources. These constraints often lead them to revert to more traditional, teacher-centered approaches, rather than implementing the learner-centered methodologies they intend to use.

This dominant mismatch highlights the need for educational institutions to provide teachers with the autonomy, support, and resources necessary to implement learner-centered methodologies effectively. By addressing these systemic barriers, educators can create more flexible, student-centered learning environments that foster deeper engagement, motivation, and learning outcomes.

4.2 RESEARCH QUESTION 2

2. What factors contribute to mismatches between intended and implemented learner-centered methodologies?

For this research l had to make a follow up to develop an understanding of the factors contributing to the mismatches. The teachers in this study suggested the following factors

Teacher 1 *Time constraints and pressure to cover curriculum content force me to revert to traditional teaching methods*.

Teacher 2 *Lack of training and support in technology integration hinders effective implementation.*

Teacher 3 *Classroom layout and space limitations make collaborative learning challenging*.

Teacher 4 *Standardized testing requirements lead to teaching to the test rather than promoting critical thinking.*

Teacher 5 *Difficulty adapting learner-centered methods for students with diverse needs and abilities.*

Teacher 6 *Administrative expectations for lesson plans and curriculum coverage conflict with flexible, student-led learning*.

Teacher 7 *Limited access to resources and materials necessary for project-based learning*.

Teacher 8 *Personal comfort level with traditional teaching methods makes it hard to transition to learner-centered approaches.*

4.2.1 OVERALL COMMENTS

The responses from the educators highlight a range of factors that contribute to mismatches between intended and implemented learner-centered methodologies. Some educators, such as teacher 1 and teacher 4, identify external pressures, including curriculum demands, time constraints, and standardized testing requirements, as significant barriers to implementing learner-centered approaches. Others, like teacher 2 and teacher 7 , point to insufficient resources, including training, technology, and materials, as major obstacles.

Despite these variations, a dominant factor emerges from the responses: external pressures, particularly curriculum demands and standardized testing requirements. Several educators, including teacher 1, teacher 4 and teacher 8, express frustration with the constraints imposed by these external pressures, which often lead them to revert to more traditional, teacher-centered approaches. This highlights the need for educational institutions to reconsider their priorities and provide teachers with the autonomy and support necessary to implement learner-centered methodologies effectively.The responses also underscore the importance of addressing systemic barriers to support teacher professional development and learner-centered practices. By providing teachers with training, resources, and support, educational institutions can help mitigate the impact of external pressures and promote more effective implementation of learner-centered methodologies. Ultimately, this requires a collaborative effort between educators, administrators, and policymakers to create a more supportive and flexible educational environment.

4.3 RESEARCH QUESTION 3

3. 11How can the disparities be accounted for?

Teachers' responses

Teacher 1 *Regular self-reflection and peer observations help identify gaps between intended and implemented practices.*

Teacher 2 *Analyzing student feedback and learning outcomes data reveals areas for improvement.*

Teacher 3 *Collaborative planning with colleagues ensures consistency in implementing learner-centered methods.*

Teacher 4 *Administrative support and resources are crucial for successful implementation*.

Teacher 5 *Differentiated professional development addresses varying teacher needs and expertise.*

Teacher 6 *Coaching and mentoring help teachers overcome implementation challenges*.

Teacher 7 *Regular evaluation and revision of curriculum and assessments ensure alignment with learner-centered goals.*

Teacher 8 *Integrating technology enhances flexibility and accessibility in learner-centered instruction.*

4.3.1 OVERALL COMMENTS

The responses from the math teachers highlight a range of strategies for accounting for disparities in mismatches between intended and implemented learner-centered methodologies. Some teachers, such as teacher 1 and teacher 2 emphasize the importance of reflective practice and data-driven analysis in identifying gaps between intended and implemented practices. Others, like teacher 3 and teacher 4, stress the need for collaborative planning, administrative support, and resources to ensure successful implementation.

Despite these variations, a dominant point emerges from the responses: the importance of ongoing support and evaluation in addressing disparities in mismatches. Several teachers, including teacher 5, teacher 6 and teacher 7, highlight the need for differentiated professional development, coaching and mentoring, and regular evaluation and revision of curriculum and assessments. This suggests that a one-time professional development workshop or training session is insufficient to support teachers in implementing learner-centered methodologies effectively. The responses also underscore the importance of a collaborative and supportive school culture in addressing disparities in mismatches. By working together and sharing expertise, teachers can develop more effective strategies for implementing learner-centered methodologies and addressing the challenges that arise. Ultimately, this requires a commitment to ongoing professional development, collaborative planning, and reflective practice, as well as a willingness to adapt and evolve in response to changing student needs and circumstances.

CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS.

5.0 INTRODUCTION

This chapter provides a summary of the research conducted on the mismatches between intended and implemented learner-centered methodologies in Mathematics at secondary schools. The study aimed to investigate how well these methodologies, which emphasize student engagement, collaboration, and critical thinking, are translated into actual teaching practices within the classroom. The research was grounded in a mixed-methods approach, combining quantitative surveys and qualitative interviews with mathematics teachers. The findings highlighted significant discrepancies between the theoretical frameworks of learner-centered education and the realities of classroom implementation. Key findings revealed that while many educators expressed a strong commitment to learner-centered principles, various factors hindered their effective application.

5.1 SUMMARY OF THE STUDY

Chapter 1 introduced the research topic focused on the discrepancies between intended and implemented learner-centered methodologies in Mathematics education at secondary schools. The chapter sets the stage by outlining the importance of learner-centered education, which prioritizes student engagement, collaboration, and critical thinking, as essential components for effective learning in today's educational landscape: The chapter discusses the historical context of mathematics education, emphasizing the shift from traditional, teacher-centered approaches to more progressive, learner-centered methodologies. It highlights the growing recognition of the need for students to develop not only mathematical skills but also critical thinking and problem-solving abilities that are crucial in a rapidly changing world. Despite the theoretical endorsement of learner-centered practices, there is a notable gap between these ideals and their actual

implementation in classrooms. The chapter identifies this mismatch as a significant concern, prompting the need for research to explore the factors influencing the effective adoption of these methodologies in mathematics teaching. The chapter emphasizes the importance of this research for educators, policymakers, and stakeholders in the education sector. By understanding the factors that contribute to the successful implementation of learner-centered methodologies, the study aims to inform strategies for improving mathematics instruction and enhancing student learning outcomes. The chapter is guided by research questions that will direct the study, focusing on the alignment between intended and actual practices, perceived challenges, and potential solutions for fostering a more learner-centered approach in mathematics education. Overally, Chapter 1 establishes a foundational understanding of the research topic, articulating the need for an investigation into the effectiveness of learner-centered methodologies in secondary school mathematics education.

Chapter 2 provides a comprehensive review of the literature relevant to the research topic, structured under several key headings that explore the theoretical foundations, definitions, and context of learner-centered methodologies in mathematics education.The first section outlines the theoretical underpinnings of learner-centered education, drawing on various educational theories that support this approach. It emphasizes constructivism as a central framework, highlighting how learners construct knowledge through experiences and interactions. The work of key theorists such as Piaget and Vygotsky is discussed, illustrating how their theories advocate for active learning environments that foster critical thinking and collaboration among students.Mathematics is defined not merely as a collection of formulas and procedures but as a dynamic discipline that involves problem-solving, reasoning, and the application of concepts to real-world situations. This section underscores the importance of viewing mathematics as a

process of inquiry rather than rote memorization, aligning with the principles of learner-centered education. Various learner-centered methodologies that can be applied in mathematics education, including collaborative learning, problem-based learning, and inquiry-based approaches were discussed and how these methodologies encourage student engagement and ownership of learning while facilitating deeper understanding of mathematical concepts.The historical evolution of mathematics education is examined, tracing the transition from traditional, teacher-centered approaches to contemporary learner-centered practices. This section highlights key reforms and movements in education that have influenced the teaching of mathematics, including the impact of technology and changing societal needs.The characteristics of effective learner-centered mathematics classrooms are outlined, including active student participation, differentiated instruction, formative assessment, and a supportive learning environment. This section emphasizes how these characteristics contribute to fostering a culture of inquiry and collaboration among students.This section delves deeper into constructivist learning theories, discussing how they apply specifically to mathematics education. It highlights the role of social interaction and authentic tasks in constructing mathematical understanding, as well as the importance of connecting new knowledge to prior experiences.The chapter concludes with a review of related studies that have investigated the implementation and impact of learner-centered methodologies in mathematics education. These studies provide empirical evidence supporting the effectiveness of such approaches in enhancing student engagement, understanding, and overall achievement in mathematics.Overally Chapter 2 synthesizes existing literature to provide a solid foundation for understanding the complexities of implementing learner-centered methodologies in secondary school mathematics education. It sets the stage for exploring the practical challenges and opportunities presented in subsequent chapters.

Chapter 3 outlines the research design and methodology employed in the study, detailing the processes used to gather and analyze data regarding the implementation of learner-centered methodologies in secondary school mathematics education.The research design describes the research design as a mixed-methods approach, integrating both qualitative and quantitative methods to provide a comprehensive understanding of learner-centered methodologies. The rationale for this design is discussed, emphasizing its ability to capture diverse perspectives and experiences of students and teachers in mathematics classrooms.The population for the study consists of secondary school mathematics teachers from selected schools within a specific district. A stratified sampling technique is employed to ensure representation across different schools. The sample size is justified based on statistical power considerations and the need for meaningful qualitative insights.Various instruments are utilized for data collection, including interviews, and classroom observations. Interviews with teachers provide qualitative insights into their experiences and challenges in implementing these methodologies. Classroom observations allow for an assessment of actual teaching practices in situ. Data entry and cleaning outlines the procedures for data entry, emphasizing the importance of accuracy in capturing responses and qualitative interview transcripts. Data cleaning processes are described . Qualitative data from interviews and observations are coded and categorized to extract key themes related to the implementation of learner-centered methodologies.The chapter discusses strategies employed to ensure the reliability and validity of the research findings. This includes triangulation of data sources, and member checking for qualitative data. The importance of establishing trustworthiness in qualitative research is emphasized, along with methods for enhancing the credibility of findings.Ethical considerations are outlined, including obtaining informed consent from participants, ensuring confidentiality, and addressing any potential biases. The chapter

emphasizes the importance of ethical conduct throughout the research process.Overally Chapter 3 provides a detailed account of the methodological framework guiding the study, ensuring that the research is conducted rigorously and ethically while aiming to contribute valuable insights into learner-centered methodologies in mathematics education.

Chapter 4 presents the findings from the research, focusing on the implementation of learner-centered methodologies in secondary school mathematics education. The results were presented per research question and are derived from three primary sources: document analysis, observations using structured observation guides, and interviews with teachers.The document analysis involved reviewing curriculum guides, lesson plans, and assessment materials from selected schools: Many documents reflected an intention to incorporate learner-centered practices, such as collaborative learning, problem-solving tasks, and differentiated instruction. However, there was variability in the extent to which these principles were implemented across different schools.Some schools provided resources that supported learner-centered methodologies, such as manipulatives and technology, while others lacked these essential tools, which hindered effective implementation.Classroom observations were conducted using structured observation guides to assess the enactment of learner-centered methodologies. Observations indicated a tendency toward teacher-centered instruction in many classrooms, with teachers often leading discussions and directing activities. Instances of student collaboration and independent problem-solving were noted but were not the predominant mode of instruction.Interviews with mathematics teachers provided rich qualitative insights into their experiences with learner-centered methodologies.Teachers recognized the potential benefits of learner-centered approaches, including increased student motivation and deeper understanding of mathematical concepts. They noted that students often became more active participants in their

learning. Many teachers reported challenges in implementing learner-centered methodologies, such as time constraints, large class sizes, and a lack of professional development opportunities. Some expressed concerns about classroom management when facilitating group work.Teachers emphasized the need for ongoing support and resources to effectively implement learner-centered practices. Professional development workshops focused on pedagogical strategies and access to collaborative planning time were highlighted as crucial for success.The results suggest that while there is an awareness and intention to adopt learner-centered methodologies in secondary school mathematics education, significant barriers remain. These include a reliance on traditional teaching methods, challenges related to classroom management, and insufficient support for teachers. The findings underscore the need for targeted professional development and resource allocation to facilitate the successful implementation of learner-centered practices.

5.2 DISCUSSION

In this current chapter I present a discussion of results. The implications of the findings presented in Chapter 4 regarding the implementation of learner-centered methodologies in secondary school mathematics education. This discussion synthesizes the key results, situates them within the broader context of educational theory and practice, and offers recommendations for stakeholders in education.

Research question 1

The findings indicate a complex landscape in the adoption of learner-centered methodologies in secondary school mathematics. While there is a clear recognition among educators of the benefits associated with these approaches—such as increased student engagement and improved conceptual understanding—there remains a significant gap between intention and practice. The

observation that many classrooms still exhibit teacher-centered practices aligns with existing literature that highlights the inertia of traditional teaching methods.

The findings of this study reveal that mismatches exist between intended and implemented learner-centered methodologies due to various factors. The data suggests that external pressures, such as curriculum demands and standardized testing requirements, are significant barriers to implementing learner-centered approaches. Additionally, insufficient resources, including training, technology, and materials, also pose significant obstacles to effective implementation.

The dominance of teacher-centered approaches, despite the intention to implement learner-centered methodologies, suggests that teachers may require additional support and training to effectively implement learner-centered approaches. Furthermore, the findings highlight the need for educational institutions to reconsider their priorities and provide teachers with the autonomy and support necessary to implement learner-centered methodologies effectively.

Research question 2

The resistance to change can be attributed to various factors, including entrenched beliefs about teaching and learning, standardized testing pressures, and a lack of institutional support for innovative pedagogies. The responses from educators highlight a range of factors contributing to mismatches between intended and implemented learner-centered methodologies. External pressures, particularly curriculum demands and standardized testing requirements, emerge as a dominant factor. These pressures often lead educators to revert to traditional, teacher-centered approaches, undermining their intentions to implement learner-centered methodologies. Insufficient resources, including training, technology, and materials, also pose significant obstacles to effective implementation.

Addressing these systemic barriers is crucial to supporting teacher professional development and learner-centered practices. Educational institutions must reconsider their priorities, providing teachers with autonomy, training, resources, and support to implement learner-centered methodologies effectively. A collaborative effort between educators, administrators, and policymakers is necessary to create a more supportive and flexible educational environment. By working together, we can mitigate the impact of external pressures and promote more effective implementation of learner-centered methodologies, ultimately enhancing student learning outcomes.

The findings that classrooms utilizing learner-centered approaches foster higher levels of student engagement resonate with constructivist theories of learning, which posit that students learn best when they are active participants in their education.

Research question 3

Accounting for disparities in mismatches between intended and implemented learner-centered methodologies requires a multifaceted approach. Reflective practice and data-driven analysis are essential strategies for identifying gaps between intended and implemented practices. Teachers, such as teacher 1 and teacher 2, emphasize the importance of regularly examining their own teaching practices and using data to inform their instruction. This enables them to adjust their teaching methods and address any disparities that may arise.

In addition to reflective practice and data-driven analysis, collaborative planning, administrative support, and resources are also crucial for ensuring successful implementation of learner-centered methodologies. Teachers, such as teacher 2 and teacher 3 stress the need for ongoing

support and evaluation to address disparities in mismatches. This includes providing teachers with differentiated professional development, coaching and mentoring, and regular evaluation and revision of curriculum and assessments. By working together and sharing expertise, teachers can develop more effective strategies for implementing learner-centered methodologies.

Ultimately, accounting for disparities in mismatches between intended and implemented learner-centered methodologies requires a commitment to ongoing professional development, collaborative planning, and reflective practice. Teachers must be willing to adapt and evolve in response to changing student needs and circumstances. Furthermore, educational institutions must provide teachers with the necessary support, resources, and autonomy to implement learner-centered methodologies effectively. By working together, we can create a more supportive and flexible educational environment that promotes effective implementation of learner-centered methodologies. However, the variability in implementation suggests that simply advocating for learner-centered methods is insufficient; teachers require practical strategies and support to effectively transition from traditional to more interactive pedagogies. The challenges identified by teachers—such as large class sizes, limited resources, and insufficient professional development—are consistent with previous research highlighting systemic barriers to pedagogical change. These obstacles not only hinder individual teacher efforts but also contribute to a broader culture that may undervalue innovative teaching practices in favor of more conventional approaches.

5.3 CONCLUSIONS

In summary, this study has investigated the implementation of learner-centered methodologies in secondary school mathematics education, highlighting both the potential benefits and the challenges faced by educators in this transition. The findings reveal a clear recognition among

teachers of the value of learner-centered approaches, which foster increased student engagement and deeper conceptual understanding. However, the persistence of traditional, teacher-centered practices indicates that significant barriers still exist, preventing widespread adoption of these innovative pedagogies. The research underscores the importance of addressing systemic issues such as inadequate professional development, resource limitations, and rigid curricular frameworks that inhibit effective implementation. To overcome these challenges, it is essential for educational stakeholders—including teachers, administrators, and policymakers—to collaborate in creating supportive structures that promote learner-centered practices. This includes investing in targeted professional development, providing necessary resources, and reforming assessment methods to align with contemporary pedagogical principles. Moreover, future research should continue to explore the dynamics of learner-centered education, focusing on longitudinal impacts, successful case studies, and student perspectives. By expanding our understanding of how these methodologies can be effectively integrated into mathematics education, we can better equip educators to meet the diverse needs of their students. Ultimately, this study contributes to the growing body of knowledge advocating for a shift toward learner-centered practices in mathematics education. As we move forward, it is crucial to prioritize the development of teaching strategies that not only enhance student learning experiences but also prepare them for the complexities and challenges of an ever-evolving world. Embracing learner-centered methodologies is not merely an educational trend; it is a vital step toward fostering a generation of critical thinkers and problem solvers who can thrive in their future endeavors.

5.4 RECOMMENDATIONS

The researcher makes the following recommendations

1. Professional Development and Training

Schools should invest in comprehensive professional development programs that focus on learner-centered teaching strategies. Workshops and training sessions should provide educators with practical tools and resources to facilitate the transition from traditional to learner-centered approaches. Encourage collaboration among teachers through peer observations and mentorship programs, allowing them to share best practices and learn from each other's experiences.

2. Curriculum Reform

Educational authorities should review and revise existing curricula to incorporate learner-centered principles. This includes integrating real-world applications of mathematics, promoting interdisciplinary projects, and allowing for student choice in assignments and assessments. Develop flexible curricular frameworks that permit teachers to adapt content and teaching methods to meet the diverse needs of their students.

3. Resource Allocation

Allocate resources for materials and technologies that support learner-centered instruction, such as manipulative, interactive software, and collaborative learning spaces. Ensuring access to these resources is crucial for effective implementation. Encourage schools to establish partnerships with local businesses and community organizations to provide additional resources and real-world contexts for mathematical learning. The curriculum may be too theoretical and not relevant to real-world applications, making it difficult for students to see the connection between what they learn in school and their future careers.

4. Assessment Reform

Shift assessment practices from traditional testing methods to more formative assessments that focus on student understanding and application of concepts. This could include project-based assessments, portfolios, and self-assessments that reflect individual student growth. Implement feedback mechanisms that allow students to reflect on their learning processes and outcomes, fostering a growth mindset and encouraging ownership of their education.

5. Research and Evaluation

Conduct ongoing research to evaluate the effectiveness of learner-centered methodologies in mathematics education. This should include longitudinal studies that track student outcomes over time and assess the impact of various teaching strategies. Create a feedback loop where teachers can contribute insights based on their experiences with learner-centered practices, informing future professional development and curriculum design.

6. Policy Advocacy

Advocate for policies at the district and state levels that support learner-centered education. This includes promoting funding for innovative teaching practices, recognizing the importance of teacher autonomy, and reducing bureaucratic constraints that hinder instructional flexibility. Engage stakeholders, including parents and community members, in discussions about the importance of learner-centered education to garner broader support for necessary changes.

By implementing these recommendations, educational stakeholders can create an environment conducive to the effective adoption of learner-centered methodologies in secondary school mathematics education, ultimately enhancing student engagement and achievement.

5.5 SUGGESTIONS FOR FURTHER STUDIES

While the current research provides valuable insights into the implementation and effectiveness of learner-centered methodologies in secondary school mathematics education, its generalizability is limited by the specific context and sample size. To address this limitation and gain a broader understanding of how these methodologies are applied across diverse educational settings, a national survey is proposed. This survey aims to collect data from a wide range of stakeholders, including teachers, students, and administrators, to assess the prevalence, perceptions, and outcomes of learner-centered teaching practices in mathematics education across the country.

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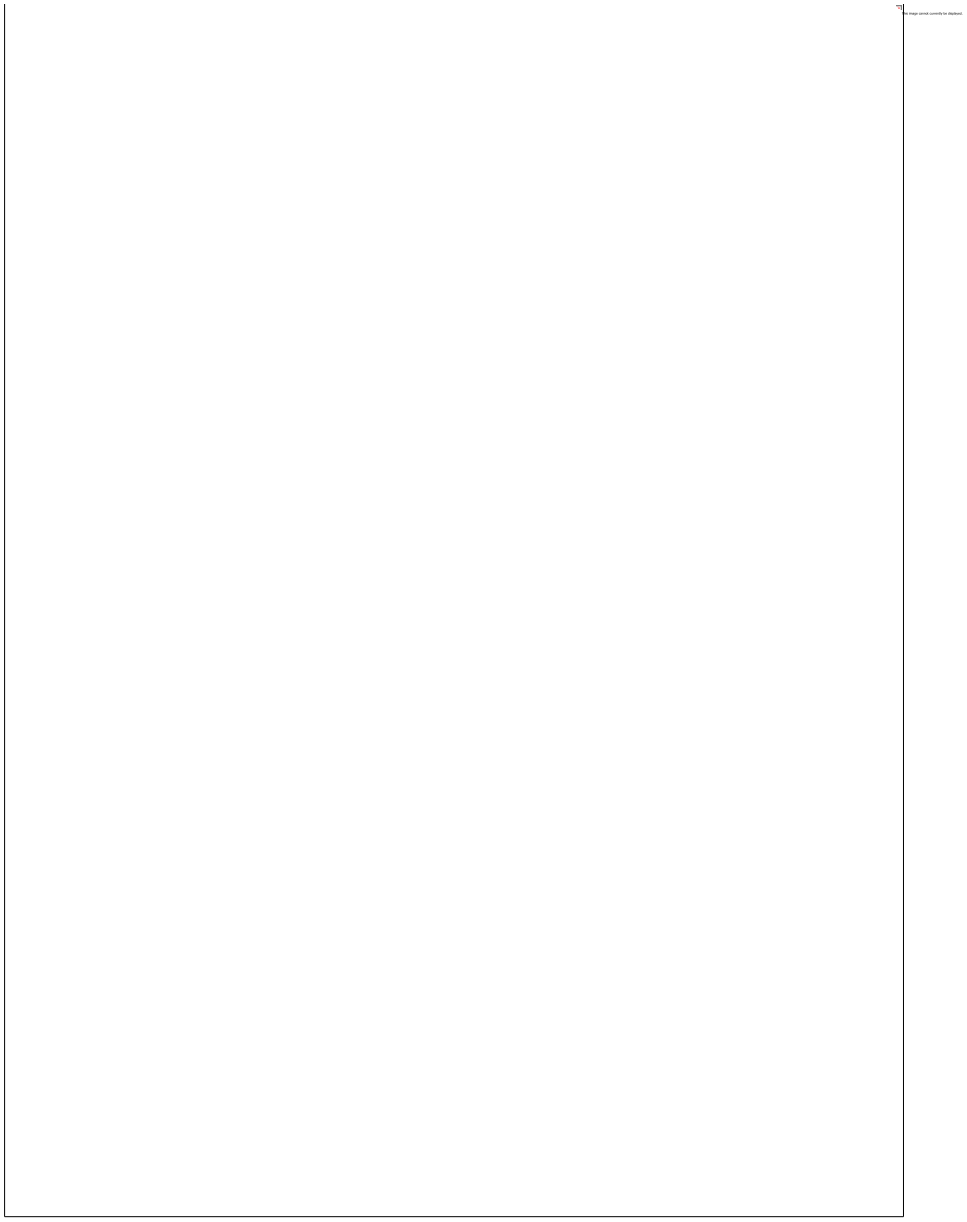
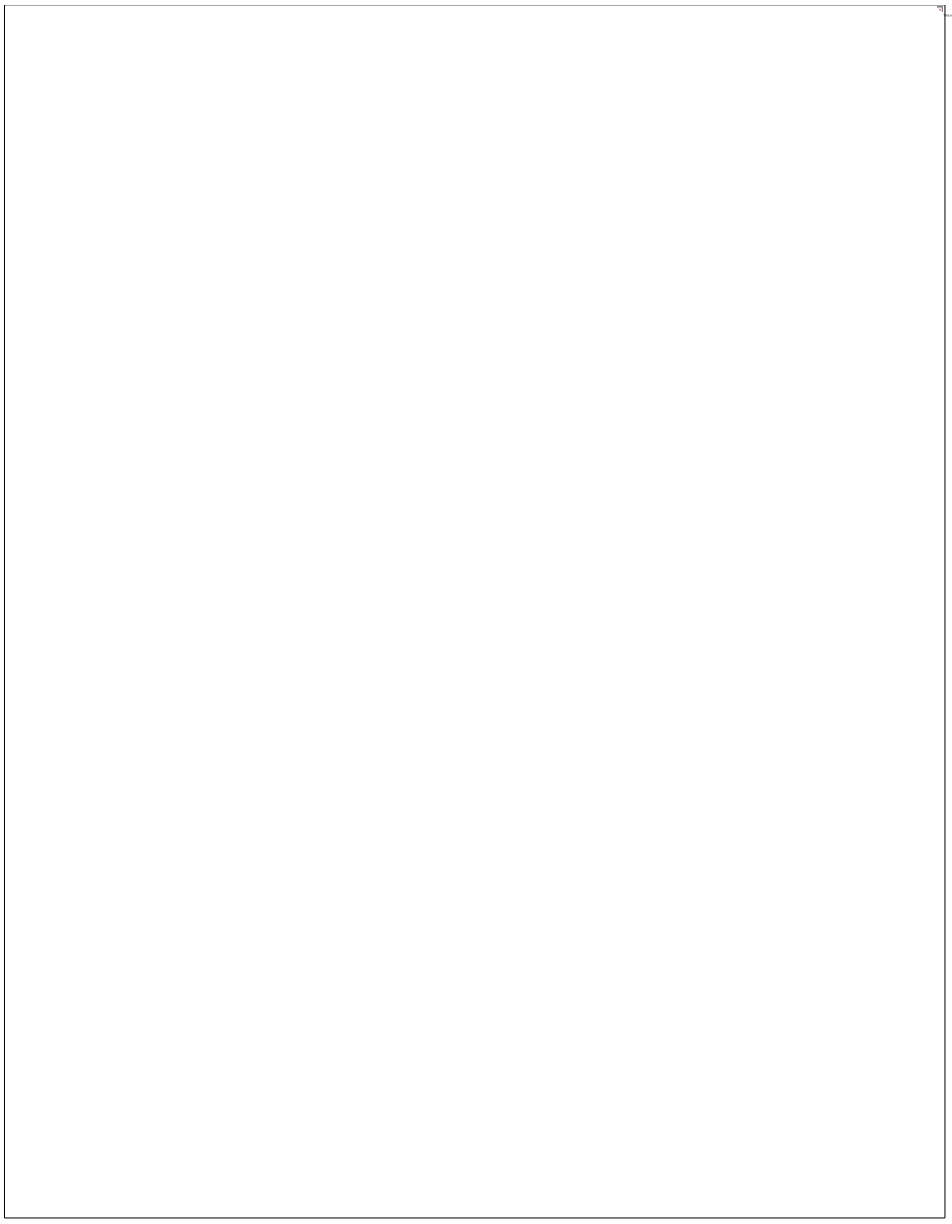
APPENDICES

APPENDIX 1

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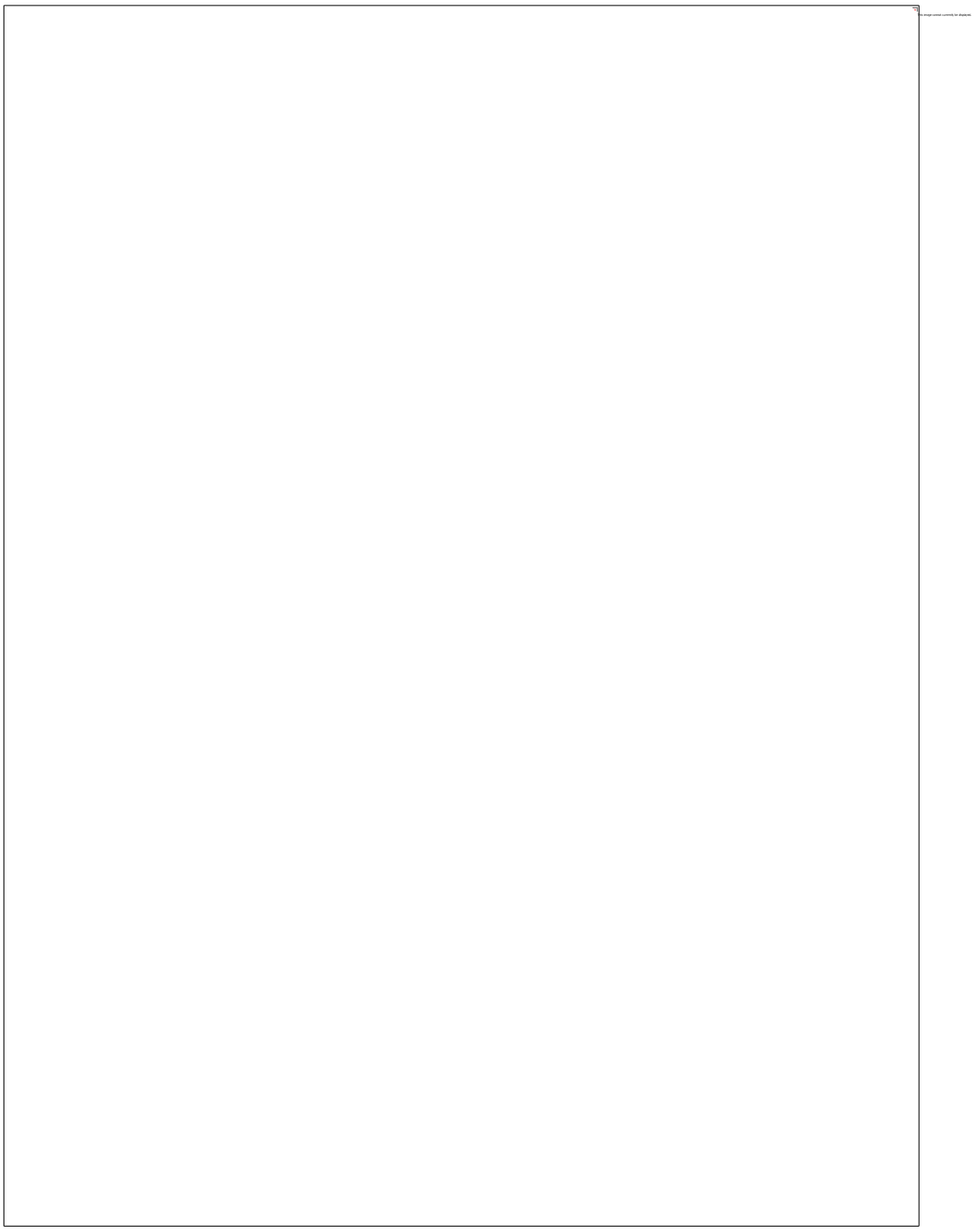

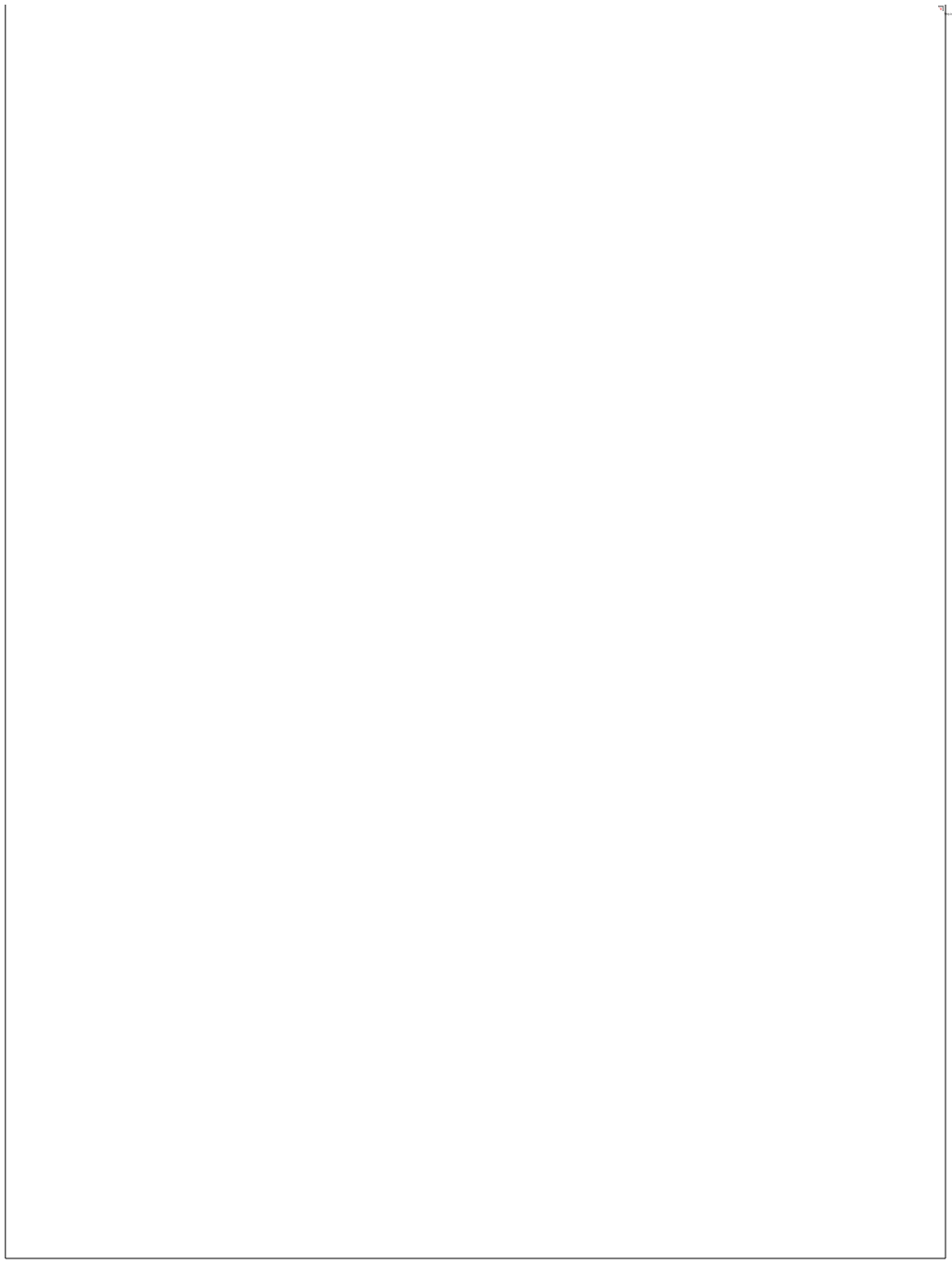
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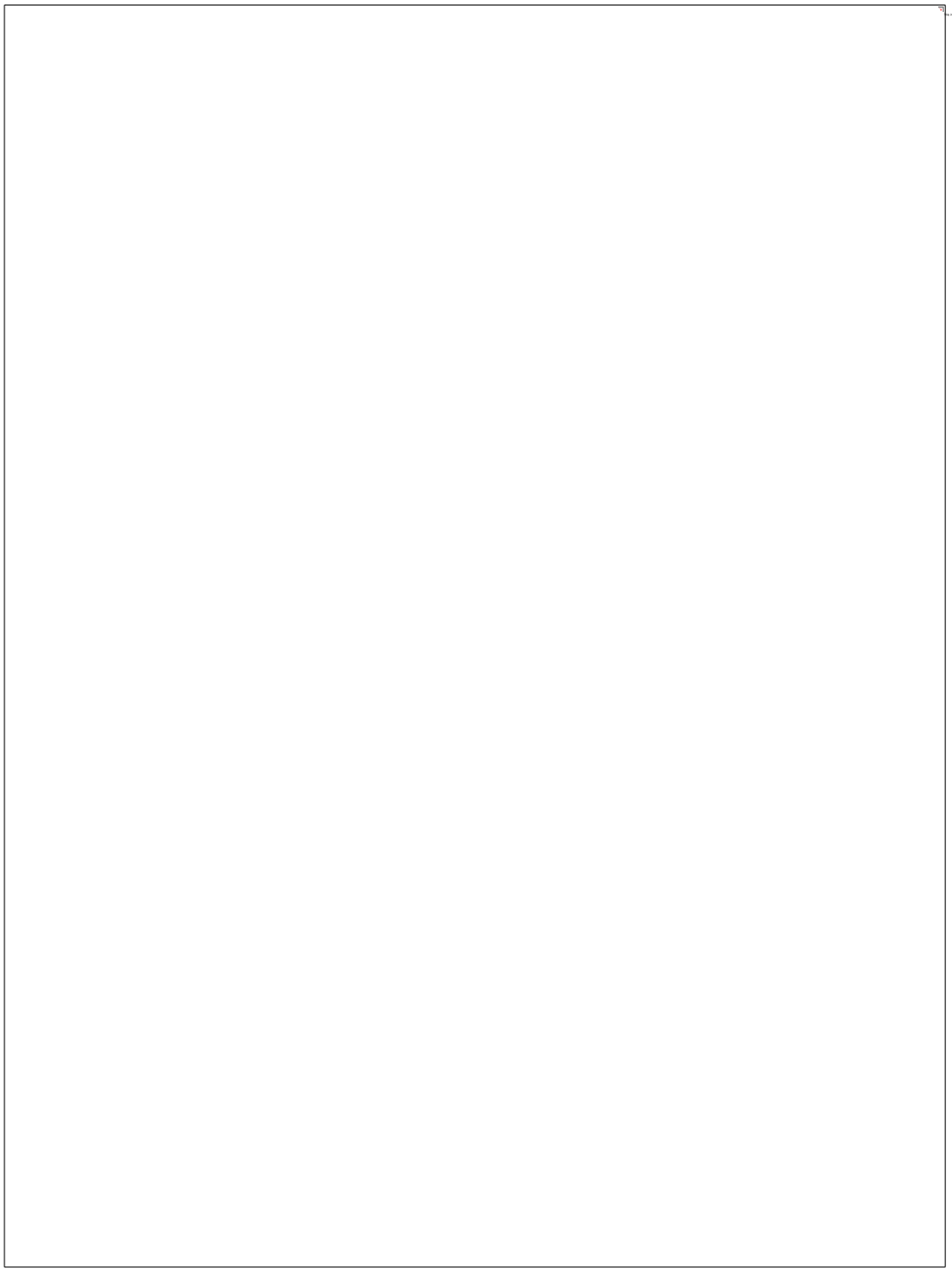
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SAMPLES OF COMPLETED INSTRUMENTS

APPENDIX 2