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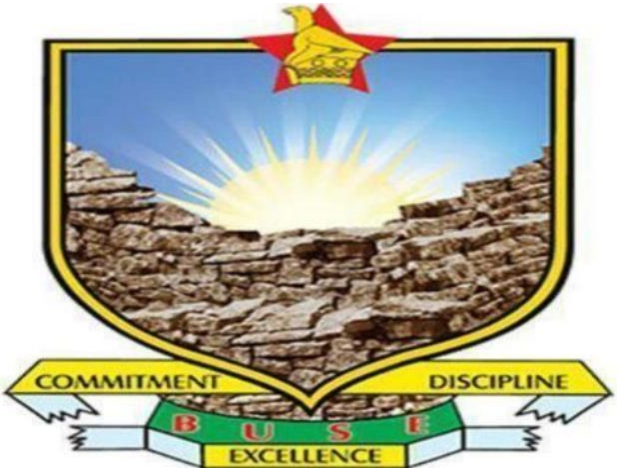

AN INVESTIGATION IN PROBLEMS FACED BY GRADE SIX (6) LEARNERS IN SOLVING PROBLEMS INVOLVING ADDITION OF DECIMAL NUMBERS AT A PRIMARY SCHOOL IN MUTARE DISTRICT, MANICALAND PROVINCE, ZIMBABWE.

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF HONOURS BACHELOR OF SCIENCE EDUCATION, MATHEMATICS

YEAR: 2024

APPROVAL FORM

The undersigned certify that they have supervised, read and recommended to Bindura

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DEGREE: HONOURS BACHELOR OF SCIENCE EDUCATION, MATHEMATICS

YEAR AWARDED: 2024

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DEDICATION

This dissertation is dedicated to my family, friends who were my inspiration, primary school administrators, teachers and grade 6 learners in Mutare District, who were courageous to share their feelings and opinions on challenges faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers.

ACKNOWLEDGEMENTS

First and foremost, I thank the Almighty who continuously gave me the zeal and material resources to carry out this research. To my supervisor Mr Gwazengwe I, I express my heartfelt gratitude for the guidance and unwavering support that she gave me throughout the study. I am very grateful to my supervisor for encouraging and believing in me even when I did not have much faith in myself. I wish to applaud the Ministry of Primary and Secondary Education for the permission to carry out the research. I would like to appreciate the support I got from my family, school administrators, primary school teachers and grade 6 learners who participated in the research.

ABSTRACT

Decimal numbers pose significant challenges for learners at Grade 6 level often leading to misconceptions and difficulties in solving problems with these mathematical numbers. This research aimed to explore the specific problems faced by learners in solving problems involving decimal numbers and to identify potential strategies to enhance their understanding and proficiency in this topic.

The research employed a Mixed-Methods Approach/Research, combining quantitative and qualitative data collection methods. A structured questionnaire was administered to a diverse sample of Grade 6 learners to gather quantitative data on their difficulties, misconceptions and attitudes towards teaching and learning of decimal numbers. Additionally, in-depth interviews were conducted with facilitators to gain deeper insight into the challenges faced and potential solutions.

Data analysis involved the use of descriptive statistics to summarize questionnaire responses and inferential statistics to examine relationships between variables. Thematic analysis was applied to the interview transcripts to identify common challenges and potential strategies for improvement.

Ethical considerations were upheld throughout the research process ensuring participant confidentiality, informed consent and voluntary participation. The findings of this study will contribute to the existing body of knowledge on the challenges faced by learners in solving problems involving decimal numbers and provide practical recommendations for educators and curriculum developers to enhance teaching and learning strategies.

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ACRONYMS

MMA/R	Mixed Method Approach/Research
MoPSE	Ministry of Primary and Secondary Education
SRS	Simple Random Sampling
UNESCO	United Nations Education, Scientific and Cultural Organisation
UNICEF	United Nations Children's Education Fund

CHAPTER 1

INTRODUCTION

1.1. Background of the study

In recent years, there has been an increasing concern about the challenges faced by grade 6 learners in Zimbabwe when it comes to solving problems involving the addition of decimal numbers. This has prompted a number of researchers to investigate the underlying issues and potential solutions to help improve the mathematical abilities of students in this area. Hence, the researcher will delve into specific outlines that explore the background of this study.

Mathematical skills are cherished by every individual the world over, hence the inclusion of the subject at primary level. As alluded by Marcum (2018), the importance of developing strong mathematical skills in students at an early age should not be overemphasized. Research has shown that proficiency in mathematics is not only essential for academic success but also for practical everyday tasks such as budgeting, shopping, and problem-solving. Therefore, it is crucial to identify and address any challenges that students may face in mastering mathematical concepts like addition of decimal numbers especially at grade 6 level. The specific focus on grade 6 learners in Zimbabwe is significant as this is a critical stage in their educational development. According to MoPSE (2015), Grade 6 is a transitional period where students are expected to have a solid foundation in mathematical basics before moving on to more complex topics in higher grades. Therefore, understanding the challenges faced by students at this stage can help educators tailor their teaching strategies and interventions to better support their learning needs.

There are various challenges faced by learners in solving decimal addition problems. Minke (2017) outlined that lack of conceptual understanding among students when it comes to addition of decimal numbers is one of the common challenges they face. This includes difficulties in grasping the place value system, understanding the relationship between whole numbers and decimals, and applying the appropriate operations in decimal addition problems. These challenges are also exacerbated by language challenges. For instance, research by Smith (2015) found that many grade 6 learners in Zimbabwe struggle with carrying over decimals when

adding multiple numbers, comprehending the demands of decimal number stories written in English which is a second language. This lead to errors and misconceptions in their calculations.

Learner attitude towards Mathematics as a learning area in general and decimal numbers as a topic in particular is also an issue of concern. Hlatywayo et.al (2015) defines attitudes as positive or negative attitudes you have about a certain person, object, place or a learning area (subject). Thus negative attitudes operate to distance us from others or from subjects leading to poor performance. For example, a study by Wang et al. (2017) found that students in Zimbabwe tend to view mathematics as a difficult and abstract subject, which can lead to negative attitudes and disinterest in learning decimal addition. Hence, negative attitudes towards Mathematics may lead learners to perceive solving decimal addition problems as difficult and to dislike the topic despite its benefit in life in general.

The challenges faced by grade 6 in solving decimal addition problems need to be addressed. According to the Journal of Mathematics Behaviour (2018), familiarity with real-world applications of mathematics is a key factor that influences students' ability to solve decimal addition problems. From a constructivist point of view, this calls for the utilization of modern learner centered teaching methods such as collaborative and inquiry based learning, scaffolding and differentiation. According to Macum (2018), research has shown that effective instruction plays a crucial role in students' mathematical development, including their ability to solve decimal addition problems. Teachers who use interactive, hands-on approaches, provide clear explanations, provide educational resources, support services, solicit parental support and offer opportunities for practice and feedback can help students build confidence and improve their problem-solving skills. Conversely, traditional rote learning methods or lack of differentiation in instruction can hinder students' understanding and hinder their progress in mathematics. Hence the need for professional development for teachers (MoPSE, 2020).

Furthermore, the curriculum and assessment practices in schools can influence students' exposure to decimal addition problems and their ability to demonstrate their mathematical skills. Research has indicated that the design of the mathematics curriculum, the alignment of instructional materials with learning objectives, and the format of assessments can all impact students' learning experiences and outcomes. For instance, a study by Brown (2014) highlighted

the importance of incorporating real-world contexts and problem-solving tasks in the curriculum to help students apply their knowledge of decimal addition in meaningful ways.

Moreover, Chen and Wang (2022) asserted that the use of technology in teaching and learning mathematics has the potential to enhance students' engagement and understanding of decimal addition. Research has shown that digital tools such as educational apps, interactive games, simulations, and online resources can provide students with opportunities for self-directed learning, immediate feedback, and personalized practice. By incorporating technology into the classroom, educators can create dynamic and interactive learning environments that cater to students' diverse learning styles and preferences.

Suffice to say, the topic of solving decimals is a fundamental skill with significant real-life applications. Proficiency in this area is crucial for Grade 6 learners as it lays the foundation for advanced mathematical concepts and problem-solving abilities. Iyengar (2016), postulates that solving decimal problems is a fundamental mathematical concept taught at primary level serving as a building block for advanced mathematical topics. Furthermore, the researcher chose this topic of addition of decimal numbers because he feels that the learners will gain valuable problem-solving skills from this area of mathematics and that it will build on the skills they have already established from the introduction of decimal numbers. This inspired the researcher to carry out the research after he had discovered that mastering the skills required to solve decimal problems is crucial for learners' success in high-level mathematics and various Science, Technology, Engineering and Mathematics (STEM) disciplines (Ministry of primary and Secondary Education (MoPSE) (2015).

Studies on problems faced by primary school learners in general in the learning of Mathematics have been carried out across the globe. For instance, Suryadi (2019) carried a research study on students’ obstacles in understanding decimal numbers in Indonesia, an Asian country. The study investigated didactical and epistemological obstacles that occur when students accomplish the problems on topic on decimal numbers.

Coming closer home, Journal of Physics Conference Series (2019) documents that Kusuma and Retnawati analyzed Sixth Graders’ Difficulties in solving Mathematics Word Problems on Whole Numbers, Fractions and Decimals in South Africa. In Botswana, Mosekiemang (2019), investigated challenges of teaching upper primary Mathematics at Mogoditshane Primary

School. Coming back home, Chirume (2020), investigated Sustainable professional development of primary school mathematics teachers in Zimbabwe through Philosophy of education 5.0. He investigated challenges and prospects. On the contrary, this research aims at specifically investigating the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers and suggesting intervention strategies to the challenges faced by Grade 6 learners in solving addition problems involving decimal numbers at a Primary School in Mutare District in Manicaland Province, Zimbabwe. Hence, there is a knowledge gap which needs to be filled with regards to teachers' perceptions on the implementation of inclusive education.

1.2. Statement of the problem

There are several challenges faced by learners when solving problems involving the addition of decimal numbers. The reality is that Grade 6 learners are experiencing problems in solving addition problems involving decimal numbers. Duah (2019) posits that decimal numbers pose a significant challenge for learners, leading to a lack of understanding and proficiency in solving them due to challenges in understanding and applying the methods involved in the teaching and learning of decimal addition. It however remains a fact that some learners still have a different perception regarding the solving of mathematics problems, with some ignoring Mathematics as a subject. This study aims to investigate obstacles that Grade 6 learners encounter in decimal addition, ultimately seeking to improve teaching strategies and promote academic success in Mathematics for these students. However, if the reality is not changed to become the ideal, it will be difficult for Grade 6 learners to have the foundation for advanced mathematical concepts and problem-solving abilities. Hence, the need to assess the challenges in decimal addition.

1.3 research objectives

The research study intends to:

1.3.1 Identify the specific types of challenges Grade 6 learners encounter when solving problems involving addition of decimal numbers.

1.3.2 Find out learners' attitudes towards decimal addition.

1.3.3 Suggest strategies that can be utilized by teachers and learners to mitigate challenges faced by grade 6 learners in adding decimal numbers.

1.4 Research Questions

Sub-questions

1.4.1 What are the common challenges faced by Grade Six (6) learners in solving addition problems involving decimal numbers?

1.4.2 What are the attitudes of learners towards decimals?

1.4.3 Are the strategies that can be utilized by teachers and learners to mitigate challenges faced by Grade 6 learners in adding decimal numbers?

1.5 Assumption of The Study

Certain assumptions were taken into consideration for the findings to be valid and the assumptions are stated below:

1.5.1 Grade 6 learners have been introduced to the concept of decimal numbers and have a basic understanding of addition.

1.5.2 The challenges faced by Grade 6 learners in teaching and learning of adding decimal numbers may stem from conceptual misunderstandings, lack of decimal number concepts, lack of practice, or computational errors (difficulties in applying mathematical procedures).

1.5.3 Learners' negative attitude towards decimal numbers lead to failure in decimal addition.

1.5.4 The study assumes that Grade 6 learners' performance in decimal addition problems can provide insights into their overall mathematical proficiency and the effectiveness of current teaching methods.

1.5.5. There are various strategies which can be adopted by teachers and learners to alleviate challenges faced by learners in decimal addition.

1.6 Significance of the study

The significance of studying the challenges faced by Grade Six (6) learners when solving problems involving the addition of decimal numbers lies in its potential to inform educational practices and improve student learning outcomes. By identifying and addressing these challenges, educators can tailor instructional strategies to better support students' mathematical development and enhance their problem-solving skills (Ministry of Primary and Secondary Education, 2019).

The study seeks to establish the challenges that learners face in the mastery of the concepts in teaching and learning of solving addition problems involving decimal numbers and find effective and ever-lasting solutions. Hence, the study could be significant to the following stakeholders:

1.6.1 Facilitators

The study will help facilitators to plan and facilitate lessons that clearly bring out to learners the understanding of solving addition problems involving decimal numbers. Facilitators will also identify grey areas in the teaching and learning of adding decimal numbers and strategies to clear these grey areas. Understanding the specific difficulties that Grade Six (6) learners face in adding decimal numbers can help teachers adjust their teaching methods to target these areas of need. Through this research, insights gained can contribute to more effective teaching strategies, improved student outcomes, and a more equitable mathematics education system (Van de Walle, Karp & Bay-Williams, 2020).

1.6.2 Learners

The study could be important to learners as it helps them in identification of practical applications of decimal numbers in real-life scenarios such as STEM subjects and optimization problems. In addition, learners will benefit on how the process of solving decimal problems requires learners to analyze and manipulate multiple variables, fostering higher-order thinking skills. The study will demonstrate the positive correlation between mastery of addition of

decimal numbers and overall achievement in Mathematics at Grade Six (6) llevel. In a nutshell, learners will have strong mathematics foundations, real-life applications, problem-solving skills and academic performance. Addressing the challenges identified in this study can lead to improved student performance in Mathematics, potentially increasing overall academic achievement and confidence in mathematical problem-solving (Boaler, 2021).

1.6.3 She school administrators

The school administrators could benefit from the study through understanding the challenges being faced by Grade Six (6) learners when solving addition of decimal numbers. This might help the school administrators to assess both the facilitators' teaching and learners' learning activities accordingly. Gutiérrez and Boaler (2021) postulate that, by investigating and addressing these challenges early in students' academic journeys, educators can work towards reducing disparities in math achievement among diverse student populations.

1.6.4 The Ministry of Primary and Secondary Education (Policy Makers)

The study could be significant for the Ministry of Primary and Secondary Education as it might reveal the long-term benefits and implications of developing proficiency in solving addition problems involving decimal numbers beyond Ordinary Level, including future educational and career prospects. This could help these policy makers to take corrective measures like devoting more time and funds to Mathematics education so that learners can understand the benefits and importance of engaging in mathematics activities. Findings from this study can contribute to the refinement of Mathematics curricula to ensure that they adequately address the challenges students encounter when working with decimal numbers (National Council of Teachers of Mathematics, 2021).

1.7. Limitations of the study

This study might encounter some various constraints. The first limitation could be that some of the participants may not be willing to participate in the study as they might think it is meant to expose their truancy and academic performance. To mitigate this limitation, the researcher will explain to the learners that this study is for academic purposes and that their identities will not be

revealed as strict confidentiality and anonymity will be maintained throughout the study. This might make them more comfortable to participate in the study.

Another limitation that might be encountered in the study is the issue of the time since learners involved in the study may also be having their normal school lessons with fully packed timetables. This might delay the study as it renders accessing the participants difficult. Limited time for data collection may restrict the depth of the study and the ability to explore all aspects of the challenges faced by grade 6 learners. To mitigate this limitation, the researcher will have to approach the school administrators and inform them of his study (Boaler, 2021).

The study will use a sample of 40 participants since it will be a qualitative study and this might make generalization of the findings to the entire population difficult. The sample size may not be representative of the entire population of Grade 6 learners. This can limit the generalizability of the findings. To mitigate this limitation, the study will also use data collected from primary sources such as various literature sources like journals, text books and other publications. Furthermore, if the sample is not randomly selected, there is a risk of sampling bias, which can affect the validity of the study.

Constraints of the study range from factors such as time, finance, sample size, lack of much co-operation from some of both the learners and facilitators. Financial constraints can also disrupt some of the study activities which may be lined up. Due to financial constraints, lack of teaching and learning materials pose a threat to the study. Furthermore, learners' performance and understanding of addition of decimal numbers can be influenced by various external factors such as home environment, socio-economic status and previous educational experiences. In the same veins, Cresswell (2018), reiterates that external factors such as classroom environment, teaching methods and home support can influence how learners perform in problem-solving tasks. These factors should be controlled or accounted for in the study. These factors may not be fully controlled or accounted for in the research, potentially impacting the accuracy and completeness of the findings.

The validity and reliability of the research instrument used to assess the challenges faced by learners need to be considered. If the instrument is not well-designed, it may not accurately capture the difficulties experienced by the learners.

The language used in the study and cultural differences among learners may impact their understanding of decimal addition problems. The influence of teachers on learners' problem-solving abilities cannot be ignored. Teachers' proficiency in teaching decimal addition and their approach to problem-solving can affect the results of the study.

Moreover, the researcher should ensure that ethical guidelines are followed when conducting research involving children. Informed consent, privacy and confidentiality should be carefully considered. To overcome these limitations, researchers can use appropriate sampling techniques, carefully design research instruments, control for external factors, conduct a thorough literature review and ensure transparency in reporting the study findings. Additionally, researchers should consider collaborating with educators and stakeholders to gain a comprehensive understanding of the challenges faced by Grade Six (6) learners in solving decimal addition problems.

1.8. Delimitations of the study

This study will be carried out focusing at a Primary School in Mutare district, Manicaland province, about 55 km South of Mutare. The school in situated in the peri- urban area of Mutare. This geographical area was chosen because it is convenient to carry out a research at this level since the researcher is one of the facilitators at this Primary school and has observed the Grade 6 learners showing different attitudes towards teaching and learning of mathematics. Furthermore, learners and teachers are likely to provide true and useful information since the researcher is familiar to them. The researcher is going to work with 40 out of 110 Grade 6 learners at the School.

This study will adopt quantitative and qualitative research techniques, using questionnaire and semi-structured interview as the research instruments. This will be done in order to get a detailed account of the learners' perceptions and attitudes towards decimal numbers. Data collection will be contacted during school days of academic third term of the year 2024 to ensure consistency in the data collection process. The specific assessment methods or tools that will be used to evaluate the challenges faced by Grade 6 could include tests, interviews, observations or a combination of methods.

1.9 Definition of key terms

1.9.1 Challenges

According to https://www.igi-global.com, challenges refer to something that by nature or character serves challenges to make a special effort, a demand to explain or difficulty in a undertaking that is stimulating to one engaged in challenges can therefore be defined as difficulties or problems that tend to retard progress.

1.9.2 Decimal

A decimal is any number in our number system, a decimal base 10 place value system where each place is 10 times bigger than the place to its right (Eather, 2020).

1.9.3 Solving

Solving means to find an answer or an explanation to a problem. For instance, in Mathematics, number stories are problem sums which need to be solved (Cambridge Dictionary, 2017).

1.10. Summary

This chapter highlighted on what this study will address. The researcher will probe into the challenges faced by grade 6 learners in solving addition problems involved in decimal numbers. The purpose of the research, research objectives, research questions, significance of the study, delimitations and limitations of the study were given to set the direction and authenticity of the project. In the next chapter, the researcher will review literature related to the problem highlighted above which will focus on the views of other authorities on the challenges faced in the inclusion of primary school learners with hearing impairment in the mainstream.

CHAPTER 2

RELATED LITERATURE REVIEW

2.1. Introduction

The current chapter presents literature related to the study. Hence, it will outline the theoretical or the conceptual framework of the study, that is, the constructivist theory. Also, three themes derived from research questions on challenges faced by grade 6 learners when solving addition problems of decimal numbers will be discussed.

2.2. The Constructivist Theory

The constructivist approach to teaching and learning was propounded by psychologists who include Piaget and Vygotsky in the 20^{th} century. Its application to the teaching of Mathematics has gained momentum in contemporary education. Thus, the constructivist approach to teaching and learning Mathematics in a classroom is geared to develop deep understanding, analytical thinking and a desire to learn in young minds. Therefore, by engaging students in hands-on activities, problem-solving and collaborative learning, teachers can help pupils build a strong foundation in Mathematics in today's ever changing technological world.

As alluded earlier on, this study will be hinged on the constructivist theory. Constructivist theory, rooted in the works of prominent educational psychologists such as Jean Piaget and Lev Vygotsky, emphasizes that learners construct knowledge through their experiences and social interactions. This theoretical framework is particularly relevant when examining the challenges faced by primary school learners in Zimbabwe in general and in Mutare District in particular as they engage with decimal addition problems. Understanding these challenges through a constructivist lens can provide valuable insights into effective teaching strategies that enhance learning outcomes in a country where educational resources and instructional methods may vary significantly.

The constructivist approach to teaching and learning which advocates for the active construction of knowledge by the pupil, rather than the passive transmission of information from the teacher to the pupil has gained significant ground in the education fraternity, especially in the teaching

and learning of Mathematics and Science. Hence, this paper is going to give a brief description of the constructivist approach, its aims in teaching and learning Mathematics and Science, the preferred teaching methods in constructivism, the role of the teacher and the child in the context of constructivism and the assessment type relevant to constructivism. However, before chewing the bone of contention, there is need to define constructivism and teaching and learning.

According to Golder (2018:679), "Constructivism is a learning theory found in psychology which explains how people might acquire knowledge and learn. It therefore has direct application to education. The theory suggests that humans construct knowledge and meaning from their experiences." As viewed by Krahenbuhl (2016:4), "Constructivism is an epistemological view of knowledge arguing that knowledge is derived in a meaning-making process through which learners construct individual interpretations of their experiences and thus, construct meaning in their minds." Constructivism is the idea that learners make meaning and construct knowledge by reflecting on and interpreting their own and others' experiences.

Allen (2022:1) points out that constructivism has roots in Piaget, Kant, Dewey, Freire and others. Liang and Akibu (2015) concurred that constructivism has roots in Piaget (1964)'s beliefs in how children learn. Golder (2018:678) adds that Jean Piaget and Lev Semionovich Vygotsky's study of cognitive development has provided the foundation for constructivist learning theory in the 20th Century which asserts that people develop their knowledge through active participation during learning. In the context of Mathematics teaching and learning, this implies that students are not simply receiving and memorizing facts and formulas through rote learning, but actively participate in the process of understanding and making sense of the concepts being facilitated by the teacher (IJRAR, 2018).

Constructivist approach in education aim at promoting active and meaningful learning. Umida, Dilora and Umar (2020) outlined that constructivism aims to engage learners actively in the process of knowledge construction, rather than passive reception of information. The goal is to help learners develop deep, meaningful understanding of concepts, rather than simply memorizing facts. Golder (2018) points out that constructivism also fosters learner autonomy and self-regulation. Thus, it emphasizes the learner's role in directing their own learning, making decisions and taking responsibility for their progress thereby developing learners' metacognitive skills, such as self-assessment, self-monitoring and self-regulation, which are crucial for lifelong

learning. Suffice to say constructivism aims to equip learners with the skills and strategies necessary for continued, self-directed learning beyond the classroom by developing critical thinking and problem-solving skills. (Tomljenovic and Vorkapic, 2020).

The constructivist approach is characterized by various teaching methods which can be utilized to impart learning to learners. Golder (2018:678) documents that Piaget's theory of constructivist learning has had wide ranging impact on learning theories and teaching methods in education and is an underlying theme of many education reform movements. According to Ministry of Primary and Secondary Education (2015), infants, which include grade one learners, thrive on hands-on learning experiences that allow them to explore and manipulate concrete objects. From Piaget (1964)’s point of view, cited by Magwa, Gudyanga and Nyanhongo (2015) grade one learners will be at the concrete operational stage which calls for the use of manipulatives such as blocks or counters to explore concepts of number and shape for example.

Afzal and Kalam (2021) noted that, the role of the teacher in a constructivist approach to teaching and learning is not to be the sole provider of knowledge but to be a facilitator, guide and collaborator in the teaching and learning process. This paradigm-shift in the teacher's role from teaching to facilitating is crucial to the success of a constructivism, especially in the teaching of Mathematics and Science to grade one pupils. Krahenbuhl (2016) highlights that in constructivism, the teacher's role is to facilitate active learning by encouraging pupils to explore, experiment and construct their own understanding of the concepts being taught. Also, the teacher also guides and scaffolds learners by providing them with the necessary support and resources to help them build upon their existing knowledge and skills. Hence, the teacher should differentiate learning for the benefit of all learners and facilitate collaborative learning opportunities.

Additionally, the teacher encourages pupils to ask questions, make predictions and make investigations. Allen (2020) contends that the teacher must be skilled at designing learning experiences that promote inquiry and problem-solving skills that allow students to take an active role in their own learning. While allowing learners to actively participate in the learning process, the teacher or facilitator should assess the teaching and learning process. In a constructivism, assessment is not simply about measuring student performance, but rather about understanding the learning process and providing students with constructive feedback to support their continued educational endeavors. Therefore, it is also the teacher's role in constructivism to design

assessment strategies that are aligned with the constructivist approach and that provide pupils with the opportunity to demonstrate their understanding in a variety of ways (Barda, 2015).

In constructivist approach to pedagogy, the learner has an important role to play. Allen (2022) outlines that the role of the learner is that of an active participant in the learning process, rather than a passive receiver of information. Thus, as Golder (2018) puts it, in constructivist approach to teaching and learning, learning is viewed as a socially and culturally situated process, where learners actively construct knowledge through interactions with their environment, collaborating with peers and facilitators. Hence, learners should reflect on their own thinking processes, monitor their learning and regulate their strategies and approaches. Suffice to say primary school pupils should actively engage themselves in the learning process through hands-on, inquiry and problem-solving activities. Therefore, pupils should take responsibility for their own learning and actively construct their understanding by connecting new information to their prior knowledge and personal experiences in Mathematis (Tomljenovic and Vorkapic, 2020).

2.3. Challenges faced by Grade 6 learners when solving addition problems of decimal numbers

Decimal numbers are a critical component of the mathematics curriculum in Zimbabwe, introduced at an early age. However, the abstract nature of decimals often leads to difficulties for learners. According to Umida et.al. (2020), constructivist theory posits that students build new knowledge upon existing cognitive frameworks. However, in many Zimbabwean classrooms such as at this Primary in Mutare District, students may lack the foundational skills necessary for understanding decimals, which can stem from inconsistent educational experiences, limited access to resources and varying levels of teacher preparedness. Thus, the ability to solve addition problems involving decimal numbers is a critical skill for primary school learners, as it lays the foundation for more advanced mathematical concepts. However, many learners encounter significant challenges when working with decimals. There are cognitive, pedagogical and contextual factors that contribute to these difficulties.

2.3.1. Cognitive Challenges

One of the fundamental challenges in decimal addition is the understanding of place value, which is crucial for performing operations accurately. Unlike whole numbers, decimals introduce

a new layer of complexity, as learners must grasp the significance of digits in both the whole number and fractional parts. Hattie (2015) points out that learners often struggle to grasp that the position of a digit affects its value, especially when decimals introduce new place values such as tenths, hundredths and thousandths. Hence, misunderstanding place value can lead to errors in addition such as incorrectly aligning numbers during calculations. According to Hurst and Muir (2016), research indicates that a solid understanding of place value is essential for performing operations with decimals effectively. In Zimbabwe, where educational resources can be scarce, visual aids and manipulatives that facilitate this understanding may not always be available. This lack of resources can lead to persistent misconceptions about the structure of decimal numbers.

Mastery of mental calculation skills is another cognitive challenge. Many primary school learners struggle with mental arithmetic, which is crucial for estimating and verifying the accuracy of their answers. Fuchs et al., (2013) outlined that the addition of decimal numbers often requires learners to perform calculations that involve carrying over values, which can be particularly challenging without strong mental math skills. Studies have shown that learners who lack confidence in their mental calculation abilities are more likely to make errors when solving decimal addition problems.

The conceptualization of decimals is also a cognitive issue of concern. Learners often find it difficult to conceptualize decimals as parts of a whole. Constructivist theory emphasizes the importance of deep conceptual understanding over rote memorization. Many primary school learners in Zimbabwe may approach decimal addition using memorized procedures without fully grasping the underlying concepts. This lack of understanding can be attributed to traditional teaching methods that prioritize drilling and practice over exploration and inquiry, limiting students' ability to apply their knowledge in diverse contexts. Additionally, Miller and Ginsburg (2013) outlined that misconceptions about decimals can significantly impact learners' ability to perform addition accurately. For example, students may erroneously believe that decimals are always smaller than whole numbers or have difficulty comparing decimal values. In Zimbabwe, where primary education often faces challenges such as large class sizes and limited individual attention, teachers may struggle to identify and correct these misconceptions effectively.

This conceptual barrier can hinder learners' ability to perform operations involving decimals, as they may not fully understand how to manipulate these numbers. Research has highlighted that

learners who struggle with the concept of decimals are less likely to succeed in solving addition problems that involve them (McIntosh et al., 2016).

Additionally, the transfer of knowledge is another cognitive challenge when solving decimal numbers. Thus, the transfer of knowledge from whole number operations to decimal operations can be problematic. Nunes and Bryant (2016) pointed out that learners may apply strategies that work for whole numbers without recognizing that decimals require different approaches. This lack of adaptability can lead to persistent errors in addition problems involving decimals.

2.3.2. Pedagogical Challenges

Teaching methods pose a challenge in the teaching and learning of decimal numbers. Magwa et.al (2015) viewed that the effectiveness of teaching methods plays a crucial role in learners' understanding of decimal addition. Traditional teaching approaches such as the lecture method that emphasize rote memorization and procedural knowledge may not adequately engage students or address their individual learning needs. Research suggests that more interactive and conceptual teaching methods can significantly improve learners' understanding of decimals (Hattie, 2014).

Curriculum limitations come with challenges as well. The curriculum may not provide sufficient emphasis on the practical applications of decimal addition, leading to a lack of real-world context that can help learners grasp the concept better. Boaler (2016) notes that when learners do not see the relevance of decimals in their everyday lives, they may struggle to engage with the material. Studies have shown that contextualized learning experiences can enhance students' understanding and retention of mathematical concepts (Miller, et.al, 2014).

Social interaction and collaboration is crucial in the teaching and learning process. According to Golder (2018), Vygotsky's emphasis on social interaction highlights the importance of collaborative learning in constructing knowledge. For example, Majokoto (2018) reveals that in many Zimbabwean classrooms, the traditional teacher-centered approach may limit opportunities for students to engage in discussions and collaborative problem-solving thereby hindering the inclusion agenda. This lack of interaction can prevent learners from sharing their thought

processes and confronting misconceptions, further impeding their understanding of decimal addition.

Insufficient exposure to real-world applications caused by teacher-centered teaching methods such as lecture method is a great challenge. According to Allen (2020), constructivist theory posits that learners benefit from engaging with real-world problems that make mathematical concepts relevant. However, many Zimbabwean students may have limited exposure to practical applications of decimal addition, such as budgeting or measurement in everyday life, which should be made possible by teachers in pedagogy through learner-cantered teaching methods such as inquiry-based learning. This disconnect can lead to a lack of motivation and engagement, making it difficult for learners to see the relevance of decimals in their lives (Marrie, 2018).

2.3.3. Assessment Practices

According to the Ministry of Primary and Secondary Education (MoPSE) (2015:51), assessment is concerned with measuring learner performance against the set standards or benchmarks as defined by the curriculum. However, assessment, both formative and summative, takes various forms, namely, portfolio, continuous assessment and formal examinations. Assessment is the process by which the quality of an individual's work or performance is judged. In schools, assessment of learning is usually carried out by teachers on the basis of impressions gained as they observe their learners at work or by various kinds of tests given weekly, monthly or termy. Standardized assessments often focus on rote memorization and procedural fluency rather than conceptual understanding. Stacey (2017) points out that this can create a narrow view of learners' abilities and may not accurately reflect their understanding of decimal addition. Notably, research indicates that assessments that incorporate problem-solving and real-world applications can provide a more comprehensive picture of learners' mathematical competencies.

Umida, Dilora and Umar (2020) pointed out that in constructivist pedagogy, the focus is on the process of learning rather than just the final product. Hence, the assessment type that is most relevant to constructivism is authentic assessment. According to Indiana Department of Education (2021:1), "The term authentic assessment describes the multiple forms of assessment that reflect student learning, achievement motivation and attitudes on instructionally relevant

classroom activities." University of Hull (2020:1) adds that, authentic assessment is characterized by open-ended tasks that require students to construct extended responses, to perform an act, or to produce a product in a real-world context-or a context that mimics the real world. For example, authentic assessments include projects, portfolios, writing an article for a newspaper or newsletter, performing a dance or drama, designing a digital artefact, creating a poster for science exhibition, debates and oral presentations. For instance, in a grade one classroom, pupils can be asked to role play or dramatize mathematics concepts and science activities. For instance, learners may be asked to role play buying and selling, giving out change at the Classroom

Shop.

2.3.4. Teacher Preparedness

The preparedness of teachers to effectively teach decimal concepts is another significant factor. Majokoto (2018) observes that many teachers may lack the necessary training or resources to teach concepts such as decimals effectively, leading to gaps in learners' understanding. Professional development programs that focus on mathematical content knowledge and pedagogical strategies can help improve teachers' effectiveness in teaching decimals (Mewborn, 2013).

2.3.5. Contextual Challenges

Contextual challenges in the teaching and learning of decimal numbers emanate from resource availability, language barriers, socio-economic factors and parental involvement. In many primary schools, especially in under-resourced areas, such as Manzinde in Mutare rural, there are a lack of materials and resources that support the teaching and learning of decimals. This includes textbooks, manipulatives and technology that can facilitate understanding. Research has shown that access to quality resources is essential for effective mathematics instruction (Miller et al., 2014).

Language can also pose a significant challenge for learners, particularly in multilingual contexts. If the language of instruction is not the learners' first language, they may struggle to understand mathematical terminology and concepts, including those related to decimals. Studies indicate that language proficiency is closely linked to mathematical understanding, and learners who face language barriers may perform poorly in mathematics (Miller and Ginsburg, 2016).

Also, the socioeconomic status can influence learners' access to educational support and resources outside of school. Learners from disadvantaged backgrounds may have limited opportunities for additional practice or tutoring, which can affect their performance in mathematics. Duncan and Murnane (2015) documents that research has highlighted the impact of socioeconomic factors on academic achievement, particularly in mathematics.

Furthermore, Epstein (2018) asserts that the level of parental involvement in a child's education can significantly impact their mathematical learning for instance. Parents who are engaged in their children's education can provide support and encouragement, which can enhance learners' confidence and motivation in mathematics. Conversely, a lack of parental support can lead to disengagement and lower achievement in subjects like mathematics (Hill & Tyson, 2016).

Thus, the challenges faced by primary school learners when solving addition problems involving decimal numbers are multifaceted, encompassing cognitive, pedagogical and contextual factors. Addressing these challenges requires a comprehensive approach that includes effective teaching strategies, a supportive curriculum and adequate resources. By understanding and addressing the barriers that learners face, educators can help improve students' proficiency in decimal addition and foster a more positive attitude towards mathematics.

2.3.2. The effects of learner attitudes in solving addition problems of decimal numbers.

Stacey and Mcgregor (2016) asserted that the attitudes of primary school students towards mathematics significantly influence their problem-solving abilities and overall performance. Research indicates that positive attitudes are linked to better problem-solving skills, while negative attitudes can hinder performance and increase anxiety. Attitudes play a significant role in a child's ability to solve decimal addition problems at the primary school level. The way a student approaches these types of math problems can greatly impact their success and overall

performance in the subject. Positive attitudes towards math can lead to greater motivation, engagement, and ultimately better outcomes in solving decimal addition problems (Minke, 2017).

Trentacosta et.al. (2017) documented that research has shown that students who have a positive attitude towards mathematics are more likely to persist through challenging problems, seek help when needed, and view mistakes as opportunities for learning and growth. Contrary, negative attitudes towards mathematics can lead to feelings of anxiety, frustration, and avoidance, making it more difficult for students to effectively solve decimal addition problems (Journal of Mathematics, 2018).

One study conducted by Stacey and MacGregor (2016) found that students with positive attitudes towards mathematics had higher levels of self-efficacy, or belief in their own ability to succeed, which in turn led to better performance in decimal addition tasks. This highlights the importance of fostering a positive attitude towards mathematics early on in a child's education. In addition, teacher attitudes towards mathematics can also impact students' attitudes and performance in the subject. Teachers who exhibit enthusiasm, encouragement, and support for mathematics can help to create a positive learning environment where students feel more confident and motivated to tackle decimal addition problems (Journal of Mathematics, 2018).

Thus, attitudes play a critical role in solving decimal addition problems at primary school level in general and to grade 6 learners in particular. Stacey and MacGregor (2016) noted that fostering positive attitudes towards mathematics in primary school students is crucial for enhancing their problem-solving capabilities. Educators should focus on building confidence and reducing anxiety to create a supportive atmosphere for learning mathematics. By fostering positive attitudes towards math, both students and teachers can contribute to improved performance, greater engagement, and increased success in this important area of mathematics

2.3.3. Strategies which can be used to mitigate challenges faced by grade 6 learners when solving addition problems involving decimal numbers

Given these challenges, educators in Zimbabwe can adopt several constructivist strategies to support primary school learners in overcoming difficulties with decimal addition. Some of the strategies have been highlighted below.

2.3.3.1. Use of Manipulatives and Visual Aids

Incorporating physical manipulatives, such as base-ten blocks or decimal grids, can help learners visualize the relationships between whole numbers and decimals. Providing visual aids, even simple ones created from readily available materials, can reinforce students' understanding of place value and support their ability to perform decimal addition accurately. According to Magwa et.al. (2015), utilizing concrete materials such as base-ten blocks, coins, or decimal grids can help learners visualize decimal concepts. Additionally, incorporating number lines and hundredths grids can aid learners in visualizing the addition of decimal numbers. These tools help students see the relative positions of decimal values and understand how to align them correctly for addition of decimal numbers. Also, allow students to physically engage with numbers, making abstract concepts more tangible. For example, using coins to represent decimal values can help students understand the relationship between whole numbers and decimals.

2.3.3.2. Collaborative Learning Environments

Collaborative Learning is a teaching method which can be utilized in the constructivist approach. Smith and MacGregor (2014) explained that collaborative learning is an umbrella term for a variety of educational approaches involving joint intellectual effort by pupils, or pupils and facilitators together. Although collaborative learning activities vary widely, they mostly center on students' exploration or application of the course material, not simply the teacher's presentation. Thus, constructivist approach to teaching and learning also emphasizes the social nature of learning where pupils construct knowledge through their interactions with their peers and the facilitator. At Primary school level, collaborative learning might involve engaging pupils in group work activities, where they can share their ideas through socialization, challenge each other's thinking and build a shared understanding of the concepts being learnt. Thus, Collaborative learning encourages learners to articulate their thought processes, confront

misconceptions, and develop a deeper understanding of decimal addition through social interaction. Teachers can structure activities that promote teamwork and communication among students (Allen, 2022).

2.3.3.3. Real-World Problem Solving

Presenting learners with real-world scenarios that require decimal addition can enhance engagement and relevance. For instance, tasks related to budgeting for a school event or calculating distances can help students see the practical applications of decimals, making the learning experience more meaningful. Teachers can draw on local contexts to create relatable problems. Additionally, Magwa et.al. (2015) asserted that the use of physical objects like base-ten blocks or decimal grids to help students visualize decimal values is handy since most primary school learners are at the concrete operational stage, and they need realia. Manipulating these tools allows learners to explore concepts like place value and how decimals relate to whole numbers.

2.3.3.4. Scaffolding and differentiation

Educators can provide scaffolding by breaking down complex problems into smaller, manageable steps. Constructivism also cherishes the utilization of scaffolding and differentiation in the teaching and learning of mathematics. Vygotsky (2017), one of the proponents of constructivism, in Magwa, Gudyanga and Nyanhongo (2015) asserted that constructivist teaching recognizes that students have varying levels of prior knowledge and understanding. Hence, they may require different levels of support and guidance to achieve their learning goals. Thus, in the teaching and learning of primary school pupils, this might involve providing pupils with scaffolded support such as visual aids, step-by-step instructions or additional practice opportunities as needed by individuals. Suffice to say, this approach allows learners to build confidence as they progress from simpler to more complex decimal addition tasks, gradually increasing their understanding and proficiency. Scaffolding can also involve providing hints or guiding questions to help students navigate challenging problems.

2.3.3.5. Using modern teaching methods

The constructivist approach also advocates for the use of modern teaching methods such as inquiry-based learning . Inquiry-Based Learning. According to Jan-Marie (2018:42), Inquiry-

Based Learning, is an approach that aims at nurturing thinking, reflection and problem-solving among learners. Golam (2019:112) says, "Inquiry-Based Learning, is a student-centered approach driven by students' questions and their innate curiosity." IBL is a child-centered modern teaching approach which utilizes teaching methods such as discovery method, project-based learning, problem-based learning and design-based learning. Thus, constructivism emphasizes the importance inquiry-based learning, where students are encouraged to ask questions, make predictions and investigate their own hypotheses in problem-solving. Hence, in a grade one mathematics classroom, inquiry based learning might involve presenting pupils with real life problem-solving situations and encouraging them to develop their own strategies for finding solutions.

2.3.3.6. Addressing Misconceptions Directly

Educators should be proactive in identifying and addressing common misconceptions about decimals. This can be achieved through targeted instruction, discussions and activities designed to challenge and correct misunderstandings. Hattie (2012) contends that teachers can create a safe environment where students feel comfortable discussing their errors and learning from them. For instance, group activities in decomposing numbers that is, encouraging students to break down decimal numbers into their component parts (, separating whole numbers from decimal fractions) can facilitate easier addition in a friendly atmosphere. This method allows learners to focus on adding like values, which can reduce errors. Also misconceptions can be addressed through the think-and-share strategy. For example, after introducing a decimal addition concept, the teacher can have students, first think individually about a problem then discuss their reasoning with a partner before sharing with the larger group. This method fosters reflective thinking and clarifies understanding.

2.3.2.7. Professional Development for Teachers

There is need for ongoing training for teachers. Ministry of Primary and Secondary Education (MoPSE) (2020) documents that investing in professional development for teachers can enhance their ability to teach decimal concepts effectively. Training programs that focus on innovative teaching strategies, understanding of decimal operations, and the use of concrete media can empower educators to better support their students. As asserted by Mutepfa and Chataika (2017), research on Zimbabwean teachers' attitudes towards inclusive education which calls for modern

teaching approaches such as differentiation and scaffolding, shows a need for enhancement of the teacher training in inclusive education practices which will assist learners in tackling addition of decimal numbers.

2.3.2.7. The provision of material resources

The challenge of learning resources calls for resourceful and innovative teachers to save the situation to some extent. As mentioned by UNICEF (2017), improved use of learning aids made out of locally available resources will go a long way in promoting the teaching and learning of addition of decimal numbers. Dua and Dua (2013:8) weighed in and said, non-specialized materials such as mini-black boards can support children with disabilities for instance, thereby catering for individual needs in addition of decimal numbers. Besides seeking donor funding, schools can embark on income generating projects to augment the meagre levies paid by the rural parents who make the bulk of the poverty stricken people in Zimbabwe in general and Manzinde Community in Mutare District in particular. The government should support schools financially and also keep on seeking donor funds from organisations such as UNICEF in order for all schools to benefit from funds such as the School Improvement Grant (SIG) which is currently catering for very few schools in the provision of teaching and learning materials.

2.4. Summary

This chapter reviewed literature related to the problems faced by Grade six (6) learners in solving problems involving addition of decimal numbers at a Primary School in Mutare District, Manicaland Province, Zimbabwe. It looked into the theoretical and conceptual frameworks of the research as well. It was highlighted that grade six (6) learners face a plethora of challenges in the addition of decimal numbers. However, there are strategies which can be used to mitigate these challenges. The next chapter, that is Chapter three, will look into research design and methodology.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Introduction

Chapter three gives an overview of the composition of the research methodology which will be used in the research study. This chapter will focus on various components of research methodology including the research design, the population sample, the sampling procedures, research instruments, data collection and analysis procedures. Chapter three also includes ethical considerations and informed consent.

3.2. Research Approach

The study will adopt a Mixed Methods Research/Approach (MMR/A) in collecting and analyzing data. Creswell (2015:2) defines Mixed Method Research/Approach as a type of research were the researcher combines elements of qualitative and quantitative research approaches (use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purpose of breath and depth of understanding and collaboration. Creswell and Creswell (2018) concurred when they noted that Mixed Method Research or Approach (MMR/A) is a research approach that involves collecting, analyzing and interpreting qualitative and quantitative data in a single study or in a series of studies that investigate the same phenomenon.

The researcher will employ both qualitative and quantitative research paradigms. Bordens and Abbott (2018) observed that qualitative research verbally describes or tells what is done or what has been done. According to Creswell and Creswell (2018:59), “Qualitative methods are more interpretive, historical and ethnographic than are quantitative approaches.” In this research, the qualitative research and quantitative methods will be mainly adopted to investigate the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers at the selected primary school in Mutare District in Manicaland Province, Zimbabwe. This will

be done through questionnaires which will be administered to primary school learners at a Primary School in Mutare District.

Boderns and Abbott (2018) noted that qualitative research design has its own advantages and disadvantages. Some of the advantages of qualitative research design are that it usually has a broader focus than that of quantitative research as it involves observing events in all or most of their complexity, rather than focusing on just a few aspects. Qualitative research design is useful for studying a limited number of cases in depth, as well as describing complex phenomena as they are situated and embedded in local contexts allowing flexibility. It is useful in describing opinions, attitudes, feelings and perceptions of a given population such as perception of teachers in the use of inquiry based learning in the teaching of decimal numbers, providing understanding and description of people's personal experiences of phenomena. Also, qualitative approaches are responsive to changes that occur during the conduct of the study. In most cases, data is usually collected in natural settings in qualitative research, for instance interviewing primary school teachers or learners in primary schools. As mentioned earlier on, qualitative research has disadvantages as well. Creswell and Creswell (2018) indicated that in qualitative research design, knowledge generated might not be generalized to other people or different settings. It is difficult to make quantitative predictions because qualitative research does not involve numbers and counting. Qualitative research results may be influenced by the researcher's personal biases. The analysis of data in qualitative design is also time-consuming.

McCombes (2019) mentions that quantitative design measures events and occurrences which are inescapable especially during analysis hence the Mixed Methods Research/Approach. Apuke (2017:40) defines quantitative research methods as "the explaining of an issue or phenomenon through gathering data in numerical form and analyzing with the aid of mathematical methods; in particular statistics." Quantitative design uses scientific methods and processes that include theories and hypothesis, development of instruments of measurement, collection of data and analysis of and the evaluation of data. In this research, the quantitative research method will be mainly adopted to collect and analyze data on the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers at a primary school in Mutare District, Manicaland Province, Zimbabwe.

3.3. Research Design

According to Saunders, Lewis and Thornhil (2019:6), a research design is the plan to be followed in order to answer the questions raised by the research problems. They further elaborated that the goal of a sound research design is to provide results that are judged to be credible and valid. On the same note, Bordens and Abbott (2018) viewed a research design as a strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research strategy. A research design refers to the plan and structures of the investigation used to obtain evidence to answer research questions.

In this view, the idea of addressing the selected questions to answer the objectives of the study will be confined to Primary School teachers and grade 6 learners at the selected school. The Research design will enable the researcher to identify the correct participants to answer questions regarding problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers at a primary school in Mutare District, Manicaland Province, Zimbabwe. As postulated by MacCombes (2019), research design is the key to obtaining valid and reliable data or information for decision making, which is the most important purpose of research. Simply stated, a research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. Although there are different research designs, this research will be mainly a case study.

3.3.1. Case Study

The researcher chose a case study design in order to tackle the research problem. According to Yin (2003) in Karlsson (2016:1), a case study is an analysis of a person, event, decision or other systems that are studied holistically by one or more methods in real life situations. Creswell (2009) cited by Creswell (2018) views that in a case study, a researcher explores in-depth a program, an event, an activity, a process, or one or more individuals. Thus the researcher investigates a particular contemporary issue within its real life context using multiple sources of data. The hallmark of the case study method lies in its strength as a tool for investigating the present status of phenomena. It manages to give a real life situation of the research. It is also easier for the researcher as it purports to be carried out in a single organization or single group,

making it accessible and cheaper for the researcher. The case study design will be used because it will allow the researcher to investigate every aspect of the phenomena and to see patterns and causes of behaviour in studying challenges faced by grade 6 learners in tackling problems involving decimal numbers at the sampled Primary school in Mutare District and suggest possible solutions which schools can adopt to assist learners in tackling problems involving decimal numbers. Case studies have advantages in that they are exploratory in nature, hence can help to create new knowledge. In this study, new knowledge will be created as some strategies will be brought up to mitigate challenges faced by grade 6 learners in solving problems involving decimal numbers.

However, although a case study is handy to this study, it has its weaknesses. A critic of the case study method by other scholars such as Hankock (1998) in Creswell (2018) is that, the case under study is not necessarily representative of similar cases and therefore the results of research lack generalizability which becomes an issue to the reader who wants to know whether the findings are applicable anywhere. Using a case study is therefore a limitation to this study because views of twenty (35) participants cannot be used to generalize the views and experiences of educators in the whole District of Mutare for instance. This can affect generalization of the findings to other schools in other districts in Manicaland Province as well.

3.4. The Study Population

According to Willie (2024:2), “A population is a cornerstone in research methodology, encapsulating a collective of individuals who exhibit shared characteristics within a geographic or institutional domain.” It is a summation of all the organisms of the same group or species who live in the same geographical area and have the same capabilities of interbreeding. In this research study, the population refers to primary school teachers (six grade 6 and grade 7 teachers) and 112 grade 6 learners at the Primary School under study in Mutare District.

3.5.1. The Sample

Bordens and Abott (2018) explained that a sample is a small sub-group chosen from a large population, which is a set of elements drawn from and analyzed to estimate the characteristics of population. Kassu (2019) acknowledges a sample as a fraction of the targeted population. Hence, this section dealt with the criterion that will be used to choose participants. For the purpose of this study, the sample will comprise of thirty-five (35) participants, that is, five (5) grade 6 and grade 7 primary school teachers who have taught grade 6 the previous year, and thirty (30) grade 6 learners at the selected primary school in Mutare District.

3.5.2. Sampling procedure

Karlsson (2019) defines sampling procedure as the process of selecting units of people from population of interest, so that by studying the sample we may fairly generalize our results back to the population from which they were chosen. Purposive sampling and Simple Random Sampling will be utilized by the researcher.

3.5.3. Purposive Sampling

According to the British Journal of Multidisciplinary Advanced Studies (2024:90), purposive sampling involves targeting only those participants who have a lot of information and experience with the phenomenon that the researcher is studying. Purposive sampling is a type of sampling where a researcher purposively selects cases from the target population. Following advice of various research methods experts, the researcher will use a purposeful selection of participant approach because the researcher feels that there is need to involve teachers who have taught grade 6 learners (grade 7 teachers) and those currently teaching grade 6 learners who work directly with grade 6 learners. Thus, purposive sampling will be more appropriate because a sample that is representative and carefully selected will allow the researcher to make inferences, generalizations and to draw conclusions about the targeted population as a whole by evaluating the sample only (Muchengetwa, Chakuchichi and Badza, 2010).

Therefore, purposive sampling emerged an appropriate sampling technique for this study because it will enable the researcher to identify participants based on selected criteria of being

knowledgeable and the richness of lived experiences with the phenomena. Hence, in this study, adhering to Borg and Galls (1996) cited by Bordens and Abbot (2018) who advised that it is more feasible to select particular groups or individuals who are familiar with the area of specialty, the researcher will purposively select five (5) primary school teachers who have taught and those currently teaching grade 6 learners and purposively selected thirty (30) grade 6 learners at the purposively selected primary school in Mutare District, for they are a source of rich information.

3.5.4. Simple Random Sampling (SRS)

MacDonald and Headlam (2018:13) cited by McCombes (2019) documented that Simple Random Sampling (SRS) is also known as chance sampling or probability sampling were each and every item in the population has an equal chance of being drawn. On the same note Creswell and Creswell (2018) pointed out that Simple Random Sampling (SRS) is a method of selecting units from a population of size N such that every possible sample of size 'n' has an equal chance of being drawn. According to Creswell (2012), one advantage of Simple Random Sampling (SRS) is that it is easy with populations of known members and every element of the population has the same chance of being selected. Suffice to say every participant is selected by chance. Another advantage of SRS is that results are generalizable since the probability of each member from different groups to be represented has an equal chance of being selected. SRS is not complicated in comparison with other sampling techniques such as systematic sampling and cluster sampling. Hence Simple Random Sampling (SRS) will be used to select purposively selected grade 6 learners in order to have thirty (30) grade 6 learners from 112 grade 6 learners at the selected primary school which will be under study.

As asserted by MedCrave (2017) in Creswell (2018), one disadvantage of Simple Random Sampling (SRS) is that Simple Random Sampling (SRS) cannot be used when dealing with populations of unknown members such as when carrying a research on gays, lesbians and drug peddlers. Also, where gender balance in research is an issue of concern, it is possible to have an unbalanced population with respect to gender. For instance, as observed by the researcher, there are more male teachers in the Junior Department in Primary Schools as compared to males. As a result, more males are likely to have more chances of being selected to take part in the research.

3.6. Research instruments

Creswell (2015) defines research instruments as tools, devices or techniques used to obtain standardized information from all participants in the sample in order to measure and analyze data related to your research interests. The process of any research hinges on accuracy and relevance of data collected. To achieve this, one needs to use appropriate instruments to elicit the required information from given source. Pandey and Pandey (2015) cited by Karlsson (2019), defines a research instrument as a tool that enables the researcher to gather data so as to get solutions to the problem under investigations. Various instruments are used to collect primary data. However, the researcher will use the questionnaire and guided interview. In addition, the literature will also provide secondary data to use during the research.

3.6.1. Questionnaire

The questionnaire will be used to collect data from grade 6 learners. According to Abawi (2013:3), "A questionnaire is a data collection instrument consistent of a series of questions and other prompts for the purpose of gathering information from respondents." Pandey and Pandey (2015) in Karlsson (2019) said a questionnaire is a research instrument consisting of a list of questions that a number of people are asked so that information can be collected about something. Although they are often designed for statistical analysis of the responses, this is not always the case. Hence, the questionnaire will be used to gather information from grade 6 learners on challenges they face in problems involving decimal numbers. Thus, in order to gather useful and relevant information, it is essential that careful consideration is given to the design of questionnaire (Creswell, 2018).

Questionnaires are ideal for evaluation when resources are limited and when you need information from many people, to gather about knowledge, beliefs, attitudes and behaviours and when it is important to protect the privacy of participants. The researcher will use both open-ended questions and closed questions in questionnaires. Bordens and Abbot (2018) stated that open-ended questions allow respondents to compose their answers than choosing between given alternatives. Closed ended questions or fixed choice questions require a tick against the response supplied. However, it does not allow respondents to quantify their answers.

To enable participants to express their views fully, the questionnaires will have both closed and open ended questions for the purposes of validity and reliability. The International Journal of Academic Research (2016) asserts that data can be considered more reliable since each individual response answers precisely the same questions in the same order, all responding to the same stimuli. Questionnaires will reduce work load on this research study because respondents will concentrate only on questions which will be supplied. Furthermore, there will be less mobility and work on data collection from participants since the researcher will distribute questionnaires and collect them for analysis.

Although questionnaires are a useful data collection tool, researchers encounter some challenges when using them. For example, The Journal of Nursing Research (JNR) (2024) mentions that questionnaires do not give room for probing and clarification. Additionally, return rate may be low and no room for change, limiting the information to be drawn from the participants. Participants are also limited in giving their views in the study in the case of guided questions. The researcher will solve such challenges by being flexible and giving recipients another chance to answer their questionnaires and simplify the language. The researcher will collect the questionnaires in person and check whether every question was answered or not. Baillie (2015) cited by the Journal of Academic Research (2016) says a well-designed questionnaire requires thought and effort, and needs to be planned and developed in a number of stages, that is, Initial considerations, question content, phrasing and response format, pre-test (pilot) and revision of question sequence and layout final questionnaire initial considerations.

It is important to be clear about the type and nature of information the researcher needs to collect and exactly the target population. In this study, as mentioned earlier on, the target group will be grade 6 learners and grade 6 teachers. The researcher will also consider the most appropriate method for administering the questionnaire. In addition, the researcher will consider how the findings will be analyzed as this will have an impact on the design of the questionnaire.

3.6.2. Semi-structured interviews

Semi-structured interviews will be used to gather information from current grade 6 teachers and former grade 6 teachers (grade 7 teachers). Just like any other research instruments, semi-

structured interviews have advantages and disadvantages. Canals (2015:9), cited by Monday (2020) outlines that in semi-structured interviews the interviewer has more flexibility when it comes to adding questions or asking for clarification. She went on to say that an interview provides immediate feedback and permits the researcher to follow up leads. Hence, it will enable the researcher to collect more data. Bordens and Abbott (2018) pointed out that the interview has disadvantages such as being misused to collect quantitative data that can be measured more accurately by other methods. They also added that the interview process is subjective. Hence, the researcher should guard against her opinions and feelings when collecting and analyzing data gathered through interviews.

3.7. Data collection procedure

The researcher will obtain an Introductory letter from the University which he will attach on his application letter to Manicaland Provincial Education Director, seeking permission to carry out the study. Upon receiving the approval letter, the researcher will take the letter to Mutare District Education Office seeking permission to carry out the research in Mutare District. The researcher will then visit the selected school and seek permission from the school head to carry out the study. The researcher will also seek participant consent and explain to them about anonymity, confidentiality and the right to participate or not to participate. Finally, the participants will be purposively and randomly sampled. The researcher will distribute the questionnaires to the sampled grade 6 learners and interview the selected grade 6 and grade7 teachers.

3.8. Data analysis

According to Hamed (2020:2), "Data analysis is simply the process of converting the gathered data to meaningful information." It is the process of bringing order to the data, organizing what is there into patterns, categories and descriptive units and looking for relationships between them. Interpretation involves attaching meaning and significance to the data, explaining patterns, categories and relationships. The responses from each participant will be coded to enable processing, checking and cross referencing. All data from questionnaires and interviews will be analyzed and processed into information. The researcher will use explanatory or descriptive approaches. Thus descriptive statistics, that is, percentages and frequencies will be used for data

analysis. Tables and figures showing information gathered through questionnaires and interviews will be used as the main medium of data presentation (Bordens and Abbott, 2018).

3.9. Ethical considerations

As viewed by Awal (2023), ethics refers to the appropriateness of the researcher's behaviour in relation to the rights of those who become the subjects of their work or affected by it. Ethics are guiding principles or code of professional conduct when carrying research. Rensik (2020) notes that ethical issues emerge throughout the research process, in planning, gaining access to institutions and individuals, data collection, report writing and dissemination of findings. The general issues of ethical concerns will be addressed through notification of the intention to conduct the study to the participants and seeking consent from all the participants.

Participants' consent will be asked for before giving participants questionnaires and carrying out interviews. Each participant will be kindly asked to sign the consent form. All participants will be informed of the purpose of the study. The researcher will assure participants that collected data will be treated as data from anonymous source. The researcher will explain to all participants why the information they will volunteer is important for the study and why they are the most appropriate people to supply that information to ensure that all participants understand what they are going to involve themselves in. The researcher will inform the participants that they have the privilege of not to respond to any question they feel uncomfortable to answer.

3.10. Trustworthiness

For any study to be scientific it must be credible, reliable, believable and trustworthy by readers. In this regard, data must be carefully measured by means of reliability and validity. Kamia (2024:2) documents that according to Bordens and Abbott (2017), reliability and validity deal with the confidence and belief about outcome of the study. Bordens and Abbott (2018) shared the same sentiments when they said that validity and reliability are key issues (concepts) in trustworthiness of data findings. Trustworthiness is when the study demonstrates that the evidence for the results reported is sound if and when the argument made based on the results is

strong. Trustworthiness is noted when findings are as closely related as possible and reflect the meanings as described by the participants (Ahmed and Istiaq, 2021).

It is believed that trustworthiness encompasses triangulation. Thus, triangulation involves identification of various sources of data and means of gathering and analyzing them by the researcher. Cohen, Schneider and Tobin (2022) explained that triangulation is the validity procedure where researchers search for convergence among multiple and different sources of information to form these or categories in the study. In order to address the issues of trustworthiness, the researcher will apply different approaches to gather data. In order to ascertain the degree of trustworthiness of the research findings, the researcher will questionnaires and interviews for data collection in order to establish a convergence of facts. Suffice to say, in this study, the researcher will triangulate methods, sources of data and data analysis. Bordens and Abbott (2014) suggested that each kind of triangulation helps qualitative studies to verify and validate qualitative analysis in different ways. Hence, triangulation of data collection methods will enable the verification and consistency of findings generated from the various methods in this research study. When data is collected over a period of time, there is need to ensure some degree of consistency through collection of data within different periods of time.

3.12. Summary

Chapter three looked at research methodology. It outlined the research design, research approach and sampling techniques that will be used to ensure the worthiness of the findings. The researcher also highlighted data collection procedures, that is, the use of structured-interviews and questionnaires, data presentation and analysis using explanatory or descriptive approaches. Ethical considerations were looked at in the chapter as they are crucial to the upholding of participants' rights during and after research. In the following chapter, the author will tackle data presentation, data analysis and interpretation of results obtained from the field.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.1. Introduction

The previous chapter looked into how the research was conducted. It revealed the sample and sampling procedure. The research instruments were spelled out as well. The main focus of this chapter is data presentation, analysis and interpretation of the findings on the problems faced by grade 6 learners when solving problems in decimal addition.

4.2. Composition of participants

Table 1: Composition of participants N=35

Participants	Males	Females	Total
Primary school teachers	5(100%)	0(0%)	5(100%)
Grade 6 learners	15(50%)	15(50%)	30(100%)
Total	20(57.14%)	15 (42.86%)	35(100%)

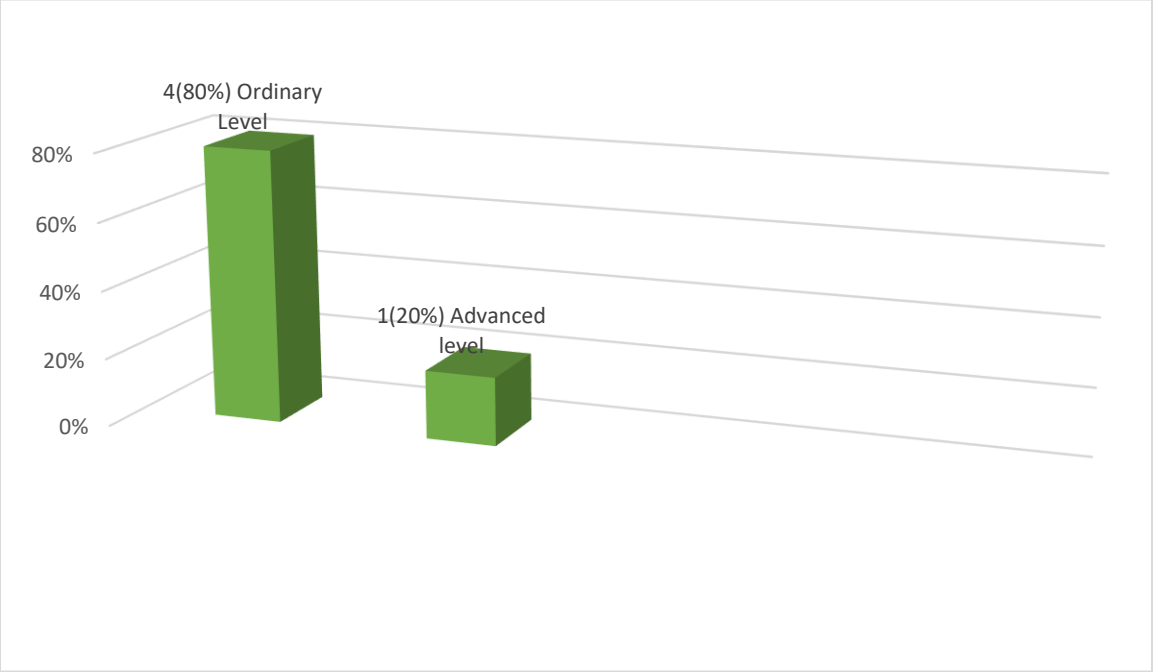
The sample for this study comprised of five (5) primary school teachers, that is grade 6 and grade 7 teachers and thirty (30) grade 6 learners. In total, thirty-five respondents participated in the study. Table 1 above also shows respondents by sex. 5(100%) grade 6 and grade 7 teachers who took part in the study were males, while no female teacher took part in the research study. This was the case because in the education system there are more male teachers in the Junior School as compared to females. Gutuza (2015) concurs when he pointed out that the number of women teachers in junior grades, especially grade 6 and 7 in Zimbabwean schools is very low considering that women constitute more than half the teacher population in the country. On the part of grade 6 learners, 15 (50%) boys and 15(50%) girls took part in the study. The researcher used the quota system to have a balance on gender. Thus, in total, 20(57.14%) respondents were males while 15(42.86%) participants were females. This shows that more male participants took part in the study. This was due to the fact that in most schools, mostly male teachers teach grade

6 and 7. Although the researcher tried to balance gender in his research by using the quota system, he could not help the situation on the ground on the part of teachers. Hence the variance on gender for the participants was 14.28%. The researcher used letters of the alphabet and numbers to represent the names of the respondents that participated in the study for ethical considerations.

4.3. Academic Qualifications of Teachers

Figure 4.1 below shows the academic qualifications of the participants who took part in the study. 4(80%) of the participants who took part in the study were Ordinary Level certificate holders while 1(20%) had accomplished Advanced Level ('A' Level).

Figure 4.1: Teachers'Academic Qualifications (N=5)

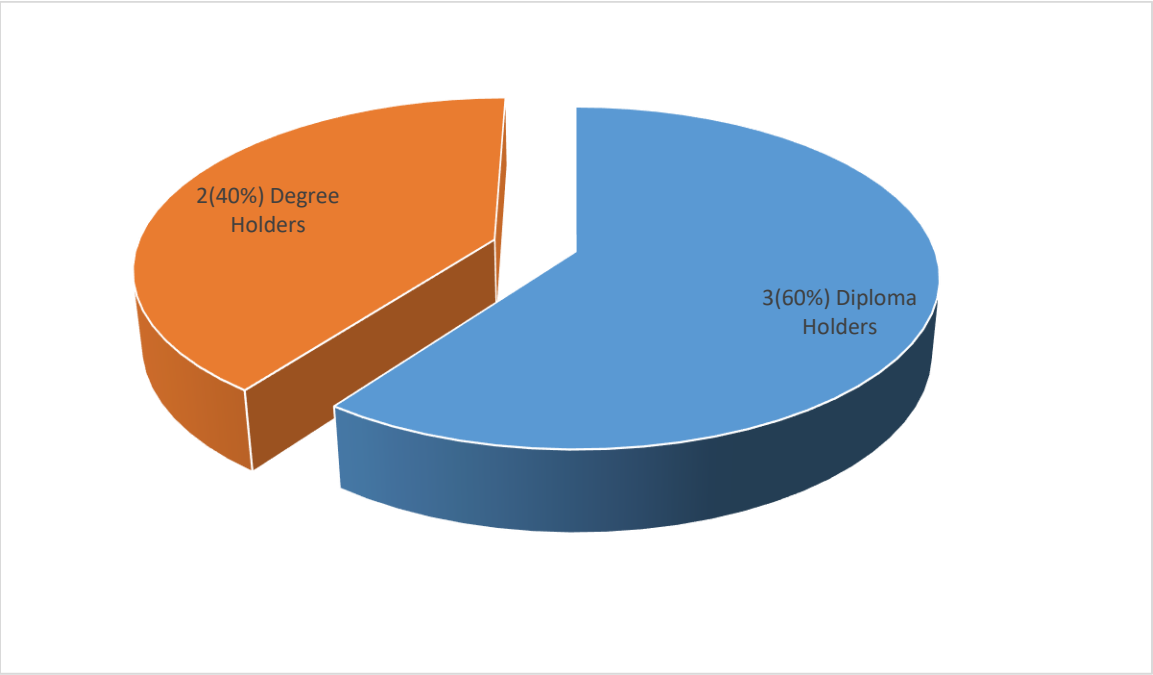


4.4. Teachers' Professional Qualifications

Figure 4.2 below shows the professional qualifications of the respondents. 3(60%) teachers had Diplomas in Education, while 2(40%) teachers were Degree holders. More respondents with Diplomas in Education took part in the study as compared to degreed ones. The Ministry of Primary and Secondary Education (2020:129) also documents that in 2019, there were more

teachers with diplomas than with degrees. Nevertheless, the data reveals that all the respondents were qualified primary school teachers.

Figure 4.2: Professional Qualifications of teachers N=5



4.5. Teachers' Responses

In this section of the study teachers' responses were presented and analyzed, question by question for better comprehension of what transpired in the field.

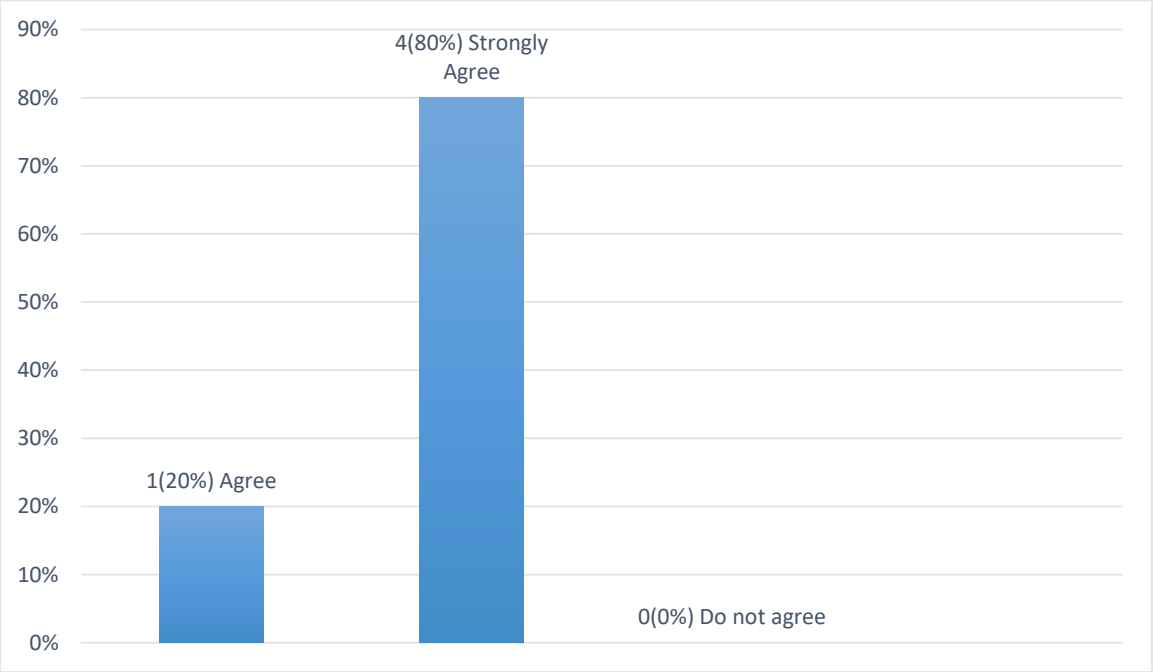
4.5.1. PROBLEMS ENCOUNTERED BY GRADE 6 LEARNERS WHEN SOLVING PROBLEMS INVOLVING ADDITION OF DECIMAL NUMBERS.

4.5.1.1. Do you agree that understanding the place value is one of the fundamental challenges that grade 6 learners encounter in decimal addition?

With regard to the above question, Figure 4.3 below reveals that, 4(80%) teachers who participated in the study strongly agreed that grade 6 learners have challenges in understanding the place value in decimal addition, 1(20%) agreed, while no participant disagreed. Suffice to say, all the teachers were of the view that understanding the place value in decimal addition was

a challenge to grade 6 learners, leading to errors in calculations. This was in tandem with Hattie (2012)'s earlier assertion that learners often struggle to grasp the fact that the position of a digit affects its value, especially when decimals introduce new place values such as tenths, hundredths and thousandths.

Figure 4.3: Challenges in understanding the place value N=5



4.5.1.2. Do teaching methods pose a challenge in grasping addition of decimal numbers?

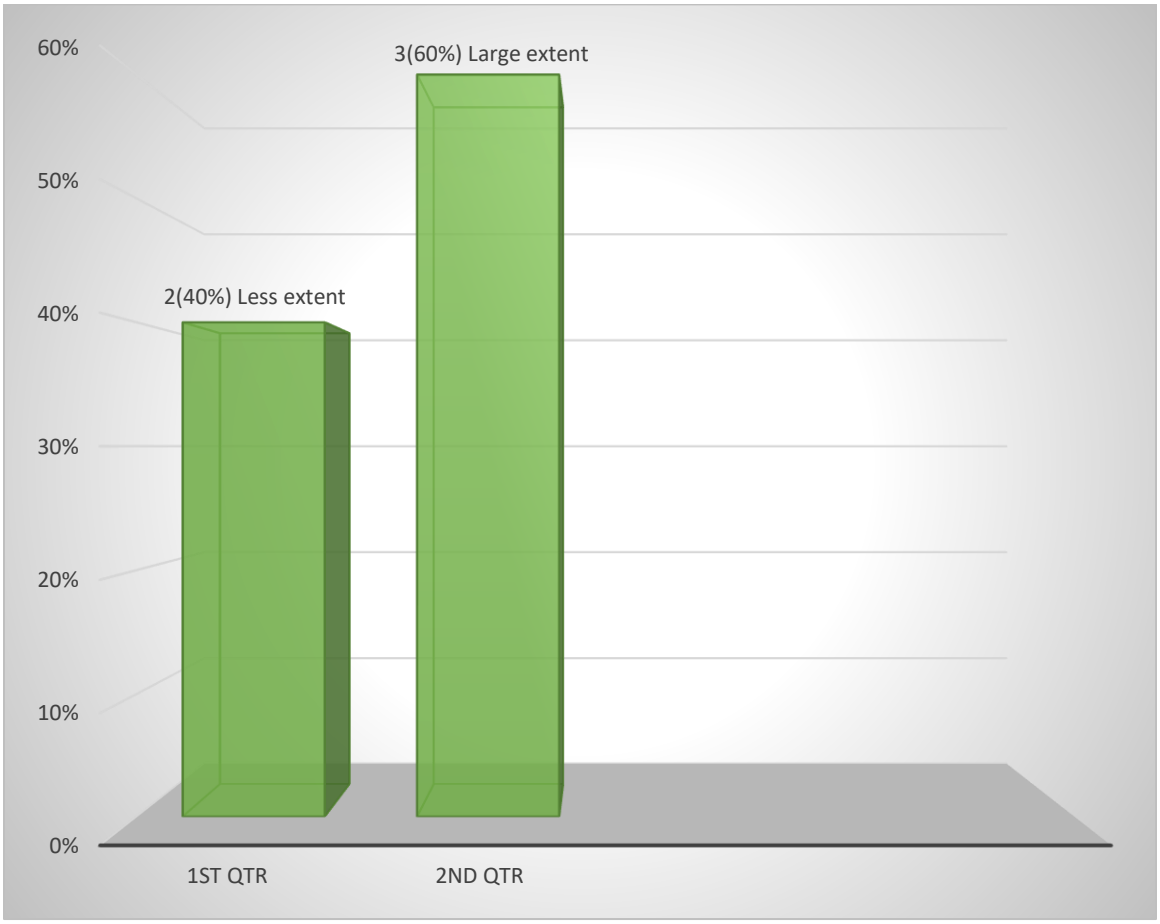
All teachers who participated in the research study pointed out that teaching methods used by classroom practitioners have a bearing on the grasping of decimal addition. This was also highlighted in the literature review by Magwa et.al (2015), who viewed that the effectiveness of teaching methods plays a crucial role in learners' understanding of decimal addition. Hence the need to prefer learner-centered teaching methods which are advocated for by constructivism.

4.5.1.3. To what extent can assessment practices be regarded as a challenges to Grade 6 learners when solving addition problems of decimal numbers?

Figure 4.4. below shows that 3(60%) primary school teachers who responded to the questionnaire indicated that assessment practices pose a challenge in decimal addition to a large

extent, while 2(40%) highlighted that assessment practices were a challenge to a less extent. As viewed earlier on by Stacey (2012), standardized assessments often focus on rote memorization and procedural fluency rather than conceptual understanding. Hence, this can create a narrow view of learners' abilities and may not accurately reflect their understanding of decimal addition.

Figure 4.4: The extent to which assessment practices can pose a challenge in decimal addition N=5



4.5.1.4. May you state other problems faced by grade 6 learners when solving addition problems of decimal numbers?

In this section of the study, primary school teachers who participated in the study outlined other challenges faced by grade 6 learners in solving decimal addition. All the participants agreed that

other challenges include resource availability, language barriers, socio-economic factors and lack of parental involvement. The above sentiments were also echoed in literature review by Majoko (2019) who hinted that in many primary schools, especially in under-resourced areas, such as Manzinde in Mutare District, there are a lack of materials and resources that support the teaching and learning of decimals. In support of socio-economic factors, Duncan and Murnane (2011) documents that research has highlighted the impact of socioeconomic factors on academic achievement, particularly in mathematics. The challenge on parental support was also echoed by Epistein (2018) who posit that a lack of parental support can lead to disengagement and lower achievement in subjects like mathematics.

To add on, on the issue of the use of English in the teaching of mathematics, which is a second language to many learners Miller and Ginsburg (2016) who asserted that, If the language of instruction is not the learners' first language, they may struggle to understand mathematical terminology and concepts, including those related to decimals. Furthermore, studies indicate that language proficiency is closely linked to mathematical understanding, and learners who face language barriers may perform poorly in mathematics.

Table 4.2: Other problems faced by grade 6 learners in decimal addition N=5

Question	**Response**	
	YES	**NO**
Tick YES or NO to indicate whether the following are other challenges faced by grade 6 learners in solving problems involving decimal addition?		
(i) Resource availability		
(ii) Language barriers		
(iii) Socio-economic factors		
(iv) Lack of parental support		

4.5.2. THE EFFECTS OF LEARNER ATTITUDES TOWARDS MATHEMATICS AND DECIMAL NUMBERS.

4.5.2.1. Do you agree that most learners have a negative attitude towards Mathematics in general and decimals in particular?

With regard to the above question, all the 5(100%) teachers who participated in the research study agreed that most learners have a negative attitude towards Mathematics in general and decimal numbers in particular. Stacey and McGregor (2016) earlier on outlined that, most primary school learners have a negative attitude towards Mathematics as a subject.

4.5.2.2. What are the effects of negative attitudes towards mathematics on the learner?

Table 4.3. The effects of negative attitudes towards Mathematics

Question	**Responses**	
	YES	**NO**
Do you agree with the following statements about the effects of negative attitudes towards mathematics on the learner?		
(i) *Negative attitudes lead individuals to dislike an activity or subject. This results in putting less effort and being disengaged leading to poor performance.*		
(ii) *Negative attitudes towards mathematics result in learners not completing tasks such as homework, which is meant to strengthen mastery of concepts perceived as difficult, leading to failure.*		

All teachers agreed to the tabulated statements above. The above sentiments show that negative attitudes towards mathematics in general and addition of decimal numbers in particular are a challenge which lead to errors in calculations, especially when decimals are involved. As pointed by Trentacosta et.al. (2017), negative attitudes towards mathematics can lead to feelings of anxiety, frustration and avoidance, making it more difficult for students to effectively solve decimal addition problems.

4.5.3.1. INTERVENTION STRATEGIES THAT CAN BE UTILIZED BY TEACHERS TO MITIGATE CHALLENGES FACED BY GRADE 6 LEARNERS IN ADDING DECIMAL NUMBERS.

Table 4.4: Intervention strategies to mitigate decimal addition challenges N=5

Questions Do you agree, strongly agree or disagree that:	**Responses**			**Total**
	Disagree	Agree	Strongly Agree	
(i)The use of Manipulatives and Visual Aids will mitigate challenges faced by grade 6 learners in decimal addition?			5(100%)	5(100%)
(ii) Real-World Problem Solving will minimize challenges faced in addition of decimal numbers?		2(40%)	3(60%)	5(100%)
(iii)the use of modern teaching methods such as Inquiry-Based Learning (IBL) and Collaborative Learning Environments (learner centered teaching approaches) will help in mitigating decimal addition challenges?	1(20%)	2(40%)	2(40%)	5(100%)

This section interrogated primary school teachers on intervention strategies that can be utilized to mitigate challenges faced by grade 6 learners in adding decimal numbers. Teachers were asked whether they agree, strongly agree or disagree with the suggested intervention strategies for mitigating problems faced by grade 6 learners in adding decimal numbers. Table 4.4 above reveals that all the 5(100%) teachers strongly agreed that the use of manipulatives and visual aids will mitigate challenges faced by learners in solving problems involving addition of decimal numbers. As documented by Magwa et.al. (2015) in Literature Review, utilizing concrete materials such as base-ten blocks, coins, or decimal grids, incorporating number lines and hundredths grids can aid learners in visualizing the addition of decimal numbers.

With regard to the question on the use of real world problem solving in decimal addition, 2(40%) participant agreed to its application, while 3(60%) participants strongly agreed. Also,

participants' interrogation on whether the use of modern teaching methods such as inquiry-based learning can mitigate addition of decimals challenges revealed that, 1(20%) teacher did not agree to the fact, 2(40%) participants agreed, while 2(40%) teachers strongly agreed. This shows that most teachers were for the idea of utilizing modern teaching methods or learner centered approaches to mitigate decimal addition challenges experienced by grade 6 learners. This was supported by Golam (2019) who says Inquiry-Based Learning (IBL) is a child-centered modern teaching approach advocated for by the constructivist approach which utilizes teaching methods such as discovery method, project-based learning, problem-based learning and design-based learning in helping learners understand concepts such as addition of decimal numbers.

4.5.3.2. Other intervention strategies

Teachers were asked to outline other intervention strategies that can be utilized to mitigate challenges faced by grade 6 learners in solving problems involving addition of decimal numbers.

Table 4.5. Other intervention strategies

Question	**Responses**	
Are you in agreement with the following views in mitigating decimal addition challenges?	**YES**	**NO**
(i)There is need to provide adequate teaching/learning materials, remediation of strugglers and addressing decimal addition misconceptions head on.		
(ii)Teachers need in-service training on teaching strategies in order to cater for the diverse needs of learners to promote inclusivity and mastery of decimal addition.		

In response to the above question, all the teachers who took part in the study were in agreement with the given views in mitigating decimal addition challenges. In support of the given views Hattie (2012) asserted that teachers should be proactive in identifying and addressing common misconceptions about decimals. Also, Magwa, Gudyanga and Nyanhongo (2015) asserted that educators can provide scaffolding by breaking down complex problems into smaller, manageable steps such as, step-by-step instructions or additional practice opportunities as needed by individuals. Additionally, as documented by Ministry of Primary and Secondary Education (MoPSE) (2020), investing in professional development for teachers on innovative teaching strategies, understanding of decimal operations and the use of concrete media can empower educators to better support their students.

4.6. LEARNERS' INTERVIEW RESPONSES

4.6.1.THEME1: LEARNERS' CHALLENGES WHEN SOLVING DECIMAL ADDITION PROBLEMS.

4.6.1.1. Place value challenges: What is the value of 4 in 2,74?

In response to the question on place value, only participant A5, A9, A11, A14, A16 and A20 managed to state that the 4 in 2,74 stands for hundredths. Participant A3, A6, A8 and A17 said the 4 stands for units, while participant A1, A2, A7, A9, A10 and A18 said the 4 in 2,74 stands for hundreds. The results reveals that most learners have challenges with place values leading to errors in calculation. This was also echoed in literature review by Hattie (2012) who points out that misunderstanding place value can lead to errors in addition such as incorrectly aligning numbers during calculations.

4.6.1.2. When solving addition of decimal problems, which language do you prefer to be taught in?

Figure 4.7. Learner language preference N=30

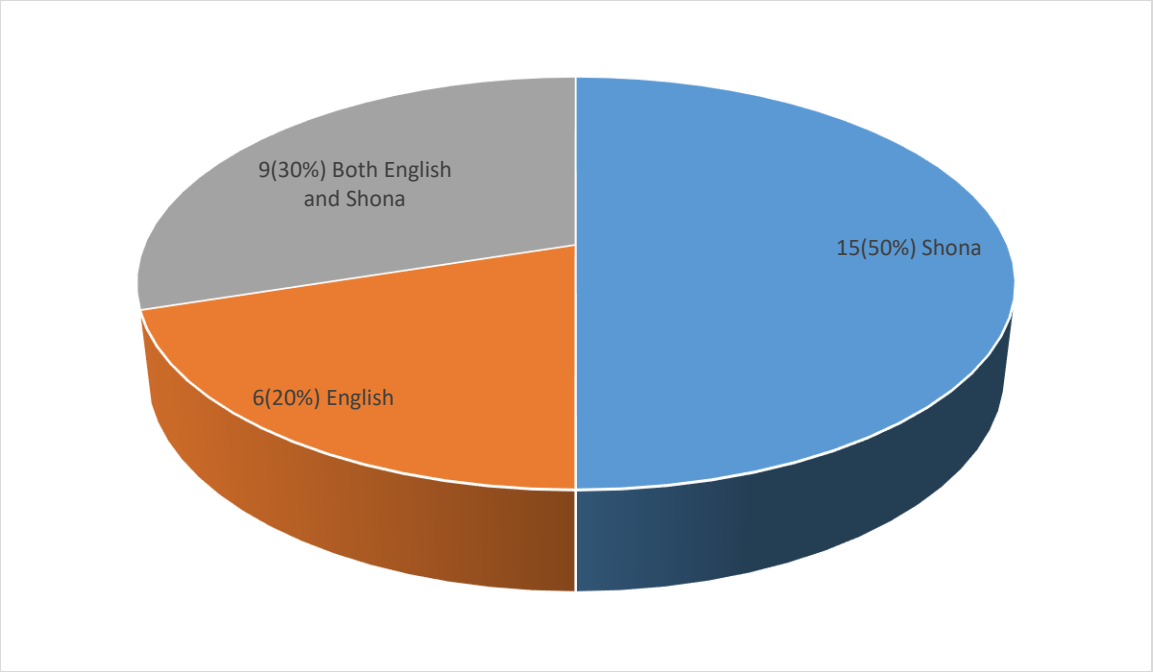


Figure 4.7 above shows that 9(30%) learners preferred to be taught Mathematics concepts including addition of decimals in both English and Shona, 15(50%) learners preferred to be taught in Shona, while only 6(20%) learners preferred English to Shona.

4.6.1.3. Give a reason to the answer you gave above question?

In response to the above interview question above, participants A2, A4, A5, A6, A9, A10, A13, A17, A18 and A20 said when learning Mathematics, they prefer to be taught in Shona rather than English language because they understand better when taught in vernacular. On the same note, according to participants A8, A11, A16 and A19's, they preferred English language to Shona language because to them, it is easy to understand Mathematics concepts in English. Participant A1, A12, A14 and A15 said:

> *When decimal addition problems are explained in both English and Shona, they understand the concept better because some English terms are difficult to understand, hence explanation in Shona simplifies them.*

This dove tails with Miller and Ginsburg (2016)'s assertion that if the language of instruction is not the learners' first language, they may struggle to understand mathematical terminology and concepts, including those related to decimals.

4.6.1.4. Which one do you prefer, calculating digits/figures only or solving number stories on addition decimal?

Figure 4.8: Learners' preference on calculating figures only or solving decimal addition number stories. N =30

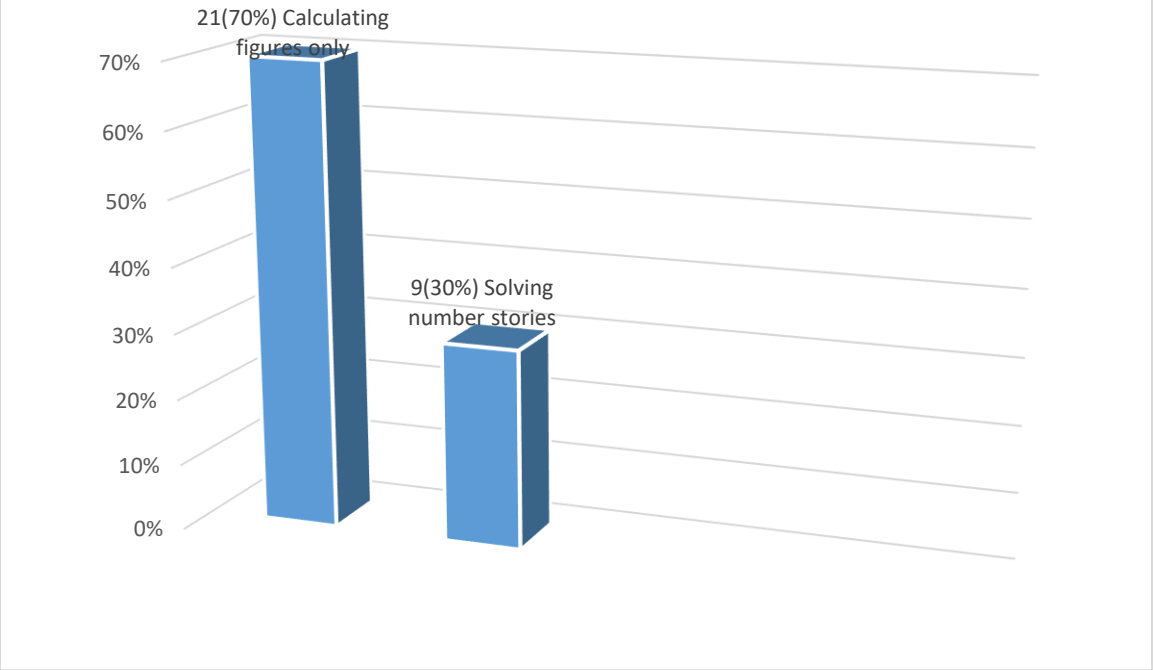


Figure 4.8 above shows that 21(70%) preferred decimal addition of figures only when dealing with decimals, while 9(30%) indicated that they enjoy solving number stories on decimal addition. This shows that, most learners were not comfortable with number stories on decimal addition which are asked in English. This resonates with Miller and Ginsburg (2016)'s earlier on assertion that linguistic factors lead students to struggle with understanding the language used in these problems, which can affect their ability to translate the text into mathematical operations.

4.6.1.5. Who assist you with Mathematics homework?

Participants A1-A7, A11, A15 and A17-A20's common response was:

> *I do homework on my own. No-one assists me at home.*

Also, with regard to the question above, participants A8-A10 and A16 indicated that:

Parents, guardians, brothers and sisters assist them with homework.

The results show that most learners were not assisted in tackling mathematics homework. Hence it becomes a challenge to tackle decimal addition problems which need constant revision in order for learners to grasp the concept. As documented earlier on by Epstein (2018), lack of parental support can lead to disengagement and lower achievement in subjects like mathematics.

4.6.1.6. Which is greater than the other; 0,01or 0,1?

Learners were interrogated on conceptual misunderstandings on this question. Participant A3, A5, A9, A11, A14 and A16 were the only learners who correctly indicated that 0,1 is greater than 0,01. This shows that most learners are victims of conceptual misunderstanding when dealing with decimal numbers. This was revealed previously by McIntosh et al. (2016), who said confusion about the relative size of decimal numbers can lead to mistakes in addition since learners often find it difficult to conceptualize decimals as parts of a whole.

4.6.1.7 May you add: (i) 0,1 and 0,4 and (ii) 0,1 and 0,01?

(i) Add 0,1 and 0,4.

Most leaners got the above sum correctly by indicating that the answer is 0.5. However, some learners such as participant A6, A11 and A18 gave the answer as 5, disregarding the decimal place.

(ii) What is 0,1 + 0,01?

In response to the question above, participant A2, A3, A7, A12 and A17 correctly gave the answer as 0,11. However, most learners got it wrong and gave answers such as 0,2 and 0,02. The results show that, question (i) was easily calculated as compared to question (ii) as learners failed to align decimal digits due to cognitive load factor. This was also outlined by Boaler (2016), who documents that Cognitive Load Theory (CLT) suggests that learners have limited capacity for processing information in their working memory. For instance, when faced with decimal addition problems, students must simultaneously manage multiple concepts, such as aligning decimal points, carrying over digits and understanding the significance of each digit in the context of the problem. Hence, failure to do so, leads to calculation errors.

4.6.2. TMEME 2: THE EFFECTS OF ATTITUDES ON SOLVING DECIMAL ADDITION PROBLEMS

4.6.2.1. Do you like mathematics most?

In response to the above interview question, Participant A2, A3, A12 and A17 indicated that they like mathematics most, while participants, A1, A4, A5, A6, A7, A8, A9, A10, A11, A13, A14, A15, A16, A18, A19 and A20 highlighted that they do not like mathematics most. The results show that most learners dislike mathematics.

4.6.2.2. May you support your answer above?

Participant A17 said:

I like Mathematics because it makes me think and be able to solve problems

On the other hand, participant A11 said:

I do not like mathematics most because it is difficult. It causes headaches.

Minke (2017) hinted that learners with a positive attitude towards mathematics will perform better as opposed to those with negative attitudes.

4.6.3. THEME 3: STRATEGIES WHICH CAN BE ADOPTED TO ADDRESS PROBLEMS ENCOUNTERED BY LEARNERS IN DECIMAL ADDITION.

4.5.3.1 Do you enjoy solving decimal addition sums in groups, in pairs or individually?

Table 4.6: Learners' preference of pedagogical approach. N=30

Question	**Responses**	**Frequencies**
Do you enjoy solving decimal addition sums in groups, in pairs or individually? Why do you say so?	In groups	18(60%)
	In pairs	6(20%)
	individually	6(20%)
Total		**30(100%)**

Table 4.6 above shows that 18(60%) learners preferred to be taught decimal addition in groups, 6(20%) indicated that they love to solve decimal addition problems in pairs, while 6(20%) preferred learning individually. This shows that 24(80%) learners enjoyed learning with others. With regard to the second question, learners indicted that they understand better with their preferred pedagogical approach. Notably, one respondent, participant A19 said:

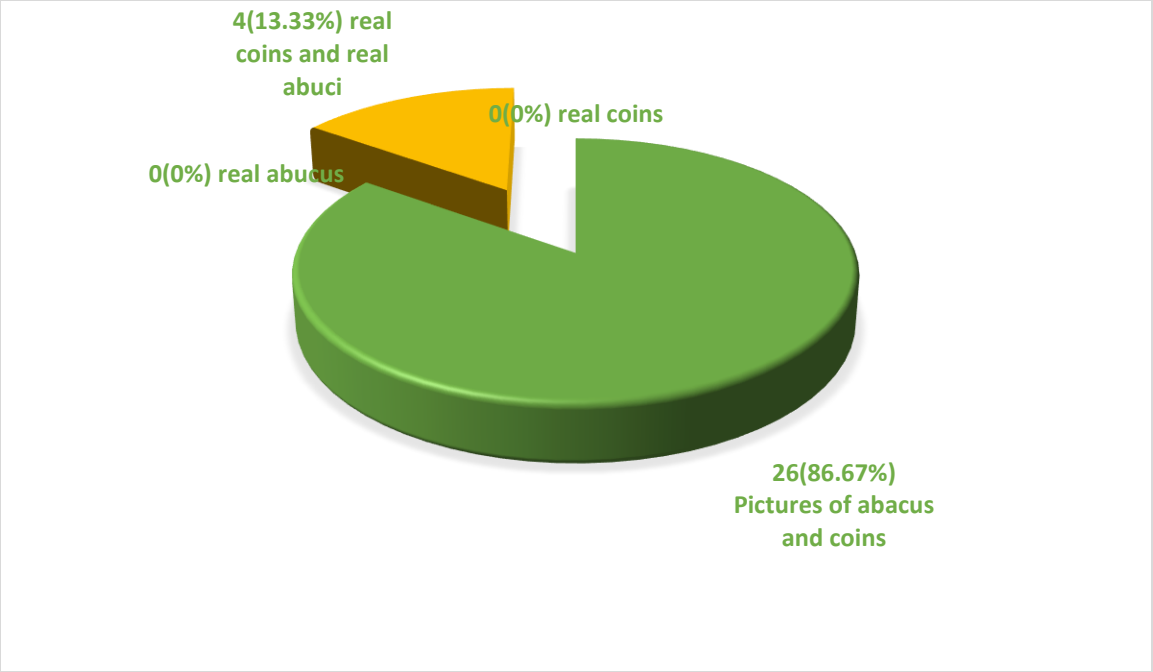
Learning in groups enables us to share ideas, assist each other and understand better.

As outlined in literature review by Magwa et.al (2015), traditional teaching approaches such as the lecture method that emphasize rote memorization and procedural knowledge may not adequately engage students or address their individual learning needs. Hattie, (2012) notes that research suggests that more interactive and conceptual teaching methods such as inquiry based learning which encompass group activities and the discovery method can significantly improve learners' understanding of decimals.

4.6.3.2. Have you ever used the abacus, coins (money) or pictures when learning addition of decimals?

Figure 4.9 below reveals that 26(86.67%) of the learners who took part in the study indicated that they have used pictures of abacus and coins when learning decimal numbers, 4(13.33%) stated that they have used real coins and real abacus. No participant used real coins only and the abacus only. The results show that teachers resort to the use of pictures a lot as compared to concrete objects, which are usually in text books. As asserted by Magwa et.al. (2015), incorporating physical manipulatives, such as providing visual aids, even simple ones created from readily available materials, can reinforce students' understanding of place value and support their ability to perform decimal addition accurately.

Figure 4.9: The use of manipulatives: N=30



4.6.3.3. Have you received remediation in Mathematics in grade 6?

In response to the above question, all learners indicated that they have not received remediation in Mathematics in 2024. This shows that despite the fact that teachers have well documented remediation record books, remediation was not being done, let alone scaffolding and differentiation. As mentioned in literature review, Vygotsky (1978), one of the proponents of constructivism, in Magwa, Gudyanga and Nyanhongo (2015) asserted that constructivist teaching recognizes that students have varying levels of prior knowledge and understanding. Hence, they may require different levels of support and guidance to achieve their learning goals through remediation, scaffolding and differentiation. Suffice to say they need support through visual aids, step-by-step instructions or additional practice to cater for individual differences.

4.7. Summary

Chapter four presented and analyzed data collected by questionnaires and semi-structured interviews from teachers and grade 6 learners at Manzinde Primary School, in Mutare District, Manicaland Province. The study highlighted findings from the study which showed that the

teaching and learning of addition of decimals was marred by many challenges. However, strategies to mitigate the problems were proffered. The next chapter focused on discussion of results, conclusions and recommendations from the findings.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

Chapter five discussed the results of the study, looked at the summary of the whole study, conclusions and recommendations on the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers in Mutare District, Manicaland Province, Zimbabwe. The recommendations are in accordance to findings discussed in chapter four obtained from the recommendations given by participants and different authorities consulted in the study.

5.2. Summary of the whole Study

The research study sought to answer the critical three research questions as follows:

i. What are the common challenges faced by Grade Six (6) learners in solving addition problems involving decimal numbers?
ii. What are the effects of learners' attitudes towards decimals?
iii. Are there strategies that can be utilized by teachers and learners to mitigate challenges faced by Grade 6 learners in adding decimal numbers?

As mentioned earlier on, primary school teachers, that is Grade 6 and 7 teachers and grade 6 learners were the main participants in the study. This was due to the fact that the purpose of the study was to investigate the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers, identify factors that contribute to these challenges and suggest strategies that can be utilized by teachers to mitigate challenges faced by grade 6 learners in adding decimal numbers. The research study was hinged on the theory of constructivism. It was a case study which roped in quantitative and qualitative research methods in gathering and analyzing data. Since the study set out to investigate the problems faced by grade 6 learners in decimal addition, a sample of thirty (30) grade 6 learners and five (5) primary school teachers, to make a total of thirty-five (35) participants was used in the study.

5.3. Discussion

The researcher investigated the problems faced by grade 6 learners in solving problems involving addition of decimal numbers. It was discovered that, grade 6 learners were facing a myriad of challenges in solving problems involving decimal addition at a selected Primary School in Mutare District. Van de Walle, Karp and Bay-Williams (2020) asserted that the challenges faced by Grade 6 learners in the teaching and learning of adding decimal numbers may stem from conceptual misunderstandings, lack of decimal number concepts, lack of practice, or computational errors (difficulties in applying mathematical procedures. As noted by Miller et al. (2014), the findings of the study spelled out that Grade 6 learners' performance in decimal addition problems can provide insights into their overall mathematical proficiency and the effectiveness of current teaching methods and teaching/learning methods. Hence, it was observed that there was need to utilize available intervention strategies timeously to remedy the situation. The Ministry of Primary and Secondary Education (2020) documents that the teaching and learning of decimal addition need to be accorded the attention it deserves from educational practitioners in order to promote the mastery of mathematics concepts and improve the educational performance of grade 6 learners.

5.4. Conclusion

As alluded earlier on, it was discovered that grade 6 learners were facing challenges in solving problems involving addition of decimal numbers. It was noted that grade 6 learners have challenges in establishing place values when dealing with decimal numbers. According to Hurst and Muir (2016), challenges in place value lead to calculation errors. As observed by participants, Miller and Ginsburg (2013) also outlined that misconceptions such as the belief that decimals are always smaller than whole numbers, is another challenge leading to challenges in comparing decimal values as well. Thus, coupled by negative attitudes towards mathematics, misconceptions and learners' difficulty in comparing decimal values can significantly impact learners' ability to perform decimal addition accurately.

Additionally, cognitive challenges such as accuracy in mental calculations pose challenges in decimal addition. As outlined by Fuchs et al. (2013) the addition of decimal numbers often requires learners to perform calculations that involve carrying over values, which can be

particularly challenging without strong mental mathematics skills. Also, teaching methods and poor assessment methods have a bearing in exacerbating challenges faced in decimal addition. Boaler (2016) notes that teaching methods which do not call for social interaction and collaboration as advocated for by the constructivist theory, pose a challenge in the teaching and learning of decimal numbers.

The research study also established that, teachers can utilize various intervention strategies to promote mastery of decimal addition. According to Golder (2018) teachers can use modern teaching methods such as collaborative learning (a constructivist approach) and Inquiry-Based Learning (IBL) in the teaching and learning of decimal addition. Also, catering for the needs of all learners through remediation, scaffolding and differentiation and addressing misconceptions directly should not be overemphasized (Jan-Marie 2018:42).

5.5. Recommendations

In light of the findings that emerged in the research study, the following recommendations were drawn from the study on the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers in Mutare District, Manicaland Province, Zimbabwe.

5.5.1 Since the challenges faced by Grade 6 learners in the teaching and learning of addition of decimal numbers stem from conceptual misunderstandings, lack of decimal number concepts, lack of practice, computational errors, or attitudinal challenges, teachers should address these challenges directly.

5.5.2. In light of the above, teachers should use constructivist learner centered modern teaching methods such as Inquiry-Based Learning (IBL) and collaborative learning which call for the hands-on approach in problem solving though critical thinking.

5.5.3. Concretization should be a weapon to deal with challenges faced by grade 6 learners. Thus, visual aids such as abacus and real coins are handy in the visualization of decimal numbers for the mastery of decimal addition.

5.5.4. There is need for teacher professional development. Teachers need ongoing training for teachers to acquire modern teaching strategies in the ever changing technological environment.

Ministry of Primary and Secondary Education (MoPSE) (2020) documents that investing in professional development for teachers can enhance their ability to teach decimal concepts effectively.

5.5.5. Since financial challenges hinder the smooth running of schools and the purchasing of teaching/learning materials, schools should embark on income generating projects to boost their financial bases and not to overburden parents by continuously reviewing school levies upwards under these economic trying situations. Above all, teachers should utilize locally available teaching and learning materials or improvise (UNICEF, 2017).

5.5.6. Teachers need to utilize scaffolding and differentiation in the teaching and learning of mathematics. Thus scaffolding which calls for the breaking down of complex problems into smaller, manageable steps which is also cherished by Vygotsky (1978)'s constructivist approach, can go a long way in alleviating problems encountered by grade 6 learners in solving problems involving addition of decimal numbers.

5.5.7. Teachers should ensure that learners develop a positive attitude towards mathematics as a subject in order to enjoy tackling any topic such as decimal addition. Positive attitude in mathematics should begin with teachers and this will cascade down to learners.

5.6. Suggestions for Further Research

In the course of the research study, the research addressed a number of pertinent issues in an effort to fill gaps in the study. However, there are areas identified which would complement this study. The areas include a comparative study on the challenges faced by learners with learning disabilities and gifted learners in the teaching and learning of decimal addition. Another issue of concern was the attitudes of parents to Mathematics homework which had a bearing on the teaching and learning of decimal addition.

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APPENDIX A: PARTICIPANT QUESTIONNAIRE FOR PRIMARY SCHOOL TEACHERS

BINDURA STATE UNIVERSITY

BINDURA

PREAMBLE

I am an undergraduate Bachelor of Education Degree in Early Childhood Development student with Bindura State University. I am carrying out a research on the problems faced by Grade 6 learners in the solving of problems involving addition of decimal numbers. Please do not write your name or school on this questionnaire. The data you will provide will be strictly kept confidential. Express yourself freely on spaces provided. In some circumstances, just tick where appropriate.

A. BIO DATA			
1	Gender	Male	
		Female	
2	Highest Level of Professional Qualification	Diploma	
		Degree	
		Masters' Degree	
B. PROBLEMS ENCOUNTERED BY GRADE 6 LEARNERS WHEN SOLVING PROBLEMS INVOLVING ADDITION OF DECIMAL NUMBERS.			
3	Do you agree that understanding the place value is one of the fundamental challenges that grade 6 learners encounter in decimal addition?	Strongly agree	
		Agree	
		Do not agree	
4	Do teaching methods pose a challenge in grasping addition of decimal numbers?	Yes	
		No	

5	To what extent can assessment practices be regarded as a challenge to Grade 6 learners when solving addition problems of decimal numbers?	To a Less extent	
		To a Large extent	
6	Tick YES or NO to indicate whether the following are other challenges faced by grade 6 learners in solving problems involving decimal addition?	YES	NO
	(i)Resource availability		
	(ii)Language barriers		
	(iii)Socio-economic factors		
	(iv)Lack of parental support		
C. THE EFFECTS OF LEARNERS' ATTITUDES TOWARDS MATHEMATICS AND DECIMAL NUMBERS.			
7	Do you agree that most learners have a negative attitude towards Mathematics in general and decimals in particular?	Yes	No
8	Do you agree with the following statements about the effects of negative attitudes towards mathematics on the learner?		
	(i) *Negative attitudes lead individuals to dislike an activity or subject. This results in putting less effort and being disengaged leading to poor performance.*		
	(ii) *Negative attitudes towards mathematics result in learners not completing tasks such as homework, which is meant to strengthen mastery of concepts perceived as difficult, leading to failure.*		

D. INTERVENTION STRATEGIES THAT CAN BE UTILIZED BY TEACHERS TO MITIGATE CHALLENGES FACED BY GRADE 6 LEARNERS IN ADDING DECIMAL NUMBERS.				
11	Do you agree, strongly agree or disagree that:	Strongly agree	Agree	Do not agree
	(i)The use of Manipulatives and Visual Aids will mitigate challenges faced by grade 6 learners in decimal addition?			
	(ii) Real-World Problem Solving will minimize challenges faced in addition of decimal numbers?			
	(iii)the use of modern teaching methods such as Inquiry-Based Learning (IBL) and Collaborative Learning Environments (learner centered teaching approaches) will help in mitigating decimal addition challenges?			
12	**Other intervention strategies** Are you in agreement with the following views in mitigating decimal addition challenges?		YES	NO
	(i)There is need to provide adequate teaching/learning materials, remediation of strugglers and addressing decimal addition misconceptions head on.			
	(ii)Teachers need in-service training on teaching			

	strategies in order to cater for the diverse needs of learners to promote inclusivity and mastery of decimal addition.			

APPENDIX B: INTERVIEW GUIDE FOR GRADE 6 LEARNERS

BINDURA STATE UNIVERSITY

BINDURA

PREAMBLE

I am a student with Bindura State University studying Bachelor of Education Degree in Early Childhood Development. I am carrying out a research on the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers. What we are going to discuss will be strictly confidential.

A. BIO DATA			
1	Gender	Male	
		Female	

B. THEME1: LEARNERS' CHALLENGES WHEN SOLVING DECIMAL ADDITION PROBLEMS.

1. What is the value of 4 in 2.74? (Place value challenges)

2. When solving addition of decimal problems, which language do you prefer to be taught in? Is it Shona, English or both (Shona and English).

3. Give a reason to the answer you gave above question?

4. Which one do you prefer, calculating digits/figures only or solving number stories on addition decimal?

5. Who assist you with Mathematics homework?

6. Which is greater than the other; 0,01or 0,1?

7. May you add:

(i) 0,1 and 0,4

(ii) 0,1 and 0,01

C. THEME 2: THE EFFECTS OF ATTITUDES ON SOLVING DECIMAL ADDITION PROBLEMS.

8. Do you like mathematics most?

9. May you support your answer above?

D. THEME 3: STRATEGIES WHICH CAN BE ADOPTED TO ADDRESS PROBLEMS ENCOUNTERED BY LEARNERS IN DECIMAL ADDITION.

8. Do you enjoy solving decimal addition sums in groups, in pairs or individually? May you explain why?

9. Have you ever used the abacus, coins (money) or pictures when learning addition of decimals?

10. Have you received remediation in Mathematics in grade 6?

APPENDIX C: CONSENT FORM FOR PARTICIPANTS

BINDURA STATE UNIVERSITY

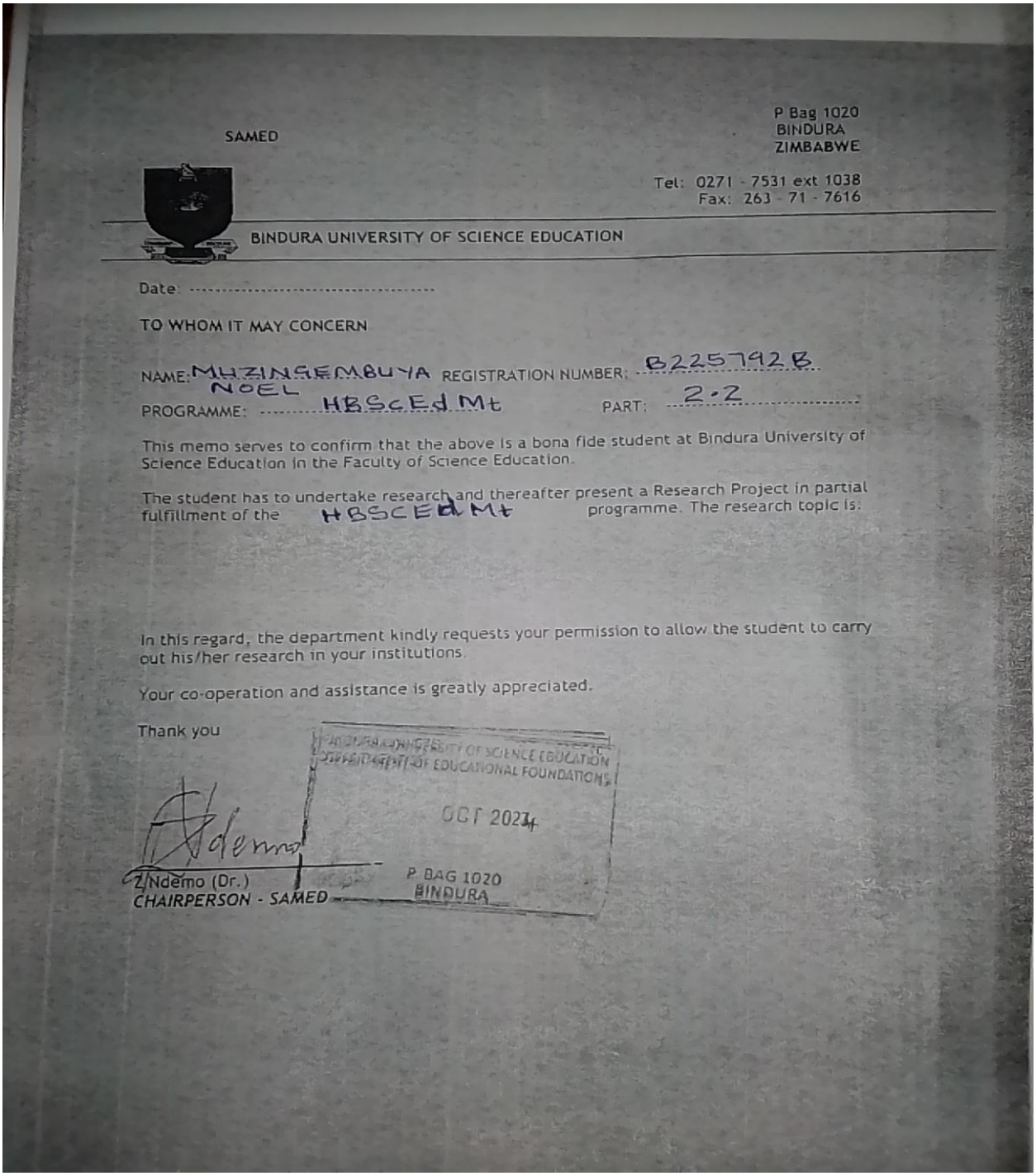
BINDURA

I ----------have agreed freely to take part in the research study entitled ***"An investigation in the problems faced by Grade six (6) learners in the solving of problems involving addition of decimal numbers at Manzinde Primary School in Mutare District, Manicaland Province, Zimbabwe."*** It has been explained to me by the researcher that the information I will give will be strictly confidential and as a participant, I will remain anonymous.

Participant's Signature ---------- Date----------

Researcher's Signature---------- Date----------

APPENDIX D: INTRODUCTORY LETTER



SAMED

P Bag 1020
BINDURA
ZIMBABWE

Tel: 0271 - 7531 ext 1038
Fax: 263 - 71 - 7616

BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: .....

TO WHOM IT MAY CONCERN

NAME: MHZINGEMBUYA NOEL REGISTRATION NUMBER: B2257928

PROGRAMME: HBScEdMt PART: 2.2

This memo serves to confirm that the above is a bona fide student at Bindura University of Science Education in the Faculty of Science Education.

The student has to undertake research and thereafter present a Research Project in partial fulfillment of the HBSCEdMt programme. The research topic is:

In this regard, the department kindly requests your permission to allow the student to carry out his/her research in your institutions.

Your co-operation and assistance is greatly appreciated.

Thank you

BINDURA UNIVERSITY OF SCIENCE EDUCATION
DEPARTMENT OF EDUCATIONAL FOUNDATIONS
OCT 2021
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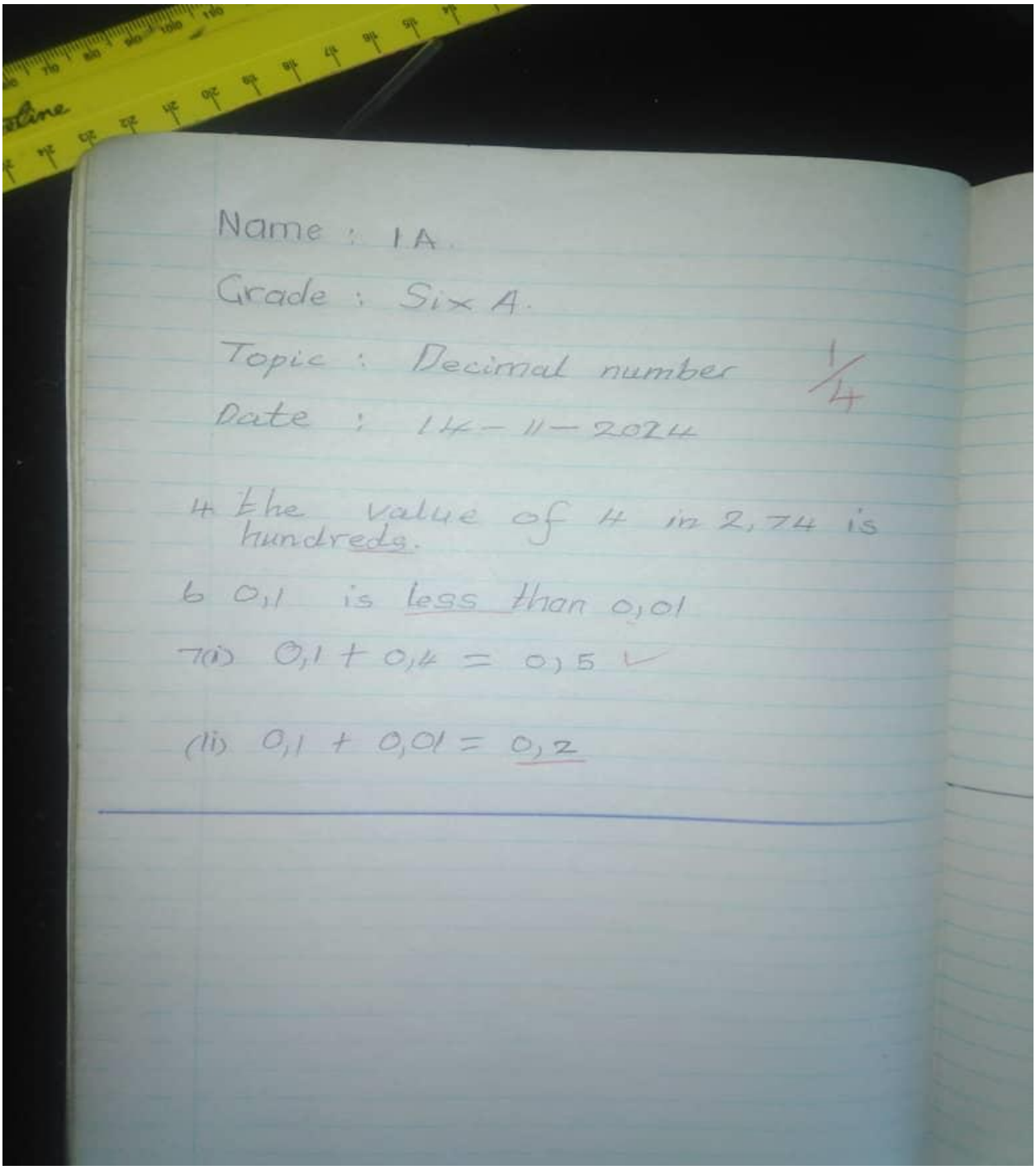
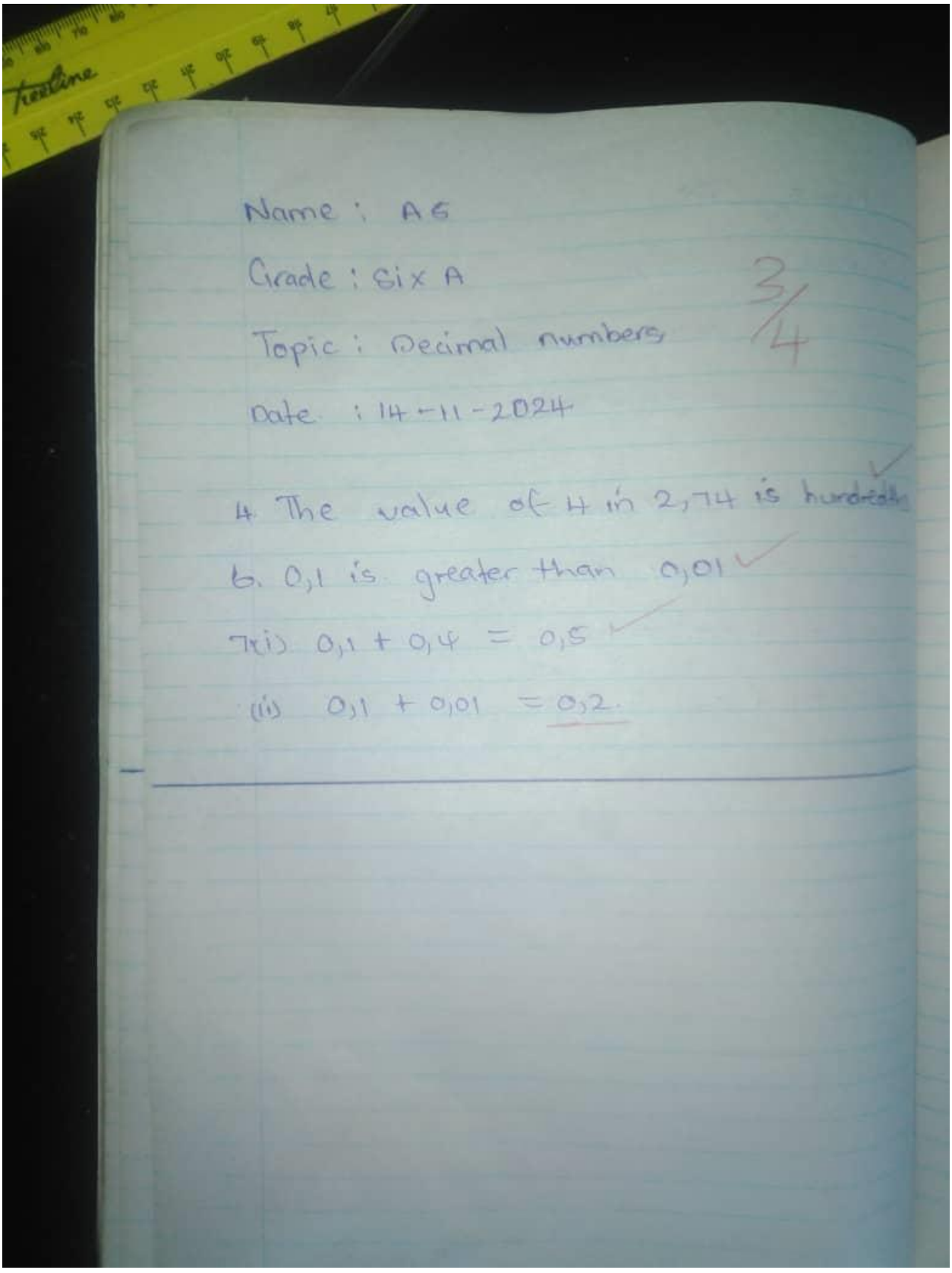
Z Ndemo (Dr.)
CHAIRPERSON - SAMED

APPENDIX E: SAMPLES OF CHILDREN'S WORK





Name : AS

Grade : Six A

Topic : Decimal numbers

Date : 14-11-2024

3/4

4. The value of 4 in 2,74 is hundredth ✓

6. 0,1 is greater than 0,01 ✓

7(i) 0,1 + 0,4 = 0,5 ✓

(ii) 0,1 + 0,01 = 0,2.

Name : Ab

Grade : Six A

Topic : Decimal number

Date : 14-11-2024

3/4

4. The value of 4 in 2,74 is ~~greater than~~ units.

6. 0,1 is greater than 0,01 ✓

7i) 0,1 + 0,4 = 0,5 ✓

ii) 0,1 + 0,01 = 0,11 ✓

Name : A11

Grade: Six A

Topic: Decimal number 3/4

Date: 14-11-2024

4 The value of 4 in 2,74 is hundredths

6. 0,1 is greater than 0,01

7(i) 0,1 + 0,4 = 0,5

(ii) 0,1 + 0,01 = 0,02.

Name : A9

GRADE : SIX A

TOPIC : DECIMAL NUMBER 3/4

DATE : 14 - 11 - 2024

(f) The value of 4 in 2,74 is hundredths. ✓

(g) 0,1 is greater than 0,01 ✓

7 (i) 0,1 + 0,4 = 0,5 ✓

(ii) 0,1 + 0,01 = 0,02.

Name : A12

Grade : Six A

Topic : Decimal number

Date : 14-4-2024

2/4

4 The value of 4 in 2,74 is Units

6 0,1 is less than 0,01

7.i) 0,1
+0,4
0,5 ✓

(ii) 0,10
+0,01
0,11 ✓

Name : AIT

grade: Six A.

Topic: Decimal number 2/4.

Date : 14-11-2024

4. The value of 4 in 2,74 is units.

6.(i) 0,1 is less than 0,01

7 (ii) 0,1 + 0,4 = 0,5 ✓

(iii) 0,1 + 0,01 = 0,11 ✓

Name : A10

Grade : Six A

Topic : Decimal Number

Date : 14-11-2024

1/14.

4. The value of 4 in 2,74 is hundreds

6 0,1 is less than 0,01

7(i) 0,1
+0,4
0,5 ✓

(ii) 0,1
+0,01
0,2