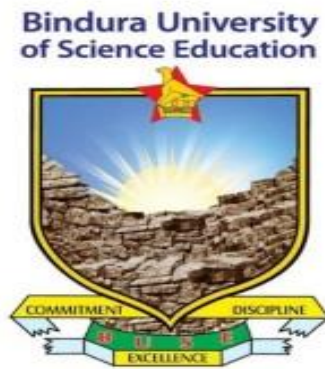




BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

**BACHELOR OF SCIENCE EDUCATION HONOURS
DEGREE IN MATHEMATICS**



AN INVESTIGATION ON THE INFLUENCE OF LANGUAGE IN THE TEACHING AND
LEARNING OF MATHEMATICS AT MT RUUNZE SECONDARY SCHOOL IN WEDZA
DISTRICT.

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
OF THE BACHELOR OF SCIENCE HONORS DEGREE IN MATHEMATICS EDUCATION

JUNE 2024

RELEASE FORM

Title of the dissertation: An investigation on the influence of language in the teaching and learning of mathematics at Mt Ruunze Secondary School in Wedza district.

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DEDICATION

This study is dedicated to my lovely husband Andy Rumhungwe who encouraged me through all circumstances to reach beyond the stars I am so thankful. To my kids Makomborero, Makanakaishe and Mukudzeishe Rumhungwe, you are the reason I have so much courage to move on when the road gets tough. To my dear friends and colleagues I am thankful for all the encouragement you have given me.

Abstract

The aim of this study was to investigate on the influence of language in the teaching and learning of mathematics at secondary school level at Mt Ruunze Secondary school in Wedza District under Mashonaland East Province. Descriptive research design was used in this research because it allowed a systematic collection of data by penetrating into the realities of the situation and also that it produced more in-depth comprehensive information. In this research, the population was made up of 86 students and 6 teachers and a sample of 20 students and 2 teachers was collected using the stratified sampling method where groups were formed according to the learners' mother language Shona. The instruments used to collect data were interviews, focus groups and tests. The findings revealed that pupils encountered challenges which include failure to interpret math language, difficulties in communicating properly with the examiner mathematically, and difficulties in linking English and math language to their local language. The study recommended that teachers need to vary their teaching methodologies and adopt methods that cater for different abilities of the learners, particularly those methods that encourage pupils' centred learning and maximum participation of the pupils while teacher is the facilitator of the process. Teachers must encourage learners to change their attitude towards mathematics as a subject and its language. There is also need for teachers to encourage students to abandon the habit of absconding lessons, they have to attend all lessons in mathematics and fully participate in all activities in mathematics so that they do not lag behind when concept of math and its language are being taught. In addition the study recommends that school authorities should support the mathematics department through providing the requested resources. All this would improve the performance of Mathematics.

Contents

RELEASE FORM.....	i
APPROVAL FORM	ii
ACKNOWLEDGEMENTS	iii
DEDICATION	iv
Abstract.....	v
CHAPTER I.....	1
1.0 Introduction	1
1.1 Background of the study	1
1.2 Statement of the problem	2
1.3 Aim of the study.....	2
1.4Objectives of the study:	3
1.5Sub questions.....	3
1.6 Significance of the study	3
1.7 Assumptions.....	4
1.8 Definition of terms	4
1.9 Limitations.....	5
1.9 Conclusion.....	5
Chapter II.....	6
Literature Review	6
2.0 Introduction	6
2.1 English as a language of instruction in mathematics education.....	6
2.2 The role of English language in the teaching and learning of mathematics.....	7
2.3 How does it affect the teaching and learning of mathematics.....	10
2.4 Conclusion	11
CHAPTER III	12
RESEARCH METHODOLOGY	12
3.0 Introduction	12
3.1 Research Approach	12

3.2. Research Design	13
3.3. Population	13
3.4. Sample.....	14
3.4.1. Sampling Procedure	14
3.5. Pilot Testing.....	15
3.6. Data collection and instrumentation	15
3.6.0. Data collecting instruments	15
3.6.1.1 interviews.....	15
3.6.2. Focus group discussions.....	16
6.3. Test.....	17
3.7. Data collection procedure.....	18
3.8. Data analysis plan	18
3.9. Validity and reliability issues.....	18
3.9.1. Validity	18
3.9.2. Reliability.....	18
3.10. Ethical considerations	19
3.11. Summary	19
CHAPTER IV	20
DATA PRESENTATION, ANALYSIS AND INTERPRETATION	20
4.0. Introduction	20
4.1. Data presentation	20
4.2 Discussion of findings.....	23
4.3 Qualitative findings	24
4.4 CONCLUSION.....	26
CHAPTER V	27
SUMMARY CONCLUSIONS AND RECOMMENDATIONS	27
5.0 INTRODUCTION.....	27
5.1 SUMMARY	27
5.2 Conclusion.....	28

5.3 Recommendations	28
5.3.1 Teachers	28
5.3.2 Pupils.....	29
5.3.3 The Ministry Of Education	29
5.3.4 School authorities	30
REFERENCES.....	31
Appendix 1: Consent Form.....	37
Appendix 2: Interview Schedule for learners.....	38
Appendix 3: Tests (In English)	39
Appendix 4: Tests (Shona).....	40

CHAPTER I

1.0 Introduction

On this research the researcher will focus on the background of the study, statement of the problem, aim of the study, objectives, Sub questions, significance of the study, assumptions, limitations and delimitations of the study and conclusion.

1.1 Background of the study

Language plays an important role in communication, thinking and is a tool for exchanging ideas and concepts between individuals (Aziz, 2003). Students use language to communicate and to understand mathematics concepts Planas (2018). Poor English language skills likely to exacerbate poor mathematics performance (Weinburg et al .,2014). According to Martin and Midgley (2016) learners do not have access to the mathematical language for them to succeed in mathematics, and that teachers may not have the necessary training to help these students. Learners have to deal with language of instruction in which mathematics is taught. Educators therefore need to develop effective ways of teaching both the language of mathematics and the language of teaching and learning. It has been opined that the challenge for many educators is helping learners to move from where they are unable to understand English to where they can communicate mathematics in English (Botes 2019). Maths content cannot taught if the pupils do not have the ability to understand the English language according to Alonso (2014). This revelation led to the researcher coming up with the hypothesis that the Wedza learners probably have inadequate English vocabulary and therefore needed some form of help that would bring them up to speed with their understanding of mathematics. Importantly, the researcher felt that such help should be integrated with their mathematics learning. The reasoning here is that the learners should not see the form of help as well as the teaching and learning of mathematics as separate components Mafa (2020). Pupils generally perform badly in Mathematics according to the results analysis at school level most students leaving ordinary level have no formal qualifications in Mathematics. In Zimbabwe most pupils fail to answer math questions due to failure to understand the language. Sometimes pupils know how to answer the question stated, but that is if they understand the language used. Some students are weak in mastering concepts in

Mathematics just because they use will be trying to master the language first before the mathematical concepts. Vukovic and Lesaux (2013) stated that language affects how students interpret mathematical ideas.

1.2 Statement of the problem

For many people, the mention of mathematics is met with downcast eyes. The fear of mathematics is learnt as soon as learners got into form one at Mt Ruunze Secondary in Wedza district. In Zimbabwe. This has resulted in poor performance in the subject which has persisted over years at Mt Ruunze Secondary.

The problems developed by learners at the primary level are at times carried over to the secondary level as reported by (Mulwa, 2014). Some of the weaknesses in the mastering of mathematical concepts and language should have been discovered in the lower classes and remedial action taken. The fact that these weaknesses have persisted for a long time requires drastic changes in the teaching of mathematics (Mulwa, 2014). The most glaring weakness is that of the learners' lack of knowledge in language and their ignorance of simple algorithms and processes. It is extremely worrying that inability to perform basic processes as multiplication and division is common feature in candidates work.

It is clear that issues on the role of language in mathematics instruction have not been dealt with in Wedza district, yet research done in other countries shows that learners have difficulties with the language of mathematics. This suggests that if the teacher tries to force new ideas that cannot be related to those already learned and mastered, the new ideas can only be learned by rote and remembered in arbitrary and disconnected manner.

The lack of understanding of the role of language in mathematics education is a significant issue, because it can lead to lower levels of achievement, and it can create a barrier to learners full participation in mathematics education.

1.3 Aim of the study

This study aims to assess the influence of language in the teaching and learning of Mathematics at secondary level.

1.4 Objectives of the study:

- To find out the influence of English language in the teaching and learning of Mathematics at secondary school level?
- 2. To elucidate how English language is useful in the teaching and learning process of Mathematics.
- To identify the specific ways in which language affects mathematics education
- To explore how language affects students' ability to learn and communicate mathematics.
- To determine whether a better understanding of the role of language can lead to improved mathematics education.

1.5 Sub questions.

- Explain the role of English language in the teaching and learning of Mathematics at secondary school level?
- How does English language affect how students learn mathematics?
- How can teachers and learners improve and use good language in the teaching and learning processes of Mathematics?
- To what extent have the roles of language contributed to effective teaching and learning of Mathematics?

1.6 Significance of the study

Zhu, Chen, Moyzis, Dong and Lin (2015) suggested that language proficiency is an important aspect in educational accomplishment. This research aims to identify the specific ways in which language affects mathematics education, and to explore how language affects students' ability to learn and communicate mathematics. The findings of this research could help to improve mathematics education in the district and to increase their opportunities for success. The Wedza teachers will benefit from the study in that after reading the research, the teacher may be able to

identify common problems faced by learners in learning math at secondary level and assist them accordingly. This study shall help learner to approach Mathematics at secondary level with a determined mind. This shall help all learners to manipulate concepts in Mathematics and change their attitude towards the subject. With the aid of this project, the learners (in the research project) may help other learners to realize the need of using appropriate language in the learning of math.

1.7 Assumptions

The researcher assumed that:

- (a) Pupils are facing problems in the use of English language in the teaching and learning of mathematics.
- (b) The researcher assumed that the distribution of learning materials is fair regardless of the language used by the learners.
- (c) The school head, teachers and pupils at Mt Ruunze secondary school help the researcher in gathering relevant information/data for the research problem.

1.8 Definition of terms

Language of instruction refers to the language used to convey a specified curriculum in a formal or non formal educational setting UNESCO (2006). Language of instruction also refers to the use of the English language to teach academic subjects other than English itself (Macaro 2020).

Teaching and learning is a process that includes many variables. These variables interact as learners work toward their goals and incorporate new knowledge, behaviors, and skills that add to their range of learning experiences Mulwa (2014).

1.9 Limitations

The study confined itself to the investigations of the influence of language in the teaching and learning of mathematics at secondary level in Wedza district. It is to be conducted at a public secondary school within Wedza district. The population of the study is form 1 to 4 pupils from the selected secondary school. The findings may not be generalized for all schools in Zimbabwe since the methods and content of mathematics teaching/learning may vary from place to place. The study is carried over a few months and therefore the period of study is too short to come up with a definite and reliable conclusion. Due to pressure of work and inadequate time, the research may not be done on time. Shortage of adequate financial resources also limited the research since finance is essential for the progress of the research. Money needed for transport and buying necessary material and also making presentable and typed research instruments and the project as a whole not enough for the researcher.

1.9 Conclusion

The researcher has focused on the background of the study which made the researcher to investigate the influence of language in the teaching and learning of mathematics at secondary level in Wedza district. The researcher also discussed sub problems that he assumes will help in researching this project. The significance of the study, hopes to help teachers to help pupils in studying math at secondary level. Assumptions were also discussed on in this research.

Chapter II

Literature Review

2.0 Introduction

In this chapter the researcher is going to look at English as a language of instruction in mathematics education, the role of language in the teaching and learning of mathematics and how English language affect the teaching and learning of mathematics.

2.1 English as a language of instruction in mathematics education.

English has become a common language of instruction in the teaching and learning of mathematics around the world Cummin (2007). This is due to several factors, including, the availability of resources and materials in English, and the desire for students to develop proficiency in a language that is widely used in teaching and learning. English is commonly used as a language of instruction in the teaching and learning of mathematics in many countries around the world Adamson (2014). English is a widely spoken language and is considered the global language of communication. Using English as the language of instruction in mathematics helps students to communicate and collaborate with peers and professionals from different parts of the world. Many of the leading textbooks, research papers, and online resources in mathematics are written in English. By learning mathematics in English, students have access to a wealth of educational materials and information that can enhance their understanding of the subject Vale (2013). English is often required for higher education and employment opportunities in mathematics-related fields. By learning mathematics in English, students are better prepared for further studies and careers in science, technology, engineering, and mathematics (STEM) fields. Standardization: English provides a common language for teaching and learning mathematics, which can help to standardize curriculum and assessment practices across different regions and countries. This can be particularly important for international students and educators. While English is commonly used as a language of instruction in mathematics, it is important for educators to consider the linguistic and cultural backgrounds of their students Raikei (2002). Providing support for students who are non-native English speakers, such as offering bilingual resources or language support services, can help to ensure that all students have equal access to quality mathematics education Howie (2003). . Language is a

critical element of teaching and learning (DiCerbo, 2014). It is the medium through which information is conveyed and through which an instructor is able to determine whether or not students grasp the concepts and skills taught. Communication is one of the key factors in building understanding in the mathematics classroom of the 21st century. Star and (Short, 2013), cited that conceptual understanding and procedural knowledge are the foundations of mathematical reasoning. Teaching techniques would therefore benefit from a widening of the range of mathematics discourse to include conceptual knowledge and procedural understanding.

(Alt, 2014), noted that the more complex the language in math problems is the lower students' performance will be. Items written in the unique vocabulary of mathematics cause performance disadvantages for learners.(Haag, 2013),alluded that linguistic complexity influences students' accomplishments on standardized attainment tests in maths. (Greer, 2015),supported that mathematics only makes sense when it becomes fixed firmly in historical, cultural, social, and political contexts. (Cho, 2015), asserted that emerging teaching strategies for teaching learners include sheltered instruction, an experiential approach, and purposefully commissioned tuition in English..(Brantlinger, 2014), suggested that maths discourse involving explanation, argumentation, and defense of mathematical concepts should be a defining feature of a quality mathematics classroom experience for learners because academic language can increase the difficulty of maths items for learners.

2.2 The role of English language in the teaching and learning of mathematics

According to Makonye (2015), English language is central to teaching, learning and communicating meaning he further adds that English language is important because mathematical concepts are communicated through the medium of language Nkonde et al. (2018) note that it is possible for a person to be familiar with English language but incompetent in using it for cognitive purposes; thus, it is important for preserve teachers to be trained in utilizing English as the language of instruction. The English language plays a crucial role in the teaching and learning of mathematics for several reasons. Firstly, mathematical concepts and principles are often explained and communicated using English terminology and language. This common language allows for clear communication between teachers and students, as well as among students themselves.

Additionally, textbooks, instructional materials, and assessments in mathematics are often written in English. Students need to have a good grasp of the English language in order to understand and effectively engage with these resources Kangas (2009). Being able to read and comprehend mathematical texts in English is essential for students to deepen their understanding of mathematical concepts and problem-solving strategies Bourdain (2016). Furthermore, English is the language of instruction in many schools and educational settings around the world. Students who are proficient in English have an advantage in terms of accessing high-quality mathematics education and resources. They are better able to communicate their mathematical ideas, thoughts, and reasoning effectively Franchaet (2016). Delli Carpini, (2014), highlighted that in mathematics, content cannot be taught if the pupils do not have the ability to understand the English language. Adding to the challenges of mathematics educators is the fact that the students in Wedza are multicultural and widely varied academically. (Sarama, 2012), suggested that students who live in poverty and who belong to linguistic and ethnic minority groups clearly showed lower levels of academic achievement. According to (Bunch, 2013), the classrooms of the 21st century place greater language demands on instructors as a result of academic expectations. Constructing maths educators' comprehension of communication could be used as the argument for making them ready to involve and support learners in the mathematics classroom as they try to develop mathematical understanding. (Valle, 2013), mentioned that in consideration of the linguistic heritage of students, mathematics instructors should incorporate teaching techniques to create a teaching and learning environment that is conducive to their learning styles, thereby promoting maths proficiency. Instructors need to dismiss the misconception that mathematics is a universal language and instead promote policies that will contribute to greater achievement in maths for all learners. (Roofe, 2013), postulated that there are many difficulties involved in instructor preparation, and this idea has continued to dominate discussions on students' educational achievements. Maths problems requiring an understanding of the English language are known to prevent language minority learners from fully grasping the concepts taught and hence from giving a practical exhibition and explanation of ideas tested (DiCerbo, 2014). Students who exhibit mastery of the English language, on the other hand, are more likely to understand worded maths problems that require the analysis of ideas (Haag, 2013). As suggested by (Stewart, 2014), there is a strong correlation between student learning outcomes, instructor quality, and instructor education. According to (Yettick, 2015), the

competence of instructors is one of the influences that contribute to the accomplishment of students. Learners require special enrichment activities while they are taught mathematics; the significant increase in the secondary school population makes the need for immediate intervention urgent. Teacher training courses expose students to elementary education, content and pedagogical knowledge and supervised teaching practicum at different stages of the curriculum. The primary goal of teacher training in Zimbabwe is to educate instructors who can give a virtual exhibition and explanation of their area of specialization as well as suitable pedagogical skill or knowledge and an understanding of their role as educators (Roofe, 2013). (Ross, 2014), reported that the linguistic needs of maths students and the inadequate preparation of teachers to support the mathematical requirements of these students have highlighted the need for maths instructors to improve their knowledge about language. According to (Bunch, 2013), in some jurisdictions, it is not certain what concepts of language or language development should be promoted in academic settings to prepare instructors to teach math. (Kibler, 2015), asserted that lack of clarity on language instruction for English language pupils has led to the promotion of a range of language-related knowledge and skills that have not resulted in an improvement in mathematical understanding. Mathematical knowledge through an emphasis on language requires mathematics instructors to involve their pupils in activities that develop conceptual understanding of mathematical concepts simultaneously with language. Maths instructors should understand that academic language is different from daily dialect in terms of vocabulary and the arrangement of words and phrases to result in the creation of well-formed sentences (Hodara, 2015). (Coady, 2015), stated that the absence of cooperation between maths and language teachers and the need for continued professional growth for both groups of instructors also negatively influence math students' ability to grasp mathematical concepts. Such findings highlight the need for ameliorating instructional practices in the mathematics lecture room to combine and amplify content and communication skills for English language learners. Learners' mathematical performance will be enhanced when maths instructors provide clear instructions in a language that the students understand (Bunch, 2013).

According to (Ottmar, 2015), many instructors are ill equipped to teach mathematics efficiently in widely varied classrooms. Proficient mathematics instructors for secondary students will advance knowledge, assist in influencing students' inherent qualities of mind and character, and build on pupils' mathematical thinking as well as their culture (Turner, 2012). Kim, Wang, and

(Mikasa, 2013), emphasized the significance of linguistics in the instruction and learning of maths; their investigation gave credence to the idea that the lack of mastery in the instructional language will hinder pupils' understanding of the procedures needed to solve maths word problems. (Rubinstein-Avila, 2014), suggested that meaningful mathematical discourse for maths students may be expected to take place when they are involved in discussions and when they are permitted to ask open-ended questions. Purposeful mathematical discourse also occur to solve problems using different strategies and provide good explanations for their solutions in a systematic. (Bunch, 2013), cited that instructors of secondary school students should evaluate their teaching strategies as well as the language they use while teaching mathematics. Linguistic issues associated with the teaching of mathematical ideas include the use of more than one system of studying signs and symbols and their use. According to (Ottmar, 2015), the unique vocabulary of maths as well as its logical structure and its grammatical features must be incorporated into lessons planned for secondary school learners. Linguistic issues associated with the teaching of mathematical ideas include the use of more than one system of studying signs and symbols and their use. The unique vocabulary of maths as well as its logical structure and its grammatical features must be incorporated into lessons planned for learners. Mathematics educators should recognize that using language in a rigorous environment is determined by both instructors and students. Using the same mathematical terminology as defined by the rigid observance of rules or conventions and choice of language, pronunciation and grammar, in addition to building mathematical understanding from real-life experiences leads to the comprehension of maths concepts (Warren, 2014). Instructional strategies used by instructors to address lack of English proficiency while highlighting mathematical content have positive results among maths students (Cervetti, 2015). The attributes, dispositions, skills and habits of thought necessary to become a valuable mathematics educator include knowledge of mathematics, persistence, positive attitude towards the subject of math, the state or quality of being ready for change and a reflective inclination or tendency (Roofe, 2013).

2.3 How does it affect the teaching and learning of mathematics

English language plays a crucial role in the teaching and learning of mathematics in various ways. English is the primary language of instruction in many countries, including the teaching of mathematics Kersaint(2007). Clear communication in English is essential for students to

understand mathematical concepts, procedures, and explanations. Teachers must be proficient in English to effectively convey instructions and explanations to students. Mathematics has its own specialized vocabulary and terminology, which students must understand to successfully solve mathematical problems. OECD (2007) states that students need to learn and use English terms such as addition, subtraction, multiplication, division, fraction, and others to communicate mathematical ideas. Teachers should provide opportunities for students to practice reading and writing in English within the context of mathematics, Kangas (2018). English language proficiency is important for students to effectively communicate their mathematical reasoning when solving problems. Students need to explain their thought processes, strategies, and solutions in English, both verbally and in writing. According to Konde (2018) teachers can help students develop their problem-solving skills by encouraging them to articulate their reasoning in English. English is often the language used in assessing students' mathematical knowledge and skills through tests, exams, and assignments. Students need to understand and respond to questions in English, as well as communicate their solutions clearly. Teachers must ensure that assessment tasks are accessible to students with different levels of English tosh proficiency. Overall, English language proficiency is essential for the teaching and learning of mathematics. Teachers should support students in developing their English language skills alongside their mathematical abilities to ensure success in mathematics education.

2.4 Conclusion

Chapter two focused on the views of some authors in relation to the role of language in the teaching and learning of mathematics at secondary level. Analyzing the views of these authors in their related literature, it is clear that the authors always refer back the problems encountered by learners to poor mastery of concepts that are part and parcel of secondary level content. However, there appear slight differences in the form of indirect research in literature. Nevertheless, a general consensus can be witnessed in both the direct research authors and the indirect as they both support the incorporation of real life situations in solving mathematical problems at secondary level. Overall, this chapter gives a literature review where the researcher looked at the views of other authors on the problem.

CHAPTER III

RESEARCH METHODOLOGY

3.0 Introduction

In this chapter, the researcher discusses the methodology employed in the carrying out of the study in order to address the research questions. In this chapter, the researcher will discuss the methodology employed in the carrying out of the study so as to address the research questions. The main issues that are discussed in this chapter include the research design, the population, sample and sampling technique. The chapter also highlights the methods that were used to collect raw data as well as the instrument used. The advantages and disadvantages of the data gathering instruments are also contained in this chapter. Validity and reliability issues are important to any research and were discussed about as well in this chapter.

3.1 Research Approach

This research is based on one broad approach to research which is the qualitative methodology. A qualitative approach is concerned with the way people interpret data, and their experiences and patterns of behaviour. Bhandari (2022) argues that it is the approach of collecting and analyzing data that distinguishes it from quantitative method. In addition it can also be noted that qualitative research is an approach that allows the researcher to examine people' s experiences in detail, by using a specific set of research methods such as in-depth interviews, focus group discussions and observations Delve, H. and Limpaecher, A. (2022) and key features that must be visible in qualitative research are, research is conducted in the natural setting, the primary aim is an in-depth understanding of the actors and events and the focus is rather on the process rather the outcome. Qualitative research makes it easier for the researcher to flexibly explore the field with the aim of assessing specific information to come up with accurate results. Additionally, it seeks to understand a given research problem or topic from the perspectives of the local population it involves.

Furthermore, this research preferred qualitative methods because it is typically more flexible as they allow greater spontaneity and adaptation of the interaction between the researcher and the

study participants. For example, qualitative method has mostly “ open-ended” questions that are not necessarily worded in exactly the same way with each participant. With open-ended questions, participants are free to respond in their own words, and these responses tend to be more complex than simply “ yes” or “ no.” As such, this will allow the respondents to fully explain the concepts without being guided by the closed questions as in the case of quantitative methods. In this study, a qualitative research approach provided the researcher with the chance to determine the challenges, experiences and views of the research participants on the role of language in the teaching and learning of Mathematics at secondary school level at Mt Ruunze Secondary school in Wedza district.

3.2. Research Design

Cooper and Schindler, (2003) defines research design as the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, there by insuring you to effectively address the research problem. It constitutes the blue print for the collection, measurement and analysis of data. Gwimbi and Dirwai, (2003) also say that research design refers to the structure of the research which provides the glue that holds the research project together. They add that the type of research design one chooses for a study has a major impact on the accuracy of the results.

The main purpose of the research design is to provide a plan of action and answers for questions such as; what techniques were used to access data? Or what sampling technique was used in the study? Huysamen , (2001) poses that a research design is a plan or blueprint according to which data is to be collected to investigate the research hypothesis or questions in the most economical man

3.3. Population

According to Grunewald, (2008), a population is defined as a specific group of people to which subjects or characteristics of subjects are being referred, compared and generalized. Tuckman,(2011) defined a population as the target group from which the researcher wants to get information about the problem or phenomenon of interest and then draws conclusions. The population that was used in this study consisted of all learners from form one to form four at Mt Ruunze Secondary School. The learners were of mixed sex groups that is both boys and girls

with a combined enrollment of eighty learners and six teachers both male and female to make a total population of eighty six people. From this population of eighty six people, the researcher came up with a representative sample of the population.

3.4. Sample

According to McMillan and Schumacher, (2010), a sample is a small proportion of the population that is selected for observation and analysis. Creswell (2008) defined a sample as a subset of the population from which the researcher is interested in carrying out the study. A good sample is one that represents and reflects the characteristics of the population from which it is drawn. The researcher used a sample of twenty learners comprising ten boys and ten girls (ten learners from form 3 and the other ten from form 4) who provided the raw data. Two Mathematics teachers who are the only math teachers at School also constituted the sample.

3.4.1. Sampling Procedure

There are several sampling procedures that researchers use to come up with a representative and unbiased sample from a population. Whilst quantitative researches make use of random, systematic, stratified, cluster and multi-stage sampling techniques, qualitative research makes use of non- probability sampling techniques. According to Holliday (2007), the difference between non-probability and probability sampling is that non-probability sampling does not involve random selection of respondents. With non- probability sampling, researchers may or may not represent the population well, and it is often difficult to know how well they have done so, (Creswell, 2008). The researcher used purposive sampling to come up with the sample for the study. According to Royce (2008), purposive sampling is a technique used to select individuals who can best supply the relevant information needed to answer the research questions raised. Babbie, (2010) stated that purposive sampling is also called judgmental sampling or expert sampling. This means that it is dependent on the researcher's judgment. Holliday, (2007) stated that purposive sampling can be very useful in situations where the researcher needs to reach a target sample quickly and where sampling for proportionality is not the primary concern. The researcher selected respondents who were assumed to provide the information that was needed. Focus was also on learners who had been at the school since form one using the stratified sampling method. Learners were first grouped according to their mother languages (shona) then

from each cluster the same number of learners was drawn, balancing the number of boys and girls in total. The researcher consulted the senior teacher in order to be assisted to select learners who supplied the information needed for the study.

3.5. Pilot Testing

According to Royce (2008), it is important to carry out a pilot study even in a qualitative enquiry. The other reason also was to determine whether the instruments meant to collect data are both valid and reliable. For this reason, the researcher selected and tested the interview questions in order to check on any irregularities or ambiguities that required modification (Babbie, 2010). In this case the researcher piloted with twenty both form three and form four students both male and female with ten in each sex group. The researcher interviewed these twenty selected learners using the same instrument that was eventually used in the actual study. Shortcomings were identified and corrective measures were taken. When it came to the actual data gathering, the instrument measured exactly what it intended to measure.

3.6. Data collection and instrumentation

3.6.0. Data collecting instruments

Answers (2011), describes research instruments as tools used to obtain or collect data on a given topic of interest on research subject. There is need for using appropriate research instruments for collecting appropriate data. In this study the researcher used direct face to face interviews, group discussions and tests as research instruments

3.6.1.interviews

An interview is a conversation between two or more people, where questions are asked to obtain information in a particular study. The researcher used face to face interviews to collect data from learners and teachers. Respondents were notified in advance as the researcher booked in advance without ambushing them for ethical reasons. The type of interview used in this research was semi-structured. The interviewer jotted down notes as the interviewing process progressed.

The researcher used interviews in order to get views from learners on the role of language in the teaching and learning of Mathematics. By getting different views from pupils the researcher was in a position to understand the effectiveness of language in the teaching and learning of mathematics. The researcher also used interviews in order to get views from pupils on how best the challenges imposed by language can be resolved in order to attain better performance in the teaching and learning of Mathematics at 'O' level.

As the researcher was interviewing the participants, the merits of interviews were; asking questions to the interviewee on a face to face basis enables the collection of first-hand information, quick response enabling the researcher to probe for more information. As interviews are flexible, they enable one to express them freely and accommodate those that are illiterate so that they give informed responses to the questions asked. They also enabled the researcher to obtain detailed as well as confidential information for ethical reasons of the research.

However, no weeds cannot be found on the bed of roses. Interviews do have shortcomings namely the possibility of bias from face to face interaction between interviewer and interviewee as the answers given may not be from the heart -or true but because the respondent is under investigation. Respondents may be shy to express their views. Interviews as data collecting tool are not immune to lies, exaggerations, omissions, and silence by the interviewee.

3.6.2. Focus group discussions

Good (1996) cited that a focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs and attitudes towards a product, service or concept. In this research focus group discussions were used to collect first hand information from learners on the role of language in the teaching and learning of Mathematics at secondary level.

The researcher opted for focus group discussions as all individuals along with the researcher have the chance to ask questions, and this provided more information as compared to interviews. Focus group discussions are an inexpensive and fast form of acquiring valuable data. Learners were more comfortable in voicing their views in each other's company than on their own with the researcher. Participants are given the chance to reflect or react to the view point of others. Dynamic discussion between participants stimulates their thoughts regarding the research

subject. This data collecting tool enabled the researcher to observe things that participants may not be able to clearly answer when using the interviewing method. The researcher may clarify clashes among participants and ask about these diverse options. The researcher found the approach useful as it provides him with first hand information.

However, some drawbacks of focus group discussions as a data gathering information tool were noticed. During the discussion the researcher experienced challenges in controlling discussion and managing the process in comparison to individual interview. A few individuals were sometimes introverts while others take control of the debate and impact the end result or possibly introduce bias. Recording data can also present difficulties, it is actually not possible to record when so many participants are speaking at the same time.

6.3. Test

According to (Martin, 2012), a test is a systematic procedure for measuring a sample of behaviour.

Pre-test

Learners were given a pre-test to help the researcher to structure pupils' knowledge, skills and problems they have in answering mathematical questions at secondary level.

Advantages of a test

- I. It reflects the pupils' understanding of the topic.
- ii. A test reflect quantitative data that will be measured accurately
- iii. A test limits possible bias as pupils will write the work individually.

Disadvantages of a test

- I. Tests are time consuming.
- ii. Attitudes and values of pupils cannot be assessed by a test.

Difficulty to monitor online.

3.7. Data collection procedure

The researcher formulated an interview schedule that was administered to selected respondents for the purpose of gathering raw data. Each respondent was subjected to the same questions for purposes of standardization. Another semi structured interview was prepared for administering to Mathematics teachers at School. The researcher personally interviewed the respondents in two ways, firstly, respondents were interviewed one by one then the second way was a group interview and pre and post tests.

3.8. Data analysis plan

Data collected was summarized, organized, assembled and displayed diagrammatically. Research findings were presented in tables and graphs. Information was presented in this way because it is easy to interpret and compare. Qualitative method will be used to analyze gathered data. Descriptive statistics was used to summarize and analyze gathered data

3.9. Validity and reliability issues

3.9.1. Validity

According to Bell (2011), the term validity indicates whether the research items measure a description of what it is supposed to measure. According to Borg and Gall (1989) cited in Bell (2011), an instrument is valid if it measures the right things. Thoughts and opinions of people are generally abstract and subjective and hence are difficult to measure precisely. They are also prone to error. Grunewald (2008) posited that there are a number of constructs that are used to assess validity in qualitative research. These are credibility, transferability, dependability and conformability. Validating the content of the interview questions is necessary to check whether each question is meant to solicit the correct thing.

3.9.2. Reliability

According to Gay (2010), an instrument is reliable if its measurements are consistent and accurate. Bell (2011) stated that reliability in research refers to the degree to which procedures give results of the same kind under constant conditions on all occasions. Being qualitative in

nature, the study did not require statistical reliability computations. However, the aspect of using reliable instruments remained a priority. The test-retest reliability procedures for data collection instrument were carried out at pilot level where pilot participants assisted in identifying sections of the interview questions that sounded vague or ambiguous. Corrections were made to ensure that the instrument became user-friendly.

3.10. Ethical considerations

The study made use of human participants. According to Cohen, Manion and Morrison (2011) when conducting research on human subjects, researchers should minimize harms and risks and maximize benefits. This can be done by respecting human dignity, privacy and autonomy. It is incumbent and upon the researcher to jealously guard against any factors that might harm the participants. The respondents participated in the research on a voluntary basis and they were not forced or coerced into giving information they felt they should not divulge. The respondents were also assured that the information they gave would be treated in utmost confidence and used purely and entirely for academic purposes. Consent forms were given to participants and they signed in agreement. Respondents were also informed that they could withdraw from participating in the research any time they felt like doing so and that they would not be penalized for taking that course of action.

3.11. Summary

The chapter looked into the research approaches, research design; research instruments particularly interviews and focus group discussions taking note of their merits and demerits. Population and sampling were also discussed in this chapter. The following chapter will highlight the data collected, presentation and its interpretation as well.

CHAPTER IV

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0. Introduction

This chapter focuses on data presentation, analysis and the interpretation of data. The purpose of the interviews and focus group discussion was to test pupils' knowledge on the influence of language in the teaching and learning of mathematics. This knowledge included a local language (shona), international language (English) as well as mathematical. The researcher used interviews in order to get views from learners and teachers on the role of language in the teaching and learning of Mathematics. The researcher also opted for focus group discussions as all individuals along with the researcher have the chance to ask questions, and this provided more information as compared to interviews.

4.1. Data presentation

Collected data was presented in form of statistical graphs. Problems that pupils faced in answering interview questions were: difficulties in interpreting English language, difficulties in interpreting mathematical language and symbols and failing to respond to the questions accordingly. The above challenges ended up causing the learners to attain less marks in the mock test which they were given in different languages. The researcher chose to use frequency tables and graphs because the tools are easy to interpret and they keep the originality of the data. The frequency table below shows the number of learners and their preferred languages in learning mathematics.

Table 1: Preferred language in learning mathematics.

LANGUAGE	English	Shona
FREQUENCY	4	16

Information from table 1 shows the results obtained after consulting twenty learners on which language they like the teacher to use when teaching math at Mt Ruunze Secondary School. The results clearly show that the majority like the use their local language (Shona) rather than the use of the international language (English) which is usually used in schools. After observing these results, the researcher decided to draft some mock tests which were set in two languages but with the same questions. Learners were given the tests which were in English and Shona

The results obtained from these mock tests were presented in figure 1

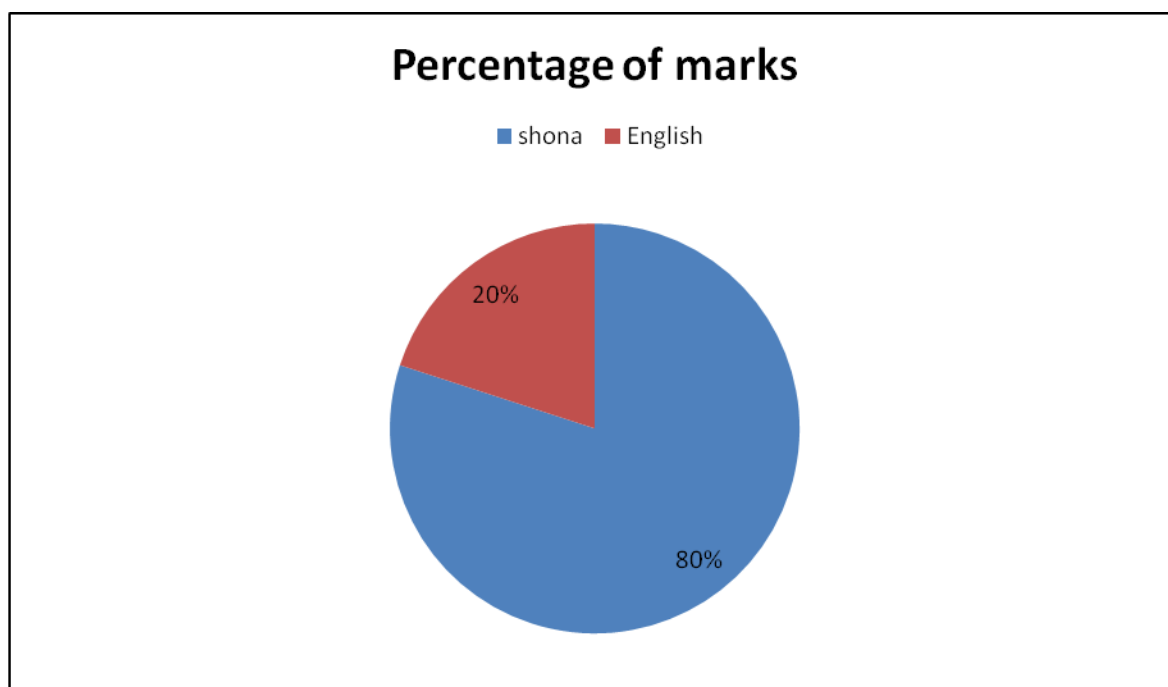


FIGURE 2: marks obtained by the students out of 20

Marks for student T not included on the graph since got zeros in both shona and English.

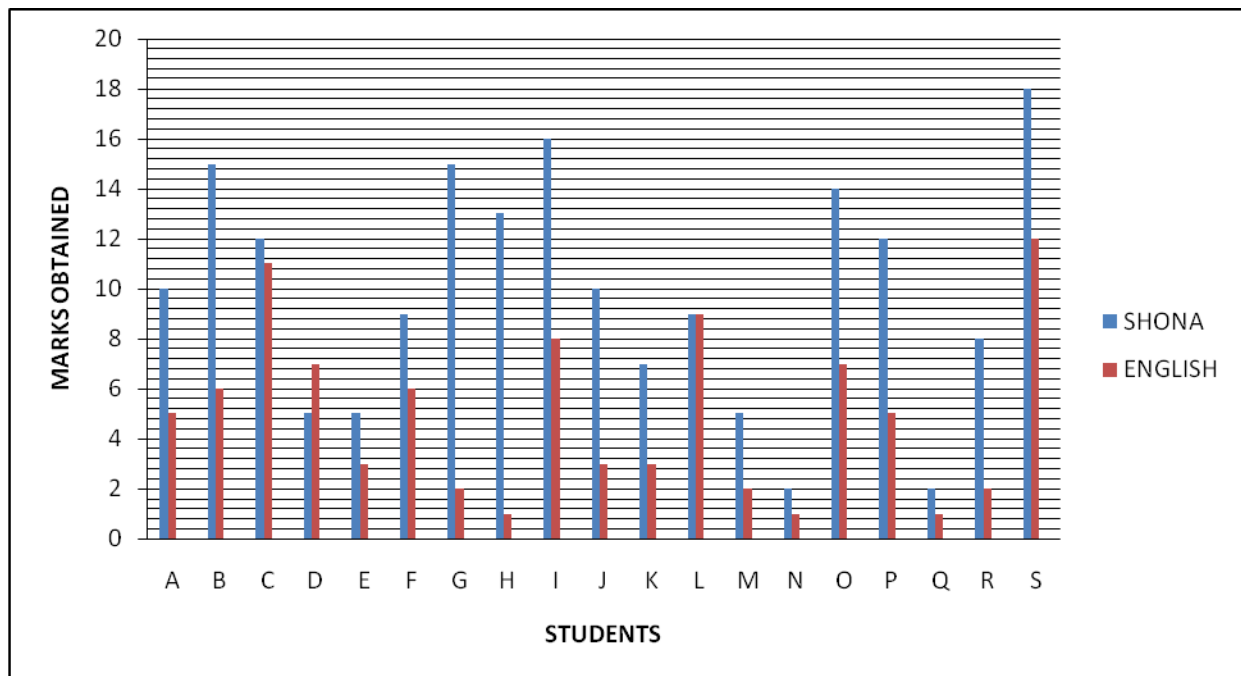


Table2: Time spent on writing the pre-test and the post test

Time spent writing the test	Mean	Standard deviation	t-value
Pre-test	13	2.709	3.291
Post-test	9.5	1.638	

At 0.05 Significance level

Table 5 shows that the mean time spent on pre-test is 13 minutes and the mean time spent on post-test is 9.5 minutes. The t-value is 3.282 which is significant at 0.05 level. This difference indicates that math language and any other language differ in saving time when working on math problems.

4.2 Discussion of findings

The purpose of this research study was to determine the role of language of instruction on student achievement in math. The findings, as they correspond to the research questions, are discussed in the following sections.

Explain the role of language in the teaching and learning of mathematics?

From the data in fig 1, it can be easily seen that the use of appropriate language which the learners understand very well will result in a better mastering of the mathematical concepts. Learners can correctly interpret the questions if they are given in the language that they understand and hence answer the questions correctly. I can conclude that the role of language is to enable learners to interpret and answer questions, thereby communicating with facilitators and hence examiners.

All in all, the role of language in the teaching and learning of math is to enhance a better mastering of math concepts and enable learners to communicate with the facilitator and examiner.

How much does language affect how students learn mathematics.

It can be concluded that effective use of math language in teaching and learning math increases the effectiveness of teaching and learning of math since there was a significant enhancement in the performance of the participants from the use of math language in the post-test. Furthermore, the data illustrated on table 2* shows that plenty of time is saved by simply using appropriate math language thereby increasing the concept mastering capacity and hence increases the overall pass rate.

How can teachers and learners improve and use good language in the teaching and learning processes of Mathematics?

From the data collected in the discussions and interviews, most participants pointed out that they encourage the use of math language from lower levels for example the introduction of directed numbers at primary level. This will build a firm foundation of math language in learners and get used to it before completing ordinary level course.

To what extent have the roles of language contributed to effective teaching and learning of Mathematics?

Responses of participants who were interviewed and discussed with have shown that the role of language contributed to effective teaching and learning of math to a greater extent. They mentioned that if the learner fails to communicate with the examiner then they will achieve nothing in math. Failure to interpret math language will result in attaining nothing in math, they added.

From the discussions the results showed that there was a strong correlation between math achievement and language used in teaching math, therefore, it was concluded that using any other language other than math or mother language could possibly influence student performance at secondary level.

4.3 Qualitative findings

Interviews were conducted with all the 20 participating learners after the learners had written the tests. Each interview session took approximately twenty minutes. During the interviews the two math educators were asked to indicate what they felt about the learner companion. First educator at Mt Ruunze secondary School expressed his unequivocal support for the use of the learner companion. On being asked why this was the case he indicated that it is important to teach learners to use the mathematical language since it is necessary in the interpretation of questions. The second teacher was complimentary and had high regard for the use of math language. He said “ *...the drawings definitely helped the learners to understand better. What makes it even more wonderful is that the child’s home language is right there*” . He also added that this math language is very important for learners because most of my learners struggle with English. “ *I like the symbols because they help the learners to see and understand what I am trying to explain*” he added.

We also requested the educators to indicate what they would like to be added or removed from the math language at secondary level. Regarding additions, they wanted the use of math symbols and math language at primary level for example use of negative numbers in directed numbers so as to build a firm foundation of understanding math language. Their basis for this call was continuity on one hand and the fact that they teach from form 1 up to form four. This view was

interesting to the researcher, one because it was mentioned that 16 (80%) of the learners under consideration were enjoying the use of math language. Two, because it intrinsically meant these teachers were indeed in favor of utilizing the math language in teaching and learning of mathematics. One of the educators continued by stating, “ *I have learners in my class whose home languages are Shona... they were excluded in that their home language does not appear in the companion... they had to rely on the math symbols only*” .

From the mentioned problems experienced by pupils, it was noted that these problems emanated from poor language use which ended up causing poor mastery of concepts. The researcher suggested that when teaching math the teacher must first expose pupils to real-life situations to enhance pupils’ understanding of math’ s language. Basically, teachers should aim at equipping pupils with the necessary skills to incorporate real life situations in solving mathematical problems. The purpose of this research study was to determine the roles of language of instruction in the teaching and learning of math and hence on student achievement in math. After the collection of data, a brief statement of the main points as it relates to data analysis results was given. The conclusions reached as a result of the inquiry, as they correspond to the research questions, were discussed in the previous sections. The research questions addressed the influence of instructors’ language for the instructional delivery and how it affected the students’ ability to learn mathematical concepts. The findings of this study will help to guide the development of appropriate maths language use that might create a social change in knowledge that will influence pedagogical shifts in the teaching of maths at secondary level.

Another benefit that may be accrued from the findings is that it will make possible better conveyance of information and cooperation between secondary school students, management and academic staff.

Findings were also appraised within the perspective of the current literature.

Evidence from these data as well as from the educational literature suggests that instructing students in their native language could contribute to an improvement in academic achievement.

In answering the research questions, consideration was given to the statistical significance while comparing the observed values with the theorized values.

Data from this study show that the language used by instructors might influence mathematics performance for secondary school students at the local level in terms of their performance. The findings further suggest that the strategy used by Mt Ruunze instructors to teach secondary school students in maths could affect students' conceptual understanding of mathematical principles and concepts however no cause and effect judgement can be drawn from this project study. The findings from this study might provide an understanding of how maths instructors could enhance students' knowledge of mathematics, students' performance at ordinary level and use specific teaching approaches with students whose native language is Shona. Results from the study indicate that improvement in secondary school learners performance in maths could possibly be achieved through the provision of support to teachers; such support should be designed to increase instructors' academic knowledge on how the verbal expressions as demonstrated through the use of maths language like symbols and diagrams, in the classroom could influence instruction and learning of mathematics for students whose native language is Shona. The statistics showed that there was a significant statistical difference between the mean scores of the students that were taught using Shona and the students that were taught using the English.

The independent sample *t* test indicated that the mathematics scores of students who received instruction using shona were higher than students receiving instruction in English. These results appear consistent with other researchers' findings (cited in chapter 2) that to maximize secondary school students' learning, mathematics instructors should try to align teaching, and student learning by using the native language of the students. The researcher concluded that if students who speak Shona are taught mathematics by instructors using Shona, it could contribute to an improvement in academic performance of the students because the results showed there was a significant positive association between students being instructed in shone.

4.4 CONCLUSION

Chapter 4 focused on aspects on data analysis and interpretation. Data gathered was presented on tables and graphs for easy interpretation. In this chapter research questions were answered basing on the data gathered through discussions, interviews and tests.

CHAPTER V

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

In this chapter the research dwelled on the summary of the project, the conclusion and the recommendations based on the findings. The recommendations include those made by the respondents through the use of interviews and those suggested by the research himself.

5.1 SUMMARY

In chapter 1 of the research, the researcher looked at the problem. He also looked at the statement of the problem, the sub problems, importance of the study, objectives of the study, assumptions, limitations and delimitations as well as the conclusion.

The purpose of the study was to investigate the influence of language in the teaching and learning of mathematics at secondary level in at Mt Ruunze Secondary School in Wedza district. The importance of the study is to make pupils and teachers develop interest in the teaching and learning of math through the use of math language. The researcher was motivated to research on this topic due to his past experiences at the ordinary level. Assumptions of the study were highlighted, this included cooperation from the authorities, Teachers and pupils of Mt Ruunze secondary School as well as the attitude of the pupils towards mathematics as a subject. The researcher went on to look into delimitations not forgetting limitations of the study.

Focus was also on chapter two which is based on literature review of the study which gave an overview of some authors' views on the roles of language in the teaching and learning of math. The researcher made the reference from the university library and the internet for some of the authentic writers who have also looked closely on the related topic previously. Knowledge from these sources strengthened and clarified researcher' s insight of the topic, thus the sources were useful in conducting the research.

Chapter three outlined what helped the researcher in the collection of the meaningful data Experimental method of collecting data was employed with the aid of two teacher made tests ,the pre and post-test. Researcher chose tests as instruments because they provide a systematic and logical explanation for answering research aims and objectives. Tests are also valuable for

they are used to identify each student's achievement, knowledge and skills in using math language in attempting questions. Interviews and group discussions were also used in gathering data. Concentration was mainly from form 3 and 4 at Mt Ruunze secondary school. The group is comprised of 10 boys and 10 girls to make a total of 20 learners and the only two math teachers at Mt Ruunze. The method of stratified sampling was to select the sample size of 20 pupils. The stratified sampling technique was chosen as pupils in the sample are a good reflection of the larger population basing on their mother languages. A preview of how data was collected, presented, analysed and interpreted was also mentioned in this chapter.

The fourth chapter of the research focused on the data presentation, analysis and interpretation. The data collected from the two tests, interviews and discussions was presented on statistical graphs. The researcher used the above statistical instruments because they are easy to interpret. Basing on errors identified, each error was analysed and interpreted from the observation noted.

5.2 Conclusion

Basing on the findings of the study carried out, the researcher was able to draw some conclusion. The researcher discovered that the problem and errors encountered by pupils in the learning of math at ordinary level with specific reference to Mt Ruunze secondary school in Wedza, result from failure to communicate correctly mathematically.

The researcher concluded that pupils encountered challenges which include failure to interpret math language, difficulties in communicating properly with the examiner mathematically, difficulties in linking English and math language to their local languages.

5.3 Recommendations

After the establishment of the fact that pupils face challenges in solving interpreting math language at ordinary level, the researcher had the following recommendations to the respective stakeholders.

5.3.1 Teachers

Teachers should make let pupils know the aims and purpose of learning math using appropriate language. This involves pointing out the significance of language in the teaching and learning of

mathematics. In order to foster learning among pupils, teacher must make use of a variety relevant teaching aids and suitable language whilst delivering math lessons.

There is also need for teachers to vary their teaching methodologies that cater for different abilities of the learners, particularly those methods that encourage pupils' centred learning and maximum participation of the pupils while teacher is the facilitator of the process. This helps the learners to interpret international and math language into their local language which they understand better.

Teachers must teach topics in mathematics in an organised and logical manner such that concept interconnect from simpler concepts to abstract ones, that will enable them to understand math language in the teaching and learning of math.

5.3.2 Pupils

Pupils must improve their attitude towards mathematics as a subject and its language. They have to brush aside their assumption that mathematics and demanding subject. Pupils must also devote themselves to regular practice in the work given by teachers as homework, class exercises, test, group work as practice facilitates retention, making use of appropriate math language. There is also need for students to abandon the habit of absconding lessons, they have to attend all lessons in mathematics and fully participate in all activities in mathematics so that they do not lag behind when concept of math and its language are being taught.

5.3.3 The Ministry Of Education

The ministry of education must advocate for the printing of more books which provide detailed information in our local languages like Shona in Wedza. The ministry of education must provide in service training to mathematics teachers so that they are equipped with basic skills of teaching mathematics concepts using appropriate math language. The ministry can provide these in service training in form of mathematics workshops and seminars for teachers.

Since the study identified that there are difficulties in using math language in learners then the ministry can allocate more time for learners to learn appropriate math language before math concepts. The Ministry of Primary and Secondary Education in partnership with parents should

provide platforms for extra lessons in mathematics after the normal school hours and at home for learners to cater for the gap between math language and math concepts.

5.3.4 School authorities

School authorities must support the mathematics department through providing the requested resources. The administrators must motivate pupils and ensure positive attitude towards mathematical concepts through offering exciting ways of teaching math using appropriate language. The methods may include classroom quiz as well as inter quiz competition such as the mathematics Olympia. Pupils who would have done well in these competitions must be reinforced in the form of prizes.

REFERENCES

- Aziz bin Nordin (2003). Peranan bahasa dalam pembelajaran kimia. Buletin Persatuan Pendidikan Sains dan Matematik Johor, Jil. 12, Bil. 1, pp. 59 - 64.
- Alt, M. (2014). The relationship between mathematics and language: Academic implications for children with specific language impairment and English language learners. *Language, Speech & Hearing Services in Schools*, 45(3) , 220-233.
- Botes, H. (2010). Language diversity in the mathematics classroom: does a learner. *South African Journal of Education*, Vol.30 , 126.
- Brantlinger, A. (2014). Critical mathematics discourse in a high school classroom:Examining patterns of student engagement and resistance. *Educational Studies in Mathematics*, 85(2) , 201-220. doi:10.1007/s10649-013-9506-2.
- Bunch, G. C. (2013). Pedagogical language knowledge: Preparing mainstream teachers for English learners in the new standards era. *Review of Research in Education*,37(1) , 201-220. doi:10.1007/s10649-013-9506-2.
- Bhandari, P. (2022). What Is Qualitative Research? | Methods & Examples.(Retrieved). Scribbr. <https://www.scribbr.com/methodology/qualitative-research/>
- Cummins, J. (2000). *Language, power, and pedagogy: Bilingual children in the crossfire*. Clevedon, England: Multilingual Matters.
- Cervetti, G. N. (2015). The effects of educative curriculum materials on teachers' use of instructional strategies for English language learners in science and on student learning. *Contemporary Educational Psychology*, 40, , 86-98. Retrieved from <https://doi.org/10.1016/j.cedpsych.2014.10.005>.
- Chen, F. (2015). Differential and long-term language impact on math. *Language testing* 33(4), , 577-605. doi: 10.1177/0265532215594641.
- Chitera, N. (2016). There is more to the teaching and learning of mathematics than the use of local languages: mathematics teacher practices. *Journal of Education and Learning*, 10(4), 10.11591/edulearn.v10i4.4959 , 308-319.

Cho, S. (2015). Effects of M3 curriculum on mathematics and English proficiency achievement of mathematically promising English language learners. *Journal of Advanced Academics*, 26(2), 112-142doi:10.1177/1932202X15577205 .

Coady, M. R. (2015). Aiming for equity: Preparing mainstream teachers for inclusion or inclusive classrooms? . *TESOL Quarterly*, 50(2) , 340-368. doi:10.1002/tesq.223/epdf.

Darhower, M. (2013). Interactional features of synchronous computer-mediated communication in the intermediate L2 class. A sociocultural case study *CALICO Journal*, 19(2) , 249-277.

DelliCarpini, M. E. (2014). Teacher education that works: Preparing secondary-level math and science teachers for success with English Language Learners through content-based instruction. *Global Education Review*, 1(4) , 155-178. Retrieved from <http://ger.mercy.edu/index.php/ger/article/view/62/84>.

Diaz, A. (2015). The influence of teacher power on English language learners' self-perceptions of learner empowerment. *College Teaching* 64.4 (2016) , 158-167. doi:10.1080/87567555.2015.1126801.

Delve, H. and Limpaecher, A. (2022). What is Phenomenological Research Design? Essential Guide to Coding Qualitative Data.<https://delvetool.com/blog/phenomenology>.

DiCerbo, P. (2014). A review of the literature on teaching academic English to English language learners. *Review of Educational Research Educational Research*, 84(3) , 446-482.

Ercikan, K. (2015). Reading proficiency and comparability of mathematics and science scores for students from English and non-English backgrounds: An international perspective. *International Journal of Testing*, 15(2), , 153-175.doi:10.1080/15305058.2014.957382.

Esquinca, A. (2013). Transfronteriza pre-service teachers managing, resisting, and coping with the demands of mathematical discourse. *International Journal of Qualitative Studies in Education*, 26(3) , *Studies in Education*, 26(3).

Florentino, L. (2014). Integrating local literature in teaching English to first graders under K-12 curriculum. *Theory and Practice in Language Studies*, 4(7) , 1344-1351.

- Greer, B. (2015). Honoring diversity in intercultural mathematics education. *Intercultural Education*, , 1-5. Retrieved from <http://dx.doi.org.ezp.waldenulibrary.org/10.1080/14675986.2015.1073876>.
- Haag, N. (2013). Second language learners' performance in mathematics: Disentangling the effects of academic language features. *Learning and Instruction*, 28, , 24-34. Retrieved from <http://doi.org/10.1016/j.learninstruc.2013.04.001>.
- Henry, D. (2014). Examining the relationship between math scores and English Language proficiency. *Journal of Educational Research and Practice*, 4(1) , 11- 29.
- Hodara, M. (2015). The effects of English as a second language courses on language minority community college students. *Educational Evaluation and Policy Analysis*, 37(4), , 243-270 doi:10.3102/0162373714540321.
- Kanno, Y. (2013). English language learners' access to and attainment in postsecondary education. *Tesol Quarterly*, 47(1) , 89-121. doi: 10.1002/tesq.49.
- Kibler, A. K. (2015). Transformational opportunities: Language and literacy instruction for English language learners in the common core era in the United States. . *TESOL Journal*, 6(1) , 9-35. doi:10.1002/tesj.133.
- Kangas, T. (2009). English as the language of instruction in mathematics: A critical discussion. In L. Verschik (SkutnabbEd.), *World Englishes: Problems, properties and prospects* (pp. 75-98). Amsterdam: John Benjamins Publishing Company.
- Kersaint, G. (2007). English language learners and the learning and teaching of mathematics. In F. K. Lester Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 955-987). Charlotte, NC: Information Age Publishing
- Maguire, M. (2014). Reforming teacher education in England:‘ an economy of discourses of truth. *Journal of Education Policy*, 29(6), , 774-784.
- Martin, A. J. (2012). Adaptability: Conceptual. *Australian Journal of Guidance and Counselling*, 22 , 58– 81.

- Masingila, J. O. (2012). Who teaches mathematics content courses for prospective elementary teachers in the United States? Results of a national survey. *Journal of Mathematics Teacher Education*, 15(5) , 347-358, doi:10.1007/s10857-012-9215-2.
- Mikasa, A. W. (2013). Outcome-based evaluation tool to evaluate student performance in high-fidelity simulation. . *Clinical Simulation in Nursing*, 9(9) , e361-e367. Retrieved from the Walden Library databases.
- Mullis, I. V. (2012). TIMSS 2011 international results in mathematics. International Association for the Evaluation of Educational Achievement , Herengracht 487, Amsterdam, 1017 BT, The Netherlands.
- Mafa, A., & Sabena, C. (2020). On the mathematics teacher’ s use of gestures as pivot signs in semiotic chains. *For the Learning of Mathematics*, 40(1), 15– 21
- Mulwa, E. C. (2014). The Role of the Language of Mathematics in Students’ Understanding of Number Concepts in Eldoret Municipality, Kenya. *International Journal of Humanities and Social Science* Vol. 4 No. 3 , 255.
- National Council of Teachers of Mathematics. (2000). Principles and standards for school mathematics. Reston, VA: Author.
- OECD. (2016). PISA 2015 Results (Volume I): Excellence and equity in education. Paris: OECD Publishing.
- Ottmar, E. R. (2015). Mathematical knowledge for teaching, standards-based mathematics teaching practices, and student achievement in the context of the responsive classroom approach. . *American Educational Research Journal*, 52(4), , 787-821. doi:10.3102/0002831215579484.
- Plan 5as, N., & Schütte, M. (2018). Research frameworks for the study of language in mathematics education. *ZDM Mathematics Education*, 0(6), 965– 974

- Prevoo, M. J. (2015). Within-and cross-language relations between oral language proficiency and school outcomes in bilingual children with an immigrant background a meta-analytical study. *Review of Educational Research*, 86(1) , 237– 276. doi: 0034654315584685.
- Roofe, C. G. (2013). “ Miss, I am not being fully prepared” : Student-teachers' concerns about their preparation at a teacher training institution in Jamaica. *Australian Journal of Teacher Education*, 38(5) , 10.1.doi:10.14221/ajte.2013v38n5.5.
- Ross, K. (2014). Professional development for practicing mathematics teachers: A critical connection to English language learner students in mainstream USA classrooms. *Journal of Mathematics Teacher Education*, 17(1) , 85-100. doi:10.1007/s10857-.
- Rubinstein-Avila, E. (2014). Does biliteracy+mathematical discourse = binumerate development? Language use in a middle school dual-language mathematics classroom. . *Urban Education*, 50(8) , 899-937.doi:10.1177/0042085914536997.
- Sarama, J. (2012). The impacts of an early mathematics curriculum on oral language and literacy. *Early childhood Research Quarterly*, 27(3) , 889- 502. doi:10.1016/j.ecresq.2011.12.002.
- Short, D. (2013). Developing academic language in English language learners through sheltered instruction. *TESOL Quarterly*, 46(2) , 334-361. doi:10.1002/tesq.20 .
- Solano-Flores, G. (2013). Semiotic structure and meaning making: The performance of English language learners on mathematics tests. *Educational assessment*, 18(3) , 147-161.
- Solano-Flores, G. (2013). Semiotic structure and meaning making: The performance of English language learners on mathematics tests. *Educational assessment*, 18(3), , 147-161 doi:10.1080/10627197.2013.814515.
- Sparapani, E. F. (2014). A global curriculum? Understanding teaching and learning in the United States, Taiwan,India, and Mexico. *SAGE Open*, 4(2). , 22. doi: 2158244014536406.
- Stewart, C. (2014). Transforming professional development to professional learning. *Journal of Adult Education*, 43(1), , 28 Retrieved from <http://search.proquest.com.ezp.waldenulibrary.org/docview/1539790971?accountid=14872>.

"Role of English in Mathematics Education" - International Journal of Engineering and Management Research.

Toll, S. W. (2014). The developmental relationship between language and low early numeracy skills throughout kindergarten. *Exceptional Children*, 81(1) , 64-78.
doi:10.1177/0014402914532233.

Turner, E. (2012). Promoting equity in mathematics teacher preparation: a framework for advancing teacher learning of children's multiple mathematics knowledge bases. *Journal of Mathematics Teacher Education*, 15(1) , 67-82. doi:10.1007/s10857-011-9196-6.

Valle, M. S. (2013). Classroom instruction and the mathematics achievement of non-English learners and English learners. *Journal of Educational Research*, 106(3), , 173-182. doi:10.1080/00220671.2012.687789.

Vukovic, R. (2013). Investigating the ways language counts for children' s mathematical development. *Journal of Experimental Child Psychology* 115 (2013) , 227- 244.
doi:10.1016/j.jecp.2013.02.002.

Warren, E. (2014). Supporting young ESL students from disadvantaged contexts in their engagement with mathematics: Teachers' pedagogical challenges. *International Journal of Pedagogies and Learning*, 9(1) , 10-25. doi:10.5172/ijpl.2014.9.1.10.

Weinburgh, M. (2014). The intersection of inquiry-based science and language: Preparing teachers for ELL classrooms. *Journal of Science Teacher Education*, 25(5), 519-541.
doi:10.1007/s10972-014-9389-9 , 519-541.

Yettick, H. (2015). One small droplet news media coverage of peer-reviewed and university-based education research and academic expertise. *Educational Researcher*, 44, , 173-184
.doi:10.3102/0013189X15574903.

Zhu, B. (2015). Educational attainment-related loci identified by GWAS are associated with select personality traits and mathematics and language abilities. *Personality and Individual Differences*, 72 , 96-100 Retrieved from <https://doi.org/10.1016/j.paid.2014.08.028>.

Appendix 1: Consent Form

Statement of Consent

My name is Rumhungwe Fortunate Portia and I am a student at Bindura University of Science Education under the faculty of Science education. I am conducting a research on an investigation on the influence of language in the teaching and learning of mathematics at secondary level in Wedza district, Mashonaland East province of Zimbabwe. It is my hope that the results are to inform policy formulations and programme designs by various actors.

Feel free to ask clarity on the questions and if you feel you can no longer continue with the interview you are free to withdraw at any stage. Pseudo names are to be used in the report to be generated.

The information you reveal to me would be anonymous, confidential and would not be attributed to you. If you are in agreement, then you could give me confirmation by ticking Yes or No and we can proceed.

Thank you.

Appendix 2: Interview Schedule for learners

INTERVIEW ON THE INFLUENCE OF LANGUAGE IN THE TEACHING AND LEARNING OF MATHEMATICS AT SECONDARY LEVEL IN WEDZA DISTRICT.

Interview ID

My name is Rumhungwe Fortunate Portia. I am a final year student studying towards an honors degree with the Bindura University of Science Education. I am conducting interviews with ordinary level math learners at Mt Ruunze Secondary School.

The information obtained will culminate into a dissertation that can be used for planning and programming purposes.

No names or house numbers are to be recorded.

Are you willing to be interviewed? Yes/ No

Interview details

Date.....

District: Wedza

Location: Mt Ruunze Secondary

Focus Group Discussion with ordinary level math learners at Mt Ruunze Secondary school.

1. Is it an advantage to be taught in your mother language in math? Explain.
2. Is it an advantage or disadvantage to be taught in English in math? Explain.
3. Which language do you prefer if you are asked to choose between the two? Give a brief explanation.
4. Briefly describe the attitudes of community members towards math as a subject.
5. Do you enjoy learning math at ordinary level? If yes briefly describe the attitudes of your colleagues towards you.
6. Briefly describe the attitudes of your family towards the use of language in the learning of math (especially when they help you working on your assignments).
7. What is your mother language?
8. Do you understand the teacher teaching in English during Maths lessons? Yes or No.
9. How does language increase the effectiveness of teaching and learning of Mathematics?
10. What do you suggest to be the ways in which you can improve and use good language in the teaching and learning processes of Mathematics?

Appendix 3: Tests (In English)

1. I have three hens. I gave Paul two of them. How many hens do I left with?
2. I think of a number. I added 1 to that number and then double the sum. The final answer is 22. Find the number that I thought of.
3. Getty is twice as old as his sister Mary. The sum of their ages is 15. Find their respective ages.
4. Find the difference of $(2x + 4)$ and $(x - 3)$.
5. Dan has \$50 with him. He spent 20% of it on chocolate. How much does Dan left with?

Appendix 4: Tests (Shona)

1. Ndine huku nhatu. Ndikapa Paul mbiri dzacho. Ndasarirwa nehuku ngani ?
2. Ndafunga nhamba.Ndikawedzera imwechete pairi ndokupeta ruviri. Pakupedzisira ndazove ne22. Tsvaga kuti nhamba yandafunga ndiyani.
3. Getty mukuru Kuna sisi vake Mary kakapetwa ruviri. Kubatanidza makore avo anoita 15. Tsvaga kuti umwe neumwe ane makore mangani.
4. Tsvaga musiyano uripo pana $(2x + 4)$ na $(x - 3)$.
5. Dan ane \$50 paari.Akashandisa 20% kutenga chocolate.Dan asarirwa nemarii?.