ASSESSMENT OF EFFECTS OF MATHEMATICAL LANGUAGE ON WORD PROBLEM SOLVING AMONG CLASS SEVEN LEARNERS IN CHEPTIRET ZONE, UASIN-GISHU COUNTY, KENYA.

BY

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DECLARATION

I declare that the thesis I have submitted is entirely unique to me and has not been submitted to any other organization or university. Without the author's or Moi University's explicit and written consent, no part of this thesis may be reprinted.

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This thesis is dedicated to my loving sons Collins and Gideon. My beloved Mum, Sisters, Brothers and my dear Dad (May his soul rest in peace) for standing by me as I spent time away from them while pursuing my studies.

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ABSTRACT

Learner performance in Mathematics as reflected by the Kenya Certificate of Primary Education (KCPE) results has remained poor over the years. This poor performance suggests that the set objectives in the primary school Mathematics curriculum have not been fully achieved. Studies indicate learner proficiency in the use of mathematical language in problem solving and overall pupil performance in mathematics remains critical. The purpose of this study was to assess how mathematical language affects learner's ability to solve word problems among class seven learners in Cheptiret zone, Kesses Sub-County, Uasin Gishu County, Kenya. The study objectives were; to establish the language difficulties learners face when solving mathematical word problems; to find out how mathematical language affect learners' ability to solve word problems; and to determine teachers' perspectives on difficulties learners have when solving mathematical word problems. The significance of the study is to help students both those who are proficient and those who are not learn the skills they need to solve word problems more successfully and it will also inform math teachers about the importance of creating strategies for teaching pupils mathematical vocabulary. The theory employed in the study is the cognitive theory propounded by Jean Piaget. The study employed constructivism paradigm and followed concurrent triangulation design using a mixed method research approach. The target population were 1292 Standard seven pupils and teachers of Mathematics from public primary schools. The study sample size comprised of 388 class seven learners selected through simple random sampling and 15 mathematics teachers selected through purposive sampling from 15 schools. Construct and content validity was used to check validity of the research instruments while Cronchbar coefficient alpha method was used to test reliability. The research tools used for data collection were pupils' questionnaires, teachers' questionnaires, and teachers' interview guide. Quantitative data analysed using descriptive statistics while qualitative data analysed thematically. The analyzed data were presented in tables inform of percentages and frequencies. Quantitative results showed that more than 37.5% of students agree that the language used in mathematics has an impact on their ability to solve word problems; 50% of students and 56.3% of teachers also agreed that being able to read and understand the language used in mathematics was helpful for students in solving word problems. From teachers' interview, findings revealed that most learners score highly when questions are numerically expressed but experience difficulties in interpreting questions in word form. In addition, on word mathematical problems, learners have a challenge in deciding on the operations to be performed. The study concluded that majority of class seven learners have difficulty in reading and comprehending thus unable to solve mathematical word problems and in deciding what operations need to be performed. The study recommends a broad exposure to mathematical language from lower classes and the use of appropriate language during teaching, learning and assessment process. The study informs the Kenya Institute of Curriculum Development to lay emphasis on the exposition of mathematical vocabulary in the approved textbooks before their use in mathematical texts and questions.

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ABBREVIATION AND ACRONYMS

CAT	Continuous Assessment Test
CSMS	Concept in Science Mathematics and Science
KCPE	Kenya Certificate of Primary Education
KICD	Kenya Institute of Curriculum Development
KNBS	Kenya National Bureau of Statistics
KNEC	Kenya National Examination Council
NACOSTI	National Council of Science Technology and Innovation
NCES	National Centre for Education Statistics
NCTM	National Council of Teachers of Mathematics
SPSS	Statistical Package for Social Science

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Overview

This chapter dealt with the background of the study, statement of the problem, purpose and objectives of the problem under study, justification and finally definition of terms.

1.2 Background of the study

Mathematics is a way of viewing and making sense of the real world. Mathematics has been viewed differently by different people depending on their experiences of it; as a search of patterns, as a way of solving problems, as a means of communicating information and ideas and as a creative activity. Mathematics is vital both for expanding internal advancement and for the maintenance of leading role with world community. Mathematics Education at the primary school level is the bedrock and the foundation towards further studies in Mathematics. It is an investment as well as instrument that can be used to achieve a rapid economic, social, political, technological, scientific and cultural development in the country. It lays the inspiration for fields like engineering, medicine, computer and technological specialization (Githua, 2013). Many mathematicians and mathematics educators have claimed that problem solving is at the heart of all the teaching and learning activities in mathematics. Several studies have found that a language barrier is one of the key factors influencing many students' low mathematics performance (Barton, & Barton 2003).

According to Silby (2006), language is used to communicate mathematics to students in the classroom. As a result, language plays an important role in communicating and improving mathematics education. The National Council of Teachers of Mathematics (NCTM) emphasized the importance of language in mathematics teaching and learning in a report published in 2000.

Communication is emphasized as an important aspect of mathematics and mathematics education in this study. To become mathematically skilled, students require numerous opportunities to engage in problem solving Mathematical language proficiency refers to the ability to learn mathematics in a way that fosters conceptual understanding, procedural fluency, strategic competence, adaptable reasoning, and a positive attitude toward mathematics (Kilpatrick, Swafford, & Findell, 2001) Word problems are consistently used as practice exercises and illustrations throughout mathematic curriculum. Learners generally grapple with the language and experience difficulty in comprehending word problem (Sepeng, P & Madzorera, A, 2014). As a result, it is logical to assume that a learner's success in answering word problems is hampered by comprehension issues.

According to Bryant (2005), children with mathematical weaknesses face a variety of challenges, the most common of which is difficulty with multi-step arithmetic. (Polya 1945/2004; Verschaffel, Greer, & De Corte, 2000) Problem solving extends beyond the standard thinking and reasoning that students use when solving exercises. In Kenya's elementary school curriculum, mathematics is a required subject. It is impossible to overstate the value of faculty mathematics.

Mathematics is essential for improved student progress in school, the production of informed citizens, job success, and personal fulfillment. Individual learners are expected to

comprehend and use Mathematics to make sense of data and complex situations in today's technology-driven culture. Many fields, including science, engineering, medicine, and also the social sciences, use mathematics as a tool in all areas. It is also utilized in everyday activities such as at home, in markets, and in offices (Neyland, 2014).

The acquisition of mathematical terminology is an important part of grasping mathematics. The understanding of words and their meanings is referred to as vocabulary (Stahl, 2015). It also includes understanding how words are utilized in both oral and written format. According to Miller (2013, p. 12), students who do not grasp the vocabulary used in Mathematics classrooms, textbooks, or assessment tests are likely to struggle in their efforts to master the concept in the subject. Mathematical vocabulary includes words like quotient, volume, vertex, dividend, and hexagon that are used in some mathematical topics (Vacca & Vacca, 2016).

One of the challenges in learning mathematical vocabulary is a lack of opportunities to learn and practice the words (Monroe & Orme, 2012). This is due to the fact that most of the jargon used in math classes is rarely used in ordinary life. Furthermore, Mathematics teachers frequently overlook the importance of teaching meaningful vocabularies; many terms have different meanings in the realm of mathematics than they do in everyday usage (Njoroge, 2013). These include, among other things, power, difference, volume, and factors. Without proper vocabulary instruction, students are more likely to have difficulty and interference learning concepts that require background that appears unrelated to mathematics.

The abstract nature of mathematical vocabulary, according to Vacca & Vacca (2016), is another element contributing to the difficulty of learning mathematical vocabulary. This is

due to the fact that many mathematical terminology refer to concepts rather than objects. Although words like quotient, fraction, and factor are used to define concepts, they do not have adequate or clear definitions in everyday speech.

Making links between words, symbols, visuals, and real-life situations can help you understand mathematics concepts (Haylock & Thangata, 2017). It is necessary to correlate mathematical concepts with a word or phrase in order for them to be understood and employed. Using words to convey Mathematical ideas; to explain, develop, and defend one's ideas orally and in writing about Mathematics is an important component of learning Mathematics (NCTM, 2018).

In order to grasp and express mathematics ideas, pupils must be able to decipher the meaning of mathematics ideas, whether written or spoken. According to Rubenstein and Thompson (2012), terminology, phrases, and symbols are critical in communicating mathematical ideas, and mastering them is critical for children's mathematical learning, which is in line with current teaching and learning skills.

It is clear that mastering Mathematics language has a direct impact on arithmetic achievement, particularly problem-solving. According to Biemiller (2011), vocabulary knowledge is highly linked to total academic achievement in school. Even if students succeed at calculation, their capacity to use their Mathematics skills will be limited if they do not comprehend the vocabulary needed to master subject or are unable to apply the skills in future scenarios. Vocabulary education in the Mathematical curriculum area could be a crucial component of good instruction.

Math is frequently referred to as a specialized language. It is regarded as a brief and exact language (Breakwell, 2012). There are both terminologies (vocabulary) and symbols in it. Unlike English, Mathematics is a symbol-based language that primarily use ideograms (symbols for conveying concepts) rather than phonograms (symbols for words). For brevity, communication in mathematics includes the use of many symbols and notations. Mathematics textbooks, exams, and instruction in classes are frequently written in both mathematics and English languages. Furthermore, it is a universal language with syntactical and rhetorical structures that includes indefinite terms, definite terms, axioms, and theorems (Njoroge, 2013).

Mathematical language has its own grammar, syntax, vocabulary, word order, synonyms, negations, norms, abbreviations, sentence structure, and paragraph structure, just like any other language. It has some language traits that aren't found in other languages (Rudd,2008)

Similarly, because of its technical nature and the fact that it is typically strictly defined, mathematics jargon is not commonly utilized in everyday situations. Language, according to Krussel (2004), is an integral aspect of the Mathematics construct since it is an indispensable tool in Mathematics. As a result, students are more likely to struggle with word problems using complex and new language (Abedi & Lord, 2011; Solano-Flores & Trumbull, 2013). There hasn't been a concerted effort to teach mathematical jargon directly (Njoroge, 2013).

Mathematics uses a syntax-language framework that is both complex and particular. Many students find syntactic aspects in mathematics to be both onerous and confounding. The Frayer model is one of the most basic strategies for teaching Mathematics vocabulary (Marzano, 2013). Kigamba and Wanjiru (2020) undertook a study to investigate the influence of Mathematical vocabulary instruction on students' Mathematics achievement in

Muranga County, revealing that there was a positive association between Mathematical vocabulary instruction and students' performance. This research study assessed how mathematical language affects problem solving ability among class seven learners in Cheptiret zone, Uasin-Gishu County.

1.3 Statement of the problem

For the development of mathematical literacy and the study of mathematics, reading literacy is essential. The capacity to read and comprehend word problems or mathematical texts is also necessary, in addition to having a working knowledge of and understanding of numbers, symbols, and the relationships between them. Therefore, instruction in classrooms should be done precisely by giving meaning to the vocabulary embedded in the topic under consideration this meaning help the learner to read and comprehend the question.

Learners require more than just a superficial understanding of the terminology; they also require conceptual understanding. Pupils must actively participate in the development of background knowledge by utilizing content-specific terminology. Any language experience necessitates the development of vocabulary. Learning mathematical vocabulary is a crucial part of mastering the language. Learning, thinking, interpreting, and conveying mathematics all need the use of mathematical language. However, in Uasin-Gishu County the effects of Mathematical language to problem solving on pupils' success in mathematics is wanting. The study was done in order to fill this need to assess how mathematical language affects problem solving ability among class seven learners in Cheptiret zone, Uasin-Gishu County.

1.4 Purpose of the study

The purpose of this study was to deepen the understanding of the relation between the language used in mathematics tasks and the difficulty in reading and solving mathematical word problems. Learners need to breakdown word problem into small steps and utilize the vocabulary and strategies being introduced in order solve word problem. Since math performance frequently falls short of expectations, it was necessary to identify strategies for helping students achieve exceptional results. Thus the intent was to assess effects of mathematical language on word problem solving ability among class seven learners in Cheptiret zone, Kesses sub-county, Uasin-Gishu County.

1.5 Objectives of the study

The specific objectives of the study were;

i. To establish the language difficulties learners face when solving mathematical word problem.
ii. To find out how mathematical language affect problem solving ability.
iii. To determine teachers perspectives on the difficulties their learners have when solving mathematical word problem

1.6 Research Questions

The study was guided by the following research questions

i. What are the language difficulties learner's face when solving mathematical word problem?
ii. How does mathematical language affect problem solving ability?

iii. What are the teachers' perspectives on the difficulties their learners have when solving mathematical word problem?

1.7 Significance of the study

This research is important because it will help students both those who are proficient and those who are not learn the skills they need to solve word problems more successfully. The study's conclusions and recommendations may be helpful to the Ministry of Education because they will let them keep track of developments and boost math proficiency across the county and the nation at large. The results of the study may be used to educate elementary school students on the value of comprehending the mathematical terminology used in mathematical texts and questions to aid in word problem solving. The results could be used to inform math teachers about the importance of creating strategies for teaching pupils mathematical vocabulary.

The study's results could be applied to teaching, learning, and assessment practices to ensure that students in lower grades have a broad exposure to mathematical language. The research may be used to help the Kenya Institute of Curriculum Development prioritize how mathematical language is presented in approved textbooks before it is used in mathematical texts and queries.

According to the research, the Ministry of Education should make sure that mathematics teacher trainers have access to the correct definitions of mathematical terms when delivering content to students.

1.9 Assumptions of the study

The study was guided by the assumption that all Public primary school under investigation;-

i. Had learners who had difficulties in solving word problems in Mathematics
ii. Same syllabus in Mathematics was used
iii. Had Mathematics teachers who were adequately trained
iv. Had similar resources for teaching and learning Mathematics
v. All learners in class seven had completed previous classes Mathematics syllabus.

1.10 Scope

The study was carried out among class seven learners and their Mathematics teachers in public primary schools on mathematics performance in Cheptiret zone, Kesses sub-county, Uasin-Gishu County. The public primary schools in the Zone were 23 and the total population was 1292 class seven learners. The main purpose of the study was to assess how mathematical language affects problem solving ability .The population of the study was class seven learners' and limited to mathematics teachers only.

1.11 Limitations

The study limits itself to the generalization of class seven learners and therefore should be utilized to summarize further research in other grades to establish whether similar results would be obtained. For a more conclusive report, all educational institutions should be studied. The study was also limited to mathematics subject only and mathematics teachers and learners in within Cheptiret zone.

1.12 Theoretical Framework

Cognitive theory propounded by Jean Piagets (1936) explains how a toddler constructs a mental model of the universe. He disagreed with the thought that intelligence was a hard and fast trait, and regarded cognitive development as a process caused by biological maturation and interaction with the environment. Piaget's work on children's development, particularly with numeric concepts, has gotten a lot of attention in the educational world.. Jean Piaget major concern is that the developmental stages of youngsters cognition. This has brought crucial insights into how children learn mathematical concepts and context. The event of a toddler, according to Piaget, occurs through an endless transition of cognitive processes. Although learners are usually grouped by age, their developments levels may differ significantly. Piaget felt that children develop steadily and progressively through the phases, with one stage's experiences serving as a springboard for progression to the next. Sensorimotor, preoperational, concrete operational, and formal operational are the four stages of development established by Piaget.

During the sensorimotor stage a toddler can connect mathematics and literature, at pre-operational stage, the kid increase in languages ability, symbolic thought, egocentric perspective and limited logic. Children should engage in problem-solving tasks that make use of materials that are easily accessible, like blocks, sand, and water. The child learns basic language skills at the concrete operational period.

According to Burns and Silbey (2000), "Hands-on experiences and a variety of methods of articulating a mathematical solution can be a manner of supporting the development of this cognitive level". These activities assist students to make abstract ideas concrete by putting their hands on mathematical concepts and ideas that can be used to solve issues.

Piaget believes that at the third stage, a toddler is capable of forming hypotheses and deducing possible outcomes, allowing the child to design his own mathematics. Teachers can help students improve their mathematics understanding by encouraging them to extract essential information from a given statement. Because the teacher develops stage-appropriate activities to keep learners active, knowing the Piaget phases helps the instructor comprehend the cognitive development of the child.

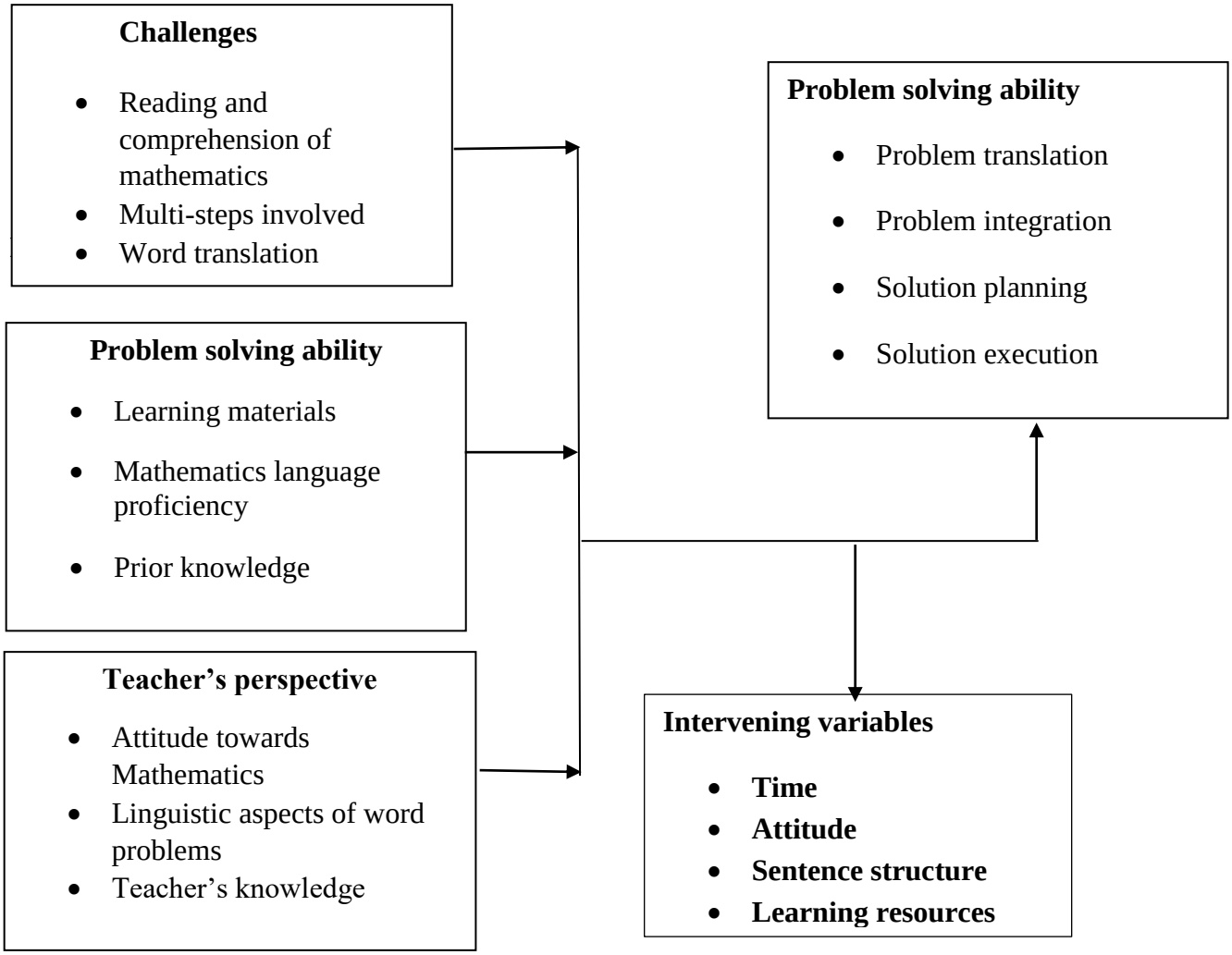
Thinking mathematically acts as an attitude and an approach for problem solving. Several models are utilized in giving ways of solving word problem. Polya (1945/2004) suggested a four step procedure namely; understanding the question, devising an idea, completing the plan and searching back. Schoenfiel (2013) came up with a four step plan as follows; reading analysis, exploration planning, implementation and verification. Mason (2009) also came up with a four step plan as follows; getting started, getting involved, keep going and being sceptical. After the above steps there was a proposed four step problem solving model. Whose steps are; Entry: here the matter solver re-phrases the given problem using their own words. Analysis: pupils reflect on their own thinking when solving the matter. “Have I encountered an identical problem like this before”. Attack and Review: apply a relevant strategy to deal with the matter computing strategy Schoenfeld (2013). The cognitive theory was utilized in this study to seek out if it really helped learners to unravel word problem questions

1.13 Conceptual Framework

The study applied the following conceptual framework to illustrate how various variables relate in the study. The researcher arrived at the conceptual framework by using objectives of the study. The conceptual consists of independent and dependent variables.

Independent Variable **Dependent Variable**

Mathematical language



Source: (Researcher, 2019)

Figure 1.1 Conceptual Framework

According to the conceptual framework above, the mathematical language was the independent variable and the ability to solve word problems was the dependent variable. When addressing mathematical word problems, language utilized in mathematics presents learners with significant hurdles. The majority of students have trouble reading and understanding mathematical texts, mistranslating words, and failing to complete problems

requiring multiple stages. Problem translation creates difficulties since a student is unable to understand a number of elements, such as language structure, which varies from language to language, and solution execution, which outlines the procedures to be done while solving an equation.

A learner needs learning materials that are pertinent and sufficient to facilitate learning in order to develop problem-solving skills. They also need mathematical language proficiency, which they achieve by mastering mathematical terms and vocabularies that are tailored to their level of understanding and prior knowledge of the concepts in the learning area developed from earlier learning levels. Due to these factors, problem integration—which calls for integrating or adding together different parts of the problem to find the whole—and solution planning—which lays out plans to improve the problem-solving capacity—should be used.

The capacity of students to solve mathematical word problems is greatly influenced by the teacher's perspective. The conceptualization of learners might be positively or negatively impacted by a teacher's attitude toward mathematics. Word issue linguistics can have an impact on both the material delivery and methodology used by teachers and students. The teaching and learning process is greatly aided by the teacher's content understanding. To ensure understanding of the material, problem translation and solution implementation should be effective and consistent. Sentence constructions are one of the interfering factors. A learner will not be in a position to understand the question and will not be able to figure it out and arrive at the solution if the sentence structure utilized is poorly stated. The difficulty to answer the problem is also influenced by the learner's attitude toward mathematics as a

subject. A learner may skip the question, guess the results, or leap to the answer if they are unfamiliar with the vocabulary being used.

Mathematical language is a critical aspect of problem-solving among learners. The use of precise and clear language helps learners to communicate their ideas, understand concepts, and solve problems effectively. In this context, mathematical language refers to the specific vocabulary, symbols, and syntax used in mathematics.

1.13 Definition of Terms

Literacy in mathematics: is having the ability to problem-solve, reason and analyze information

Problem solving: the process of working through details of a problem to reach a solution.

Language of mathematics: system used by mathematicians to communicate mathematical ideas.

Word problem: is a mathematical exercise where significant background information on the problem is presented as text rather than in mathematical notation.

Assessment: is the systematic basis for making inferences about the learning and development of the content learned

Teachers' perspective: refer to teacher readiness in academic achievements, content mastery and ability to transfer learning to new or future situations

Challenges: computational shortcomings, a lack of knowledge transmission, and an inability to relate the language or terms employed.

Mathematical language: is a mechanism employed in the study of mathematics for the exchange of ideas, concepts, and theories. It is separate from the common language most people are accustomed to and is intended to convey abstract and logical ideas.

Problem solving ability: is the process of understanding a situation and developing an intelligent solution utilizing logic and imagination.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter summarizes the research that has already been done in the field of study. It included a review of the numerous studies carried out by other researchers on the language barriers that students encounter when solving mathematical word problems, how the language of mathematics affects problem-solving ability, and the viewpoints of teachers on the barriers that students encounter when solving mathematical word problems.

2.2 Language difficulties learners face when solving mathematical word problem.

Solving mathematical word problem is an integral part of mathematics education because these problems allow learners to apply their mathematical knowledge and skills to real world situations. Researchers have shown that the process of modelling word problem is often affected by the language. Verschaffel, Geer & De Corte (2000) have noted that the wording and rewording of word problems have systematic effects in the problem solving performance of learners. Such effects have been associated with difficulties in understanding certain types of problems, such as those that use ambiguous and abstract language and contexts (Moreau, S., & Coquin Viennot, D. 2003). Reading relies entirely on the ability to comprehend text structures and nuances of language, as well as to interpret the authors' ideas, visualize, assess, and infer meaning (Ball & Bass, 2003; p.29).

If a learner has no ability to conceptualize the language used in the text, he/she will not be able to solve the problem at hand according to the posed question.

2.2.1 Reading and Comprehending Word Problem

When reading a text, a representation of the text is made by the reader, which describes how the reader understands the text. Many studies about reading comprehension show, or support the conclusion, that “multiple levels of representation are involved in making meaning” (Kendeou, P., & O'Brien, E. J. 2014). Language difficulties prevent learners from comprehending the text of the word problem. The difficult part of solving mathematical word problem appears to be the process of understanding a problem and deciding what operations needs to be performed. Actively reading a problem helps people grasp it, but the depth and quality of the learners' decoding and subsequent understanding of the material has an impact on their achievement (Pape, 2004). Individuals must manage both the text and the mathematics embedded inside the text to solve a word problem (Vilenius -Tuohimaa, Aunola & Nurmi 2008). It's critical to decode a troublesome text thoroughly. According to Adams (2003), many students struggle to solve mathematical word problems because they have difficulty reading, interpreting, and understanding the problem's language. Furthermore, literature (Hosp and Jacek, 2003) suggests that children have difficulty solving mathematical word narrative problems because the problems are complex and difficult for them to comprehend.

Explicit analytic reading skills instruction, according to other research (Barton, Heidema, & Jordan, 2003; Vilenius-Tuohimaa, Aunola, & Nurmi, 2008), improves learners' capacity to solve mathematical problems in a written format. According to the National Center for Education Statistics (NCES), many students struggle to obtain basic arithmetic and reading skills. They also claim that reading and math are the foundations for further academic achievement.

According to Adams (2003), learners are unable to solve mathematical problems smoothly and accurately in a written format due to a lack of comprehension of the specific language and a failure to interpret the written content. He also says that learners don't perceive mathematics written content to be a language, thus they don't use reading skills to comprehend it. Furthermore, according to Jitendra and Griffin (2007), learners are not given adequate instruction in how to answer mathematical word problems. They also claim that teachers believe in the use of textbooks for instruction, claiming that textbooks fail to properly educate children to reason and draw connections.

This, according to these experts, impedes learners' capacity to solve written format mathematical problems efficiently. Many students struggle with story problems, according Jitendra and Griffin (2007). They claim that solving these problems is challenging because it requires learners to comprehend the problem's language and factual facts, as well as transform the problem into a mental representation that is acceptable.

The students must next create and oversee a solution plan, as well as do efficient technical calculations. Learning how to solve story issues, according to Jitendra and Griffin (2007), requires understanding of semantic structure and mathematical relationships. They emphasize that in order to solve issues in a written manner, students must have a fundamental understanding of arithmetic skills and techniques. The ability to read and comprehend the terms used in the text allows the learner to analyze and choose the best operations to employ, making it simple for them to solve the mathematical word problem.

Story word problems, according to Jitendra and Griffin (2007), are crucial in assisting youngsters in making connections between meanings, understandings, and relationships and mathematical procedures. (NCTM, 2011) emphasizes that problem-solving is an essential

part of upper classes mathematics curriculum. Mathematical word problem-solving methodologies and skills must be integrated. They claim that mathematical word puzzles can help students develop conceptual comprehension, improve their ability to reason and communicate quantitatively, and pique their curiosity. The development of learners' problem-solving ability is not only a fundamental aspect of mathematics learning across curriculum areas, but it is also an important part of mathematics learning throughout grade levels.

This research implies that certain skills, such as decoding and reading comprehension, are required for learners to interpret textual material. It also implies that these are important in comprehending the overall problem and in solving it efficiently. Ponce and Garrison (2005) emphasize that if a student does not grasp what a question is asking, they will be unable to work out the meaning owing to a lack of comprehension, which will irritate learners because they will be unable to address written format difficulties efficiently. Before performing the exercise, the student must comprehend what the inquiry has requested. If the person has understood, they are now in a position to solve the problem, and once they have done so correctly, they become motivated.

Adams (2003) encourages educators to emphasize the idea that mathematics may be viewed as a language rather than a set of skills: disregarding this risked learners missing out on mathematical notions that would strengthen and reinforce their learning. According to Adams (2003), the terms, nomenclature, and language used in mathematics are key in comprehending and expressing issue solutions, and that understanding and utilising formal definitions is necessary for understanding and implementing important mathematical

concepts when reading text. He highlights the significance of mathematics education as a language.

He claims that in order for students to understand mathematical problems, teachers must present a variety of reading methodologies. This has created need to investigate why they are affected with the reading and comprehending of such questions. This study therefore seek to find out if mathematical language can be a problem in solving mathematics word problem or if the learners are affected by reading and comprehending of mathematical word problem questions.

2.2.2 Transformation/ translation

Learners who are capable of reading and understanding word problem could not transform. They In order to solve the problem, they lack the ability to effectively describe the information in the problem, and they do not correctly apply appropriate techniques to select the correct procedure. Many students struggle with word problems because they involve numerous steps to arrive at a proper answer, and if a mistake is made at any stage along the process, the entire solution is erroneous. As a result, many students will simply give up or make an educated guess. Making a visual depiction of an issue can help students connect the relationships between the numbers in the problem and the operations required to solve it. Learners who struggle with math can benefit from training that teaches them how to conceptualize, represent, and think analytically about the problem.

The challenge for teaching word problems is how to help student's use quantitative reasoning to identify the relationship between the quantities in the problem and connect those relationships to appropriate operations. If learners are encouraged to know and

meaningfully represent mathematical word problems instead of directly translate the weather of the matter into corresponding mathematical process, they'll more successfully solve their problems and better comprehend the mathematical concepts embedded within them. Most learners are not able to translate word problem to mathematical equations thus the gap has to be filled. This study will therefore find out apart from reading and comprehending can the learner be affected with the translation of the word problems.

2.2.3 Working out and looking back

After the learner has translated word problem into mathematical equation, he or she has to work out the equation until the correct answer is arrived at. This step has become a difficult stage for the learners due to multi-steps required to solve most questions (Jitendra, 2007). Hence there is need for them to be given proper guidelines in solving multi-steps questions. Different researchers have come up with different techniques to support learners in working out such questions. According to (Mercer, Mercer & Pullen 2011) they came up with a strategy called RIDE; R - Make sure you remember the problem.

I - Determine what information is relevant.

D - Decide on the operation and units that will be used to express the answer.

E - Enter the proper number, calculate the solution then double-check it.

The above steps were intended to assist learners who experience difficulty with abstract reasoning, attention, memory and/ or visual spatial skills.

The TINS Strategy (Owen, 2003) helps students to examine and answer word problems in a variety of ways.

T- Considered, Consider what you'll need to do to solve this challenge and circle the important words.

I - Information circle and write the information needed to answer this problem; draw a picture; cross out any information that isn't needed.

N - Write a number phrase to represent the issue.

Write a solution statement that describes your answer.

According to (Wang, Y., & Chiew, V. 2010 as mentioned by polya 1992) there are four steps that a learner has to understand and use to solve mathematical word problem. He suggests steps one must use to solve a problem from the basis of strands in problem solving. The steps are; understanding the problem, devising a plan, carrying out the plan and looking back. This study will investigate if learners after translating the word problem can be capable of working out the word problem and look back to check their working.

2.2.4 Word Problems

O'Halloran (2015) stated that the word problem is created by its own system in this mathematically positioned setting. This language system groups verbal functions, mathematical symbols, and visual displays into categories. Due to its linguistic qualities, failing to comprehend this system will result in failure to comprehend word issues. As a result, in order to deal with linguistic challenges in word resolution,

Word problems are essentially difficulties that occur in a real-life setting (Verschaffel, Van Dooren, Greer, & Mukhopadhyay, 2010); they are distinguished from other sorts of problems by this feature. In this scenario, learners must read and comprehend in order to solve the problem while also incorporating their mathematical knowledge. Because word

problems lack a "simple" mathematical expression, they need a sequence of complex processes to solve (reading, comprehending, changing into mathematical language, processing the mathematics, interpreting the result to the context provided, and assessing the result) (Reys, Lindquist, Lambdin, & Smith, 2014; Ryan & Williams, 2007; Verschaffel et al., 2010). The context of word problems is "situated" or encoded into syntax and diction known to mathematicians, regardless of their real-world context (Verschaffel et al 2020). It's a good idea to look at the linguistics features that go into creating them.

Several linguistic characteristics or aspects that make up mathematics language have been described in the literature. Schleppegrell (2007) and O'Halloran (2015) investigated the linguistic characteristics of mathematical language in depth. To expand the system and categorize the aspects of mathematical speech, the authors used a linguistics perspective. Multiple semiotic systems, vocabulary, and grammar and syntax were identified as three key aspects of mathematical discourse. According to Lee (2005)'s research focused on the characteristics of mathematical language that are particularly useful for evaluation and instruction. Apart from vocabulary and syntax as the fundamental features of mathematical language, the study addressed the naming power, or the ability of a certain word or phrase to awaken related notions in the mind.

Despite the fact that these studies classified mathematical language into three comparable aspects, Lee emphasized on the importance of words and syntax, whereas the first two concentrated on the numerous semiotic systems feature. More was provided by Abedi and Lord (2001), who focused on the use of mathematics language in written assessments, particularly word problems. This effort aided in the development of written instructional language for use in word problems. All of these sources are utilized in conjunction with one

another to provide the most realistic picture of linguistic difficulties in arithmetic word problems. Mathematical discourses, and hence word problems, have a distinct lexicon. Lee (2005) divided those vocabularies into three categories: same-meaning words, math-specific terms (technical words), and words with different meanings.

Words with the same meaning in real life and mathematics are referred to as identical meaning words. Panjang, for example, has the connotation of length or being long in both Indonesian everyday language and mathematical language. Other words are specialized or technical terms that are solely used in mathematics. For example, the terms koefisien (coefficient) and hipotenusa (hypotenuse) are only used in mathematics and not in everyday Indonesian dialogue.

Terms that are used in both everyday conversation and mathematics discourse but have different meanings in each are the last type of words. For example, the word fungsi (function) is used in both daily conversation and mathematics in Indonesia, although it refers to the usage of functions in daily conversation and a mapping of one set to another in mathematics. Ganjil means "weird" or "odd" in everyday Indonesian, but it also implies "not even" in mathematics, or a number that is not a multiplication of two.

The importance of comprehending the meaning of terminology because it appears in mathematics word problems cannot be overstated. Learners failed to solve word problems in certain research (Seifi M, Haghverdi, M., & Azizmohamadi, F. 2012) because they couldn't describe the vocabulary. The word problems in these studies were given in the learners' native language, thus the difficulty is not attributable to translation, but rather to how learners interpret vocabulary.

In several research, learners even failed to consider the meaning of language in word problems. Verschaffel, Greer, and de Corte (2000) and Verschaffel et al. (2000) also addressed this issue in their studies (2010). When faced with a word issue, students are more inclined to focus on the numbers or symbols rather than the vocabulary. When presented the problem "There are 13 boys and 15 girls in a class," learners came up with a numerical solution. "What is the teacher's age?"

This demonstrates that learners still struggle to pay attention to language, let alone make sense of it. Riccomini, Smith, Hughes, and Fries (2015) proposed an approach for getting students to use their language in arithmetic word problems. To enhance mathematical vocabulary, the technique termed vocabulary education employed explicit vocabulary instruction, mnemonic strategies, multiple on vocabulary, game-like activities, and technological applications.

For example, a mnemonic approach for learning the term "parallel lines" is to identify it with a "pair of elves" who are unable to intersect. This mnemonic method provided an engaging and memorable way for students to grasp the notion of parallel lines. The method is not new in and of itself, but owing to technicalities (short of time, lack of sufficient training, etc.) it was not always used by teachers, despite its success. The challenge posed by characteristics of mathematical vocabulary in relation to multiple semiotic systems is in understanding each term independently, regardless of the sentence in which it is used, whereas the challenge in multiple semiotic systems is in how learners can relate the meaning of one representation (be it language, symbols, or visual representation) to another.

When examining language obstacles in mathematics word problems, it is important to remember that the challenges posed by the two can be considered as both separate and

linked at the same time. Complex Syntax and Grammar Mathematical discourse has its own grammar system, which is a set of rules for structuring words, phrases, and clauses in a text; Riccomini, Smith, Hughes, and Fries (2015) proposed an approach for getting students to use their vocabulary in math word problems.

To enhance mathematical vocabulary, the technique termed vocabulary teaching employed explicit vocabulary education, mnemonic strategies, multiple exposures to language, game-like activities, and technological applications. For example, a mnemonic approach for learning the term "parallel lines" is to identify it with a "pair of elves" who are unable to intersect. This mnemonic method provided an engaging and memorable way for students to grasp the notion of parallel lines. This may give the impression that numbers are less important than they are, and that variables other than computational skills are a key source of difficulty with word problems (Daroczy, et al 2015).

In this regard, it's also worth noting that problems with word problems have been documented that can't be related to a lack of basic reading comprehension skills or a lack of general mathematical skills (Hegarty et al., 2012). Nonetheless, linguistics and numerical elements are rarely treated separately in word problems, and they are rarely separated by other means (e.g., regressions).

Lexical inconsistency is one of the few aspects that has been researched in relation to text and arithmetic issues. Language markers such as "less" and "more" can be found in some word problems. Students simply identify "less" with subtraction and "more" with addition in the direct translation technique (Hegarty et al., 2012). They look for keywords and linguistic cues. They use the problem model method to create a mental model of the problem and design their solution around it.

In eye-tracking experiments, successful problem solvers are more likely to use the problem model method; they focus more on variable names and relationship phrases, and they re-read the text less frequently (Pape, 2003). In the (Hegarty et al., 2012) eye tracking study, unsuccessful learners appear to rely on the direct translation technique, focusing on numerals and related terms, as well as linguistics markedness. In lexically inconsistent texts, where "more" is linked with subtraction and "less" with addition, this leads to incorrect results.

Working memory helps with early arithmetic, and research shows that it also helps with word problems solving (Lee et al., 2004). This is because the semantic memory representation "less than" is more complex than "greater than." Changes in the structure of the text place a greater burden on the worker. It has been claimed that word problems are linked to working memory in general (Swanson et al., 2011). Instructions detailing how players must answer a word problem, as well as the manner of evaluation and score system, will most likely impact this. Working memory is employed in reading comprehension model to maintain a number of text propositions active at the same time.

2.2.4 Terms used to show the Four Arithmetic Operations

In math instruction, language's main purpose is to make it possible for both the teacher and the student to precisely explain their understanding of mathematics. Teachers and textbook authors must employ a language whose structure, meaning, technical terminology, and symbolism can be grasped by students at a specific class level in order to achieve the goals of mathematics training.

Receiving messages sometimes includes interpretation on the side of the recipient, which should serve as a warning that messages might be interpreted incorrectly (Mulwa E. C., 2015)

Nickson, (2004) looked on children's challenges with seemingly basic addition problems. He investigated the many types of language that youngsters encounter when dealing with mathematical procedures. 'Add 5 and 3', 'add 3 to 5', 'get the sum of 5 and 3', and '5 + 3' are some examples. As a result, he came to the conclusion that youngsters must be prepared to interpret these seemingly disparate instructions and connect them to the symbolic form '5 + 3'. Anghileri (2006) investigated the role of language in children's division learning, specifically how they read and comprehend the division symbol. She stated that, while there is evidence that children's learning is inextricably linked to the language they use to interpret arithmetic symbols, teachers and researchers should consider how classroom interactions might help these two processes so that true comprehension can be achieved.

Addition and subtraction are the most common operations utilized in Word problems experiments (Fuson, K.C. 2020; De Corte et al., 1988; Schumacher and Fuchs, 2012). Silver, E.A (2013) classified elementary addition and subtraction in their categorization. In the 1980s and 1990s, researchers focused on how youngsters learn to solve one-step addition and subtraction problems with small whole numbers; see Vicente et al (2007). Later, the emphasis shifted to multiplication Word problems or mixed Word problems for example; Greer (2012) proposed a paradigm for categorizing multiplication and division Word problems as models of circumstance based on the sorts of numbers involved (positive integers, fractions, and decimals).

The solution strategies for addition and subtraction are also influenced by the semantic problem structure. Because children do not have a repertoire of "highly automatized schemata" for representing different problem types, word problems require some connection between linguistic and mathematical understanding by their very nature (Garcia, A., Jimenez, L., and Hess, S. 2006). As a result, it's unsurprising that children make more mistakes when solving word problems than when solving number problems (Geary, 2003; Koedinger and Nathan, 2004). Before beginning formal schooling (Verschaffel, et al 2009) children are able to solve a variety of addition and subtraction problems and understand numerical ideas (Verschaffel, et al 2009). (Garcia, A., Jimenez, L., and Hess, S. 2006). As a result, most studies implicitly assume that problem solvers, even children, have the essential basic arithmetic skills.

These findings show that the four procedures were conceptually understood by the students. The goal of this study was to see how well students could use and generate the technical terms 'sum,' 'difference,' 'product,' and 'quotient,' as well as the notions that go with them (addition, subtraction, multiplication, division). The learners' performance on the relevant exam items was expected to demonstrate their understanding of how to utilize each phrase (and also the ability to distinguish between the four terms). Mulwa, E.C (2015) observed that there were difficulties with this latter element.

Many students mistook the word 'product' for' sum' (addition)... or 'difference' (subtraction)... a large number of students defined its (product) everyday application and gave 'something produced' or the same p. 20). As a result, the necessity for this study was felt to discover how widespread this perplexity, comparable to the one described above, was among standard seven students in order to recommend appropriate solutions.

2.3 How Mathematical language affects problem solving ability

2.3.1 Teaching of Mathematics

Teaching of mathematics should follow a systematic flow where a learner is actually involved in the construction of knowledge by physically manipulating and exploring objects through experience. This material improves learner's concentration skills and competence. Mathematical language should be communicated to the learners so as to be able to differentiate the meaning in the ordinary English and its mathematical language. This will enhance learner's mastery of the mathematical concept (Clemson, 2006). A mathematical symbol is a letter or sign showing an operational factor. The symbols are therefore a kind of shorthand where each symbol conveys something. For example 2+3=5, is the shorthand for two put together with three which then comes to five or the sum of two and three is five.

Teachers need to provide appropriate learning materials during instruction. This makes learning practical, it involve use of pupils real life experience. The class has to be spacious for learners to manipulate freely and use them to solve mathematical problems, the availability of learning resource reduces time that could have been spent by teachers in explaining the concept. Many learners lack proficiency in basic mathematics vocabulary.

This lack of understanding of mathematical terms has led to breakdown in the ability to solve multi-step problems thus preventing them from being adept problem solver. Fletcher and Santoli (2013) suggest that the vocabulary of mathematics is not usually taught in schools. These points seem valid as learners are immersed in literature that contains vocabulary from other subject areas but rarely have the researcher seen learner's using the vocabulary of mathematics. It is therefore crucial to stress vocabulary instruction as a part of a mathematics program. Most learners lack skills to solve the problem.

Knowledge of mathematics vocabulary is an important component of learning mathematics. In order to communicate math, thinking clearly learners need to use the language of mathematics precisely it is important to model appropriate language in context, both verbally and visually. Research has shown that vocabulary are often an obstacle to success in mathematical language. These obstacles can be overcome in several ways; the use of learning glossaries to maintain vocabulary comprehension, the use of journal to write about mathematical ideas and the use of literature to learn mathematics language. There has been progress in mathematical problem solving research and findings regarding potential to market problem solving with varied emphasis in the twentieth century (Pehkonen, E., Ahtee, M., Tikkanen, P., & Laine, A. 2011).

In a first phase of problem-solving research, particularly in the 1960s and 1970s, a number of studies on problem-solving processes focusing on the role of Algebraic expression and Arithmetic in problem solving were carried out, based on a model by Pólya (2009).

It was anticipated that teaching and studying heuristic strategies, ideas, and tools would provide students a sense of direction in issue situations, improving their problem-solving ability (Schoenfeld, 2018). Mathematic students can achieve success, according to Kilpatrick et al., (2001), when heuristic approaches are introduced to them, clarified through examples, and trained through the presenting of problems. The need of making learners aware of heuristic techniques is now widely acknowledged in pedagogic discourse.

Differences in approaches to problem-solving abilities are more about determining which problem-solving methods or heuristics should be given to learners and in what order, rather than whether they should be imparted at all. The most successful technique for teaching

computation and mathematic word problem solving to students with learning impairments is explicit systematic instruction. Explicit systematic education necessitates a direct explanation of the topics or abilities being taught.

The main components of explicit systematic instruction include student-teacher interaction, modeling the goal skills, leading the lesson, and providing prompt feedback (Archer & Hughes, 2011; Kocaoz, O.E,2016; Tournaki, 2003). According to the National Mathematics Advisory Panel (2008), these components help children with arithmetic challenges develop core abilities and conceptual knowledge. During explicit systematic instruction, the teacher describes all necessary processes and establishes learning objectives. Another significant feature of this teaching style is assessing students' prior knowledge in order to connect targeted abilities in the learning sequence. The teacher models all steps of the new skill/concept and gives pupils opportunities to see if they can perform the targeted skills appropriately. Although the teacher guides the lessons and activities, students actively participate in the learning. According to the researchers, explicit systematic instruction should be employed regularly in math classes.

2.3.2 Learning of Mathematical Vocabulary and Operations.

Mathematical problem solving is an important part of learning and thinking about mathematics. Unfortunately, even when they are capable of executing other mathematical activities, learners have difficulty addressing word problems in the workplace. Basic mathematical operations such as addition, subtraction, multiplication, and division are simple for them to perform. These students use numbers and equations to solve problems and identify units of measurement. When the operations are hidden beneath a word problem,

however, many students are stumped. In some cases, students attempting to solve a word problem will be able to recognize some of the problem's aspects but will be unable to complete all of the needed operations and hence will be unable to give an acceptable response.

To succeed in mathematics, students must be able to communicate in the language of mathematics (Pimm, 2002, Moschkovich, 2012). Many math teachers have comparable challenges in assisting students in learning to answer word problems (NCTM, 2000; Van De Walle, 2007; Burns, 2007). Before moving further with problem solving, mathematics training should help learners to fully comprehend the problem (Pape, 2004). Instructions that allow students to break down assignments into more manageable or helpful representations and to employ a variety of representations and techniques aid in the development of mathematical skills (Hiebert et al 2005; Van de walle, 2007).

Researchers have looked into the importance of mathematical vocabulary and how it affects students' arithmetic and word problem solving abilities (Amen, 2006; Blessman & Myszczak, 2001; Georgius, 2006; Mcconell, 2008). According to researchers, grasping the problem, particularly the terms that are contained in some situations, is a particularly tough element of solving word problems. The earliest challenges in word problem solving arise from a lack of understanding of specific words, which leads to the incorrect application of relevant mathematical processes. According to several research findings, the growth of mathematical vocabulary has an impact on students' mathematical abilities. One of the biggest reasons of confusion in mathematics, according to Blessman and Myszczak (2001), is terminology. To be successful in mathematics, students must have a better comprehension of mathematical language.

Understanding of mathematical vocabulary affects comprehension of lessons, tasks, and various tests, particularly in problem solving, hence a lack of understanding of mathematical words has an impact on problem-solving ability (Amen, 2006).

2.4 Teachers' perspectives on the difficulties learners have when solving Mathematical word problem

2.4.1 Teachers knowledge

Teachers need to hold knowledge of mathematical problem solving for themselves as problem solvers and to help learners to become better problem solvers. Thus a teachers' knowledge of and for teaching problem solving must be broaden through general ability in problem solving. Ball, Thames and Phelps (2008) suggested that general mathematical ability doesn't fully account for the knowledge and skills needed for effective mathematics teaching. Chapman (2015) found out that teachers could hold different conceptions of contextual problems that have the potential to limit or enhance how problem solving is perceived experienced and learnt by their learners. According to Anderson (2009), mastering problem solving in mathematics helps students develop methods of thinking, habits of tenacity and curiosity, and confidence in novel situations that will serve them well as problem solvers outside of the mathematics classroom.

Anderson (2009) agrees that problem solving is an important mathematical activity because it needs students to integrate abilities and concepts to deal with specific mathematical circumstances.

It is critical to teach issue solving to employees because they will acquire problem-solving habits of mind when working with content areas, which will prepare them for real-world circumstances that need effort and thought (Keşan, C., Kaya, D., & Güvercin, S. (2010). Learners who master mathematical problem solving skills early on are better prepared for advanced math and other complicated problem-solving activities.

Problem solving talents are used not only in advanced mathematical courses such as algebra, geometry, and calculus, but also across the mathematics curriculum, according to NCEE (2012).

According to NCEE (2012), problem solving is an essential component of all mathematics education and should not be treated as a separate subject. Number and operations, algebra, geometry, measurement, and data analysis and probability should all be included. Problem solving teaches students not only how to think mathematically, but also how to face life's issues with confidence in their abilities to solve problems (Cheng, D., & Sabinin, P. 2011). Mathematical problem-solving skills can be transferred to other aspects of life, such as the ability to reason. Problem solution is dynamic and varied, which aids learners with a variety of learning methods in developing and demonstrating mathematical understanding.

According to Stigler and Hiebert (2004), problem-solving can also be utilized to effectively introduce new mathematical knowledge to learners by establishing a need for it. According to Carson (2007), problem solving bridges the gap between theory and practice by allowing students to apply abstract academic information to actual real-world situations.

Not only are problem-solving abilities useful in a scholarly context, but they can also assist learners understand and produce answers while dealing with many of life's difficulties or challenges in a diverse and challenging environment, according to Hains-Wesson (2013).

Mathematical problem solvers, according to Rigelman (2007), are versatile and fluent thinkers who are confident in their knowledge and procedures. Mathematical problem solvers are also defined by their desire to accept a challenge and persevere in their efforts to understand and solve a problem. Finally, mathematical problem solvers are viewed as individuals who are curious, seek patterns and connections, and think reflectively.

Furthermore, Rigelman (2007) claims that being a strong problem solver can provide significant benefits outside of the classroom. This study's issue solving incorporates problem solving by students in class seven, which may entail generating major connections between multiple representations and requiring students to demonstrate their conceptual understanding. Under the cognitive level complex procedures, these are challenges involving complex calculations and higher order reasoning. It is obvious that involving students in problem solving can aid in the development of reasoning skills. Teachers should ensure that students are encouraged to use logic in their mathematics work, including word puzzles.

Collaborative teaching as a teaching approach can be used to build a culture where learners learn to reason and improve their problem-solving skills and strategies.

2.4.2 The linguistic aspects of word problem

Despite the fact that there are many different types of word problems, it is clear that language plays a critical part in all of them. According to Sepeng and Madzorera (2014), the most challenging component of solving a mathematical word problem appears to be determining what operation(s) must be done (p.217). As a result, addressing word problems entails a variety of cognitive and language processes, such as understanding (Bnaks, Jeddeeni & Walker, 2016; Martiniello, 2008; Zhang & Lin, 2015). These complicated processes have sparked curiosity in the manner in which language might influence an individual's mathematical performance.

2.4.3 Attitude towards Mathematics

Attitude is the will or zeal to do something both fully and positively for a better result or negatively for wrong or unpleasant result. Mathematics involves application of varied technique therefore children need varied methods of teaching/ learning to make learning realistic and enjoyable. Mathematics needs maximum cooperation for all individuals (parents, teachers and learners). Learner's attitude towards mathematics depends on many factors. At home parents may take mathematics positively or negatively depending on their past experiences. Children may develop the same attitude as their parents, ever before they go to school. When the learners come to school it's the teachers' responsibility to develop a positive attitude in all the pupils towards mathematics. However some of the teacher's may also have a negative attitude towards mathematics.

If the attitude of the pupil's, teachers' and parents' is positive, you need to support and strengthen it for the better performance and achievement in the learning of mathematics.

However if the attitude is negative one should try to change this through relating mathematics to everyday life, use of games during learning of mathematics, use of appropriate resources, use of models, in service training and team work teaching. Teachers' should promote equal opportunities in learning mathematics through class interaction in mathematics lesson, sitting arrangement, use of language and positive relationships

2.4.4 Mathematics Anxiety

Maths anxiety is characterized as a sensation of tension, uncertainty, and worry that impairs one's ability to do mathematical operations, manipulate numbers, and solve mathematical problems in a range of real-world and academic contexts (Ashcraft MH, 2002). Math anxiety, according to Olango M. (2016), is an affective, behavioral, and cognitive reaction to a perceived danger to one's self-esteem that happens in response to circumstances involving mathematics. There are two approaches to distinguish dyscalculia, which is defined by a particular cognitive weakness in mathematics, from math anxiety, which has emotional roots (Mammarella IC, Hill F, Devine A, Caviola S & Szucs D, 2015). First off, even though someone may despise math, math anxiety can still exist in them. Second, unlike dyscalculia, math anxiety includes an emotional component (Helal A, Abo Hamza E, and Harstorm F, 2011).

All educational levels, from elementary school to university, are susceptible to math anxiety. According to research by Harari RR, Vukovic RK, and Bailey SP (2013) on a sample of first-graders, the most noticeable aspects of math anxiety are negative emotions and numerical confidence. At the tertiary level, similar findings were also seen in a variety of fields, including the health care industry. For instance, Roykenes K. and Larsen T. (2010)

discovered that there was a negative relationship between prior likes/dislikes in mathematics and self-assessment of mathematical aptitude among 116 baccalaureate nursing students.

Numerous elements may assist or contribute to math anxiety. Teachers, parents, peers, and society can all be considered as these influences or facilitators. Arithmetic anxiety might develop as a result of unpleasant math learning experiences in the classroom or at home (Mutodi P and Ngirande H 2014). First off, the teacher has a big part to play in attracting students and easing their fears. A pleasant learning atmosphere can be created by effective math teachers so that students have high expectations for their education (McNaught M and Grouws D 2007). Second, parents have a significant impact on how their children acquire or manage their arithmetic phobia. Parents' actions and interactions with their kids are crucial in this regard (Mutodi P and Ngirande H 2014). The parents can identify any early learning issues by talking about the worries and anxieties that their kids may have (McNaught M and Grouws D 2007). By doing this, the pupils may avoid experiencing any learning phobias in the future.

Additionally, children who have parents who struggle with arithmetic also struggle with math anxiety by the end of the school year (Maloney EA, Ramirez G, Gunderson EA, Levine SC & Beilock SL 2015). Thirdly, peers are crucial in reducing math fear (Mutodi P and Ngirande H 2014).Peers can negatively affect their colleagues at any level of the learning process. For instance, when students make mistakes, they may feel inferior in front of their peers.

Finally, because of societal misconceptions about mathematics, or "math myths," math anxiety may emerge. Math anxiety has a negative effect on people; many students who experience it lack confidence in their mathematical abilities and only enrol in the bare

minimum of mathematics courses, which severely restricts their career options (Fispino M, Pereda J, Recon J, Perculeza F & Umali C 2017).

Mathematics anxiety is anxiety about one's ability to do mathematics independently. This is phenomenon that is often considered when examining learner's problem in mathematics. Ponce ,Garrison (2005) stated that "not knowing what the matter says, not understanding what the matter means, and not recognizing the way to do the matter contribute significantly to the frustration that learners feel when trying to solve word problems and to the challenge teacher face in trying to help learners overcome this frustration".

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The chapter covered research methodology under the following headings: Research methodology, Research design, location of study, target population, sample and sampling procedures, research instruments, piloting of research, testing for validity and reliability, data collection procedures ,data analysis and ethical considerations.

3.2 Research design

The study employed constructivism paradigm and followed concurrent triangulation design using a mixed method research approach. Mixed method approach is an approach to inquiry that combines or associates both qualitative and quantitative forms. It provides researchers across research discipline, with a rigorous approach to answering research questions. It was especially useful in understanding the quantitative results and qualitative findings. Reflect participants' point of view. The study was concerned with ways in which learners can solve mathematical word problem with ease. It is specifically intended to investigate the relationship between effects of mathematical language and problem solving. The approach was employed mainly because it gave a voice to study participants and ensure that study findings are grounded in participants' experiences. A questionnaire was used to gather quantitative data. Closed-ended questions were used in the questionnaire because they are simpler to administer and analyze because an alternate response is provided for each item. This questionnaires was given to examine how well learners understood the mathematical terms used in the word problem solving exercises. Likert scale questions were used in the

study. A question with a likert scale has 5 possible answers. The ordinal data (which can be ranked) were obtained through a closed-ended questionnaire. This required the employment of a thorough, 5-point Likert scale–structured questionnaire, which was chosen for the questionnaire's aim. Open-ended questions are used in qualitative data to generate lengthy written or typed responses. The purpose of the questions is to elicit beliefs, knowledge, stories, or accounts. To investigate the degree to which students understood the mathematical terminology used in word problem solving assignments. Additional information was gathered through an interview schedule given to the teachers.

3.2.1 Study Area

The study sought to assess the performance of Mathematics among class seven learners in Public Primary Schools in Cheptiret Zone, Kesses Sub-county, Uasin-Gishu County, which has a population of 1292 learners from 23 schools from May 2019 to February 2020.

3.3 Target population

The target population refers to the specific group, individual relevant to a particular study. Mugenda and Mugenda (2013) explain that a population is a group of individuals or objects that have the same form of characteristics. The target population of this study was 1292 class seven learners and 31 mathematics teachers of Cheptiret zone Uasin Gishu County.

3.4 Sample Size and Sampling Techniques

Sample is part of the research target selected to participate in research, representing general target group. Sampling process is a practise of selecting part of research target to represent whole population. Simple random sampling was used to select class seven learners in twenty three schools from the zone because simple random sampling has equal chance, no biasness

and saves time and money. Balloting was done where odd numbers were used as the sample size Also Purposive sampling was used to select 15 mathematics teachers in the sampled because purposive sampling chooses a representative who is the key informant. Fifteen mathematics teachers were selected from the even ballots. The sample size for this study was 388 this was based on Kombo and Tromp (2006) who says that a sample size of 10%-30% of the target population is acceptable. Therefore from this study the sample size of 30% of the target population was used as shown in the table below.

Table 3.1 Sample size

Kerita Tulwet	**28**	**8**
Kerita Kosyin	**68**	**20**
Chebii	**24**	**7**
Mugundoi	**48**	**14**
Chesegem	**54**	**16**
Cheplosgei	**63**	**18**
St.Mathews	**32**	**10**
Seiyo	**43**	**13**
Chuchuniat	**46**	**14**
Mogobich	**47**	**14**
Chemenei	**44**	**13**
Keringet	**32**	**10**
Rehema	**46**	**14**
Hillschool	**105**	**32**
Racecourse	**112**	**34**
Sosiani	**126**	**38**
Oasis	**42**	**13**
Kerita main	**48**	**14**
	1292	**388**

3.5 Research Instruments

This involves the techniques for data gathering phase of the work. In order to meet the objective of the study, the following instruments namely questionnaires and interviews were used to collect data.

3.5.1 Questionnaires

According to O'Leary, Z (2014) questionnaires were used because it can be given to a large number of respondent simultaneously, it is less expensive particularly in terms of time spent collecting the data. Using this instrument make the respondent to feel that they can remain anonymous and thus may be likely to express controversial opinions. There were open-ended questionnaires where the respondents created their own answers and closed-ended questionnaires which were limited to what researcher provided.

3.5.2 Interview Schedule

According to (Bell & Waters, 2014) interview is a conversation where questions are asked and answers are given. In common parlance, the word interview refers to a one-on-one conversation with one person acting in the role of the interviewer and the other in the role of the interviewee. The interviewer asks questions, the interviewee responds, with participants taking turns talking. The study employed both structured and unstructured interview schedule. For the unstructured or free-wheeling and open-ended conversations there is no predetermined plan with prearranged questions, while highly structured conversations specific questions occur in a specified order. This was used to obtain data from the mathematics teachers. This was suitable since it allowed room for more elaboration. The use of interview schedule was essential to the respondent since the data collected was first hand.

3.6 Pilot Study

The pilot study was conducted in Keiyo South Sub-county, Metkei Zone. In a pilot study, questions such as whether something can be done, if it should be pursued, and how should be answered is crucial for enhancing the main study's effectiveness and quality. However, it features a unique design element. A 14 percent representative sample size as recommended by Korean J Anesthesiol (2017) was used for the purpose of the pilot study; three (3) schools [14% of 23 schools of the target population] and 54 learners [14% of the 388 targeted learners]. A reason for piloting is to test the instruments accuracy and appropriateness, to identify problem before implementing the study, to examine the validity of each question and to determine the feasibility of the study protocol. From the pilot study it was evident that most learners have difficulties in solving mathematics word problem. Learners need to be given thorough practice on solving word problem. After the pilot exercise some items were revised to address the objectivity of the study. The researcher re-framed the items, which appear vague and insert more items to improve the quality of the instruments and this reduced the possibility of misinterpretation

3.7 Validity and Reliability of Research Instruments

3.7.1 Validity of the Research Instrument

Validity refers to the degree to which ends up obtained from analysis of knowledge collected actually represent the phenomena understudy. This is often supported by (Orodho, 2012) who notes that validity refers to the degree to which a test measures what it purports to live. In other words, validity is that the degree to which the results obtained from the info actually represents the phenomena under a study. (Kimberlin and Winterstein 2008) notes

that validity of an instrument is improved through expert judgement. to realize content and construct validity, the researcher sought assistance from the university supervisors and other research experts from the varsity of Education to determine whether the question items within the instruments measured what they were alleged to measure. Content validity ensured that the instrument covered all areas to be examined while construct validity ensured that the question items measure the construct it purports to live. For face validity, the researcher ensured that the overall outlook of the instrument is acceptable and appealing to the respondents by use of correct font size and sort. Adequacy of workspace, clarity of printing among others. Feedback was revised and reviewed to make sure that the question items are adequately and properly structured.

3.7.2 Reliability of the Research instrument

Reliability is the measure of the degree to which a search instrument yields consistent results or data after repeated trials. Orodho (2012) refers to reliability because the extent to which a test within the research is internally consistent and yields consistent results upon testing and retesting. Reliability enhances dependability, accuracy and adequacy of the instruments through piloting. Reliability of research instruments were tested after piloting using Cronbachs' Coefficient Alpha method, which may be a measure of internal consistency of things. The tactic is found to be the foremost appropriate because it involves one administration of the instruments. A reliability Coefficient level of 0.7 or more would indicate that the instrument is reliable enough to solicit for the specified information (Shevlin, M., Miles, J. N. V., Davies, M. N. O., & Walker, S. 2000). The equation below was supported by Cronbach (1997) which was applied on Statistical inference for coefficient alpha:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}} \quad \text{.....(iii)}$$

Where N is equal to the number of items, c-bar is the average inter-item covariance among the items and v-bar equals the average variance. Reliability coefficient of 0.7 or higher would be considered acceptable as generated by Santos (1999) on a tool for assessing the reliability of scales. The following are the reliability results which indicated that the research instruments were reliable and allowed data collection to take place, see results in Table 3.2.

Table 3.2 Reliability Results

Variables	Number of	Alpha value
Language difficulties	3	0.836
Problem solving ability	5	0.787
Teacher's perspective	6	0.772

The pilot results indicated that the reliability of the language difficulties was 0.836 using Cronbach's alpha test of reliability; the reliability of the problem solving ability was 0.787; the reliability of the teacher's perspective was 0.772. Accordingly, Sekaran and Bougie (2011), opine that a Cronbach's alpha of 0.70 and above is considered good. The study results revealed that all the variables gave an alpha test value of greater than 0.70, therefore all the items were regarded reliable hence valid for data analysis.

3.8 Data Collection Procedures

After assessment, corrections were made, the researcher sought clearance from Moi University through the Ethical Review Committee and letter from Dean School of Postgraduate Studies and then consent sought from National Commission of Science Technology and Innovation. (NACOSTI) to conduct the data collection. The researcher then obtained a letter of authorization from the School of Education Moi University. This letter was taken to the ministry of Education, County Education officer Uasin Gishu County to obtain permission before proceeding to the field. Letter was dispatched to the Head teachers' of the sampled schools to allow the researcher to use the school for the purpose of the study. The researcher then collected data from the selected respondents after receiving clearance to conduct the research in the schools sampled for the research.

3.9 Data Analysis

The filled questionnaires were checked for completeness to verify that all the questions in the questionnaires were filled. Data collected from questionnaires, was examined to remove those with incomplete items and multiple entries. Quantitative data was coded and entered into the computer for analysis using the Statistical Package for Social Sciences (SPSS) version 24 for windows. Quantitative analysis tends to be based on numerical measurements of specific aspects of phenomena (Hall, S., & Whannel, P. 2018; Pritchard, D. E., DeBoer, J., Stump, G. S., Ho, A. D., & Seaton, D. T. 2013). Closed-ended questions were analysed using likert scales into mutually exclusive categories and frequencies by employing descriptive statistics using the statistical package for social science (SPSS V 24). Analysis involved the production and interpretation of frequencies counts and tables that was described and summarize the data. The items on teachers and learners questionnaires were

scored on a 5 point as follows: SA- Strongly Agree = 5 points, A –Agree = 4 points, U-Undecided = 3 points, D-Disagree = 2 points and SD- Strongly Disagree = 1 point. Open-ended questions were analysed using thematic analysis. Thematic analysis was used to analyse qualitative data from the interview schedules. A thematic analysis strives to spot patterns of themes within the interview data.

3.10 Ethical Consideration

The researcher sought permission to do the study from School of Education and Department of Curriculum Instruction and Media of Moi University and from the respondent who participated in the study. This was done through letters which were written to the Ministry of Education, Uasin Gishu county education office, and head teachers of the respondent schools. The nature and purpose of the study was explained to the respondent by the researcher. The researcher respected the respondent rights to safeguard their integrity and confidentiality. The results of the study were availed to the Uasin Gishu County Education Office and to those participants who were interested in the outcomes of the research study.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

Data findings and analysis in form of percentages, tables and figures is presented in this chapter. Field data obtained was investigated using descriptive statistics.

4.2 Response Rate

Out of the 388 questionnaires that were distributed to different schools for the study, 320 were successfully filled and taken back. This represents a response rate of 83%. According to Nachmias (2009), a response rate exceeding 60% was believed to be sufficient for analysis and thus, 83% return rate, was considered to be satisfactorily. Also all the 15 teachers participated in the interview schedule. These represent a response rate of 100%.

4.3 Language Difficulties Learners Face when Solving Mathematical Word Problem

The study sought to find out the challenges learners' face when solving mathematical word problem, a likert scale was used as follows SA= Strongly Agree, A= Agree, UD = Undecided, DA = Disagree SD = Strongly Disagree.

Table 4.1 Language difficulties learners face when solving mathematical word problem

Statement	SA		A		UD		DA		SD	
	f	%	f	%	f	%	f	%	f	%
Mathematics language affects my ability to solve word problems	45	14.1	122	38.1	60	18.8	80	25	13	4.0
I often seek assistance in word problem questions	110	34.3	132	41.3	0	0	78	24.4	0	0
Ability to read and knowing basic facts help me be successful at solving maths word problem	140	43.8	162	50	18	6.2	0	0	0	0
Am given time by my teacher to read and interpret word problems	102	31.88	180	56.25	38	11.87	0	0	0	0
I usually skip and come back if I get stuck on a word problem	90	28.1	125	39.0	80	25	20	6.3	5	1.6

***Source*: Field data (2019)**

The study sought to determine the challenges learners face when solving mathematical word problem in among class seven learners in Cheptiret Zone, Uasin-Gishu County, Kenya and the findings were as shown in Table 4.1

The research findings on how mathematics language affects learners ability to solve word problems were, 45(14.1%) strongly agreed, 122(38.1%) agreed, 60(18.8%) undecided, 80(25%) disagreed and 13(4.0%) strongly disagreed .From the results it's clear that majority of the respondents 122(38.1%) agreed that the mathematical language used affects their ability to solve word problems while minority 13(4.0%) strongly disagreed with the statement. Learners were interviewed on what affects their performance in mathematics and

most learners responded that *"the language used in mathematics some mean the same as ordinary English but there are other words that we only encounter in mathematics. Such words hinder us from solving the word problem questions"*. The findings were in agreement with the study by (Pape, 2004) that language difficulties prevent learners from comprehending the text of the word problem. The difficult part of solving mathematical word problem appears to be the process of understanding a problem and deciding what operations needs to be performed. Actively reading a problem helps people grasp it, but the depth and quality of a learner's decoding and subsequent comprehension of the material has an impact on their achievement (Pape, 2004). Individuals must manage both the text and the mathematics embedded inside the text to solve a word problem (Vilenius-Tuohimaa, Aunola & Nurmi, 2008).

The research findings on i often seek assistance in word problem questions were as follows 110(34%) strongly agreed, 132(41.3%) agreed and 78(24.4%) disagreed with the statement. From the results it's clear that majority of the learners 132(41.3%) often seek assistance in word problem questions from their teachers in order to comprehend the word problem, minority 78(24.4%) disagreed with the statement meaning that they don't often seek assistance in word problems this could be interpreted to mean that they experience little to no challenge hence no need to seek assistance. The learners were also interviewed on which mathematical operation they use to solve a problem, majority of the respondents indicated that "*we read the question, internalize and figure out which math operation to use in solving the mathematical problem*". Choosing mathematical operations is a crucial step in the process of converting English words to mathematical statements. Success is contingent on two factors: (a) the ability to comprehend the sentence's literal meaning (b) the ability to

mathematically represent this meaning even if they have the requisite mathematical skills, learners who do not understand the literal meaning of the sentence will be unable to represent it mathematically. (Imagine attempting to answer a word puzzle in a language you are unfamiliar with, such as Arabic.) Even if students comprehend the sentence's literal meaning, they will be unable to solve the problem unless they can also represent this meaning mathematically. To put it another way, successful word problem solutions require both reading and math ability. Choosing an operation, in particular, entails recognizing language signals that point to mathematical meanings.

The research findings on the ability to read and knowing basic facts help me be successful at solving mathematics word problem were as follows;140(43.8%) strongly agreed,162(50%) agreed and 18(6.2%) undecided. From the results, it's clear that majority of the respondents 162(50%) agreed that ability to read and know basic facts help them be successful at solving mathematics word problem while the minority 18(6.2%) were undecided whether this helps them at solving mathematical word problems or not. These results could be interpreted to mean that most learners who had the ability to read and know basic facts help them be successful on solving mathematical word problem. On the issue of learners' comprehension and application of math's concept the learners interviewed indicated that when solving a mathematical problem, the learner follows a certain pattern. One of the responded said "*whenever I read and understand the question, I can be able to solve the problem*". According to (Polya, 1992) there are four steps that a learner has to understand and use to solve mathematical word problem. He suggests steps one must use to solve a problem from the basis of strands in problem solving. The steps are; understanding the problem, devising a plan, carrying out the plan and looking back.

The findings were in agreement with the study done by Adams (2003) proclaims that learners are unable to solve mathematical problems fluently and properly in a written format due to a lack of comprehension of the specific language and inability to interpret the written content. He also says that learners don't perceive mathematics written content to be a language, thus they don't use reading skills to comprehend it. In addition, Jitendra et al. (2007) and Griffin and Jitendra (2008) claim that students are not given adequate instruction in how to solve mathematical word problems.

The research findings on if learners are given time by their teacher to read and interpret word problems were as follows; 102(31.88%) strongly agree, 180(56.25%) agree and 38(11.87%) disagree. From the results, it's clear that majority of the respondents 180(56.25%) agreed that they were given time by their teacher to read and interpret word problems while minority 38(11.87%) disagreed. These results could be interpreted to mean that learners who were given enough time by their teacher to read and interpret word problems were able to solve this problem and therefore overcome the challenge. The learners were also interviewed on the way in which they determine if they have chosen the correct method to solve a mathematical problem. Most of the learners indicated that "*we read the mathematical sentence, highlight the keywords while reading the mathematical problem, re-read the question, draw a picture of the situation that the problem presents and determine the goal of the problem*". One of the biggest reasons of confusion in mathematics, according to Blessman and Myszczak (2000), is terminology. To be successful in mathematics, students must have a better comprehension of mathematical language. Understanding of mathematical vocabulary affects comprehension of lessons, tasks, and

various tests, particularly in problem solving, hence a lack of understanding of mathematical words has an impact on problem-solving ability (Amen, 2006).

The research findings on learners usually skip and come back if they get stuck on a word problem were as follows; 90 (28.1%) strongly agreed, 125(39.0%) agreed, 80(25%) undecided, 20(6.3%) disagreed and 5(1.6%) strongly disagreed. It's evident that majority of the respondents 125(39.0%) agreed that they usually skip and come back if they get stuck on a word problem and thus able to solve the mathematical word problem. The learners were also interviewed on what helps them learn maths well, most of the learners responded that "*having positive attitude towards maths was the main thing that made us learn maths well and at ease*". Attitude is the will or zeal to do something either fully or positively for a better result or negatively for wrong/ unpleasant result. Because of their knowledge of the grammatical language of education, learners' ability to master mathematical language will determine their success in interpreting and solving word problems. Mathematics performance and reading skills are tightly intertwined, according to Light and DeFries (cited in Velenius-Tuohimaa, Aunola, & Nurmi, 2008), and difficulties in arithmetic are associated with the growth of reading ability.

In the same paper, Velenius-Tuohimaa et al. (2008:409) state that Jordan, Hanich, and Kaplan (2003) discovered that reading disabilities predict children's development in mathematics, but that mathematics disabilities have no effect on children's reading progress. According to Pape (2004:188), the semantic content of seemingly similar items varies greatly between languages, and identical meaning is expressed in different ways in different languages. Mathematics involves application of varied technique; therefore children need varied methods of teaching learning to make learning realistic and enjoyable. The teaching

method of a teacher was also cited as a contributing factor that helps the learner learn maths well. Chapman (2015) found out that teachers could hold different conceptions of contextual problems that have the potential to limit or enhance how problem solving is perceived, experienced and learnt by their learners.

4.4 How mathematics language affects problem solving skills

The study sought to find out how mathematical language affect problem solving ability. A likert scale was used as follows SA= Strongly Agree, A= Agree, UD = Undecided, DA = Disagree SD = Strongly Disagree

Table 4.2 How mathematics language affects problem solving skills

Statement	**SA**		**A**		**UD**		**DA**		**SD**	
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Mathematics as a subject is difficult	42	13.0	98	30.6	60	18.8	76	23.8	44	13.8
Listening and practice helps me learn mathematics at ease	146	45.6	74	23.1	58	18.1	42	13.1	0	0
There are words that means differently in mathematics and ordinary English	118	36.9	80	25	84	26.3	38	11.9	0	0
Most learners score high when the questions are not wordy	0	0	188	58.8	70	21.8	62	19.4	0	0
Whenever i see mathematical questions i just read and guess the answers	0	0	80	25	55	17.2	81	25.3	104	32.5

(Source: Researcher, 2019)

The study findings on listening and practice helps me learn mathematics at ease, the results were as follows 146(45.6%) strongly agreed, 74(23.1%) agreed, 58(18.1%) were undecided, 42(13.1%) disagreed. From the findings, majority of the respondents 142(45.6%) strongly agreed that listening and practice helps learners learn mathematics at ease the minority 42(13.1%) disagreed. One reason why children are expected to exhibit their work when doing homework or answering questions on a math test is because of this. According to the learners,

> "*Teachers may give out more credit for good work than for right responses. This technique may penalize a gifted child who intuitively arrives at the proper solution but does not understand how they arrived there, or a child who struggles to write by hand. Recognizing the needs and strengths of individual students is at the heart of teaching quality*".

From these results its evident listening and practice helps learners learn mathematics at ease, when learners are given mathematical problems to work on they tend to develop problem solving ability thus able to overcome the mathematical language effect and thus learn mathematics at ease. According to (Reynders, 2014) Engaging learners through shared problem-solving is a great method to get them involved.

The teacher and the students collaborate to pose and solve challenges. The teacher could, for example, encourage the students to think of some questions that people might have regarding their lesson. Typically, children will begin by asking simple 'how many' questions, such as: How many girls are there? What is the total number of boys? How many girls do you know who have long hair? Eventually, more complicated questions develop, such as how many more boys there are than girls, for example. What is the total number of students in the class? Mathematical learners with learning difficulties can benefit from training that enables them to visualize, represent, and think analytically about an issue.

The study findings on there are words that means differently in mathematics and ordinary English were as follows 118(36.9%) strongly agreed,80(25%) agreed, 84(26.3%) were undecided,38(11.9%) disagreed. From the findings, majority of the respondents 118(36.9%) strongly agreed that there are words that means differently in mathematics and ordinary English while the minority 38(11.9%) disagreed. From these results its evident that majority of the learners agreed that there are word that means differently in mathematics and ordinary English, this was in agreement with study by (Clemson, 1994) Mathematical language should be communicated to the learners so as to be able to differentiate the meaning in the ordinary English and its mathematical language. On how to differentiate mathematical terms from ordinary English the learners suggested the following;

> "*we need to be motivated by demonstrating real-life instances in which math is used outside the classroom. Explain how math works, reassuring us that it isn't just about arithmetic, and encouraging us to try it out and feel comfortable trying out new approaches to problem solving, even if we don't always get the right answer*".

The teacher gives verbal explanations, displays work on the board, and, if possible, incorporates tactile artifacts that students may touch and move around with. Perse sensory input can help learners learn by making it simpler for them to engage with a lesson and by helping learners remember it. This is particularly necessary when dealing with a subject that can be somewhat abstract. According to research (Griffin & Jitendra, 2007), story problems pose a challenge for many students. According to these experts, solving these challenges is tough because it requires learners to comprehend the problem's language and factual material, as well as transform the problem into a mental representation that is acceptable. The students must next create and oversee a solution plan, as well as do efficient technical calculations. Learning how to solve story issues, according to Griffin and Jitendra (2007),

requires understanding of semantic structure and mathematical relationships. They emphasize that in order to solve issues in a written manner, students must have a fundamental understanding of arithmetic skills and techniques. Story word problems, according to Griffin and Jitendra (2007), are crucial in assisting youngsters in making connections between meanings, understandings, and relationships and mathematical procedures. Contextualized issues, often known as word or story problems, are important in the development of mathematical thinking in students of all ages (Reynders, 2014). Language is linked to issues like poor reading and comprehension abilities. Understanding the grammatical constructions that learners have and employ in word problems can show additional aspects that contribute to poor problem-solving in word problems (Reynders, 2014). A mathematical symbol is a letter or sign showing an operational factor. The symbols are therefore a kind of shorthand where each symbol conveys something. For example, 2+3=5, is the shorthand for two put together with three, which then comes to five, or the sum of two and three is five.

On the findings on most learners score high when the questions are not wordy the responses were as follows; 188(58.8%) agreed, 70(21.8%) undecided and 62(19.4%) disagreed. From the results its evident that majority of the respondents 188(58.8%) agreed that most learners score high when the questions are not wordy, this can be interpreted to mean that most learners experience difficulties in interpreting wordy questions as compare to questions being numerically expressed. Learners were interviewed on their scores and most responded that "*when given numerical questions we score the best, but when the questions are wordy our performance is below expectations"* Based on a model (Polya, 2009), a series of studies on problem-solving processes were conducted in a first phase of research on issue solving,

particularly in the 1960s and 1970s, with an emphasis on the role of Algebraic expression, Algebraic expression, and Arithmetic in problem solving. It was anticipated that teaching and studying heuristic strategies, ideas, and tools would provide students a sense of direction in issue situations, improving their problem-solving ability (Schoenfeld, 2013).

The findings on whenever I see mathematical word problem questions I just read and guess the answers the results were as follows; 80(25%) strongly agreed, 55(17.2%) agreed, 81(25.3%) undecided, 104(32.5%) disagreed. From the results its evident that majority of the respondents 31.3% disagreed that whenever learners see mathematical word problem questions they read and guess the answers. These findings can be interpreted to mean that most learners actually work or try to work out the problem in order to find the solution. The learners were asked to give their own opinion on the learning experience that makes mathematics become difficult and here were there responses;

> "*Math anxiety causes a lack of desire, as does a lack of comprehension of how to apply and perform mathematical procedures*".

Many learners may become frustrated when answering word problems since the method requires numerous stages to arrive at a proper answer, and if a mistake is made at any point along the way, the entire problem is incorrect. As a result, many students will simply give up or make an educated guess. Making a visual depiction of an issue can help students connect the relationships between the numbers in the problem and the operations required to solve it.

4.5 Teachers Questionnaire

The study seeks to identify teacher's perspectives on the difficulties their learners have when solving mathematical word problem. A likert scale was used as follows SA= Strongly

Agree, A= Agree, UD = Undecided, DA = Disagree SD = Strongly Disagree. 15 teachers took part in the study.

Table 4.3 Teachers Questionnaire

Statement	SA		A		UD		DA		SD	
	f	%	f	%	f	%	f	%	f	%
Solving mathematical word problem is hard to most learners	4	26.7	5	33.3	3	20	3	20	0	0
Mathematical language is a major cause of poor performance in mathematics	0	0	6	40.0	4	26.7	2	13.3	3	20
I often vary my teaching methods of problem solving	6	40.0	4	26.7	3	20.0	0	0	2	13.3
Learners rarely seek assistance in word problem question in mathematics	0	0	7	46.7	7	46.7	1	6.6	0	0
Most mathematics teachers avoid word problem questions during lesson presentation	0	0	0	0	3	20	5	33.3	7	46.7
I always motivate learners develop positive attitude towards mathematics	8	53.3	4	26.7	2	13.3	1	6.7	0	0
Learners take a long time more than the stipulated time to solve word problem	0	0	9	60	3	20	2	13.3	1	6.7

***Source*: Researcher (2019)**

The research findings on solving mathematical word problem is hard to most learners were 4(26.7%) strongly agreed, 5(33.3%) agreed, 3(20%) undecided, 3(20%) disagreed. From the results it is clear that majority of the respondents 33.3% agreed that solving mathematical

word problem is hard to most learners while minority 20% were undecided and disagreed respectively. From the teacher's interview, majority replied as follows; "*Learner's may fail to read some words thus not understand what the question asks. Others can read and fail to interpret what requires to be done*". Language barrier was cited as a major hindrance to learners' ability to read and comprehend word problem, Learners employ two separate paths to interpret literature, according to Hegarty, Mayer, and Monk (1995): the direct translation technique and the issue model approach. Instead of building mental representations of the difficulties, the former relies on key words. According to research, requiring students to rely only on their knowledge of particular key terms can actually deter them from attempting to comprehend the challenges (Krick-Morales, 2006). Key words might make it difficult to tell the difference between common and mathematical language. "The mathematical language that we employ (symbols, pictures, phrases, and numbers) is often unique (used solely by mathematicians) or is borrowed from daily language and transformed into something different," for example (Kotsopoulos, 2007).

The findings were in agreement with the study by (Pape, 2004) that language difficulties prevent learners from comprehending the text of the word problem. The difficult part of solving mathematical word problem appears to be the process of understanding a problem and deciding what operations needs to be performed. Actively reading a problem helps people grasp it, but the depth and quality of a learner's decoding and subsequent comprehension of the material has an impact on their achievement (Pape, 2004). Individuals must manage both the text and the mathematics embedded inside the text to solve a word problem (Vilenius Tuohimaa, Aunola & Nurmi 2008).

The research findings on mathematical language is a major cause of poor performance in mathematics were as follows 6(40%) agreed, 4(26.7%) undecided, 2(13.3%) disagreed and 3(20%) strongly disagreed with the statement. From the results it's clear that majority of the teachers 40% indicated that mathematical language is a major cause of poor performance in mathematics while minority 13.3% disagreed with the statement. As a result, understanding word problems is crucial and serves as a stepping stone to successful solutions (Valentin & Sam, 2004). According to some responded, "*Some students are perplexed because they do not understand the problem. Others, rather than grasping a problem, hunt for keywords when they read it. This will result in a faulty translation*". When students fail to translate the problem, they arrive at an incorrect solution (Dela Cruz & Lapinid, 2014). The causes of poor performance in mathematics can be attributed to lack of enough instructional materials, libraries and laboratories, poor attitude of learners, improper teaching methods, anxiety, home background, overcrowded classrooms and interrupted teaching.

The research findings on varying teaching methods of problem solving were as follows; 6(40%) strongly agreed, 4(26.7%) agreed, 3(20%) undecided and 2(13.3%) strongly disagreed. From the results, it is clear that majority of the teachers 40% agreed that varying teaching methods helps in solving mathematical problems while the minority 13.3% strongly disagreed whether this helps them at solving mathematical word problems or not. These results could be interpreted to mean that when teachers vary their teaching methods, learners can improve their mathematical problem solving techniques. Teachers were asked on the strategies they employ in teaching word problem and they responded as follows;

> "*We employ the following strategies; Read the entire word problem, Think about the Word Problem, Write on the word the Word Problem. Draw a simple picture and Label It, Estimate the Answer before solving, Check your work when done and Practice Word Problems Often*".

The research findings on most mathematics teachers avoid word problem questions during lesson presentation were as follows; 3(20%) undecided, 5(33.3%) disagreed, 7(46.7%) strongly disagreed. It is evident that majority of the respondents 46.7% strongly disagreed that most mathematics teachers avoid word problem question during lesson presentation while the minority 20% were undecided. This can be interpreted to mean that most mathematics teachers do not avoid word problem questions during lesson presentation. On interview most teachers responded that "*we do not avoid word problems but we try our best to encourage learners to develop a positive attitude and do thorough exercise"*

The research findings on teachers motivate learner to develop positive attitude towards mathematics were as follows; 8(53.3%) strongly agree, 4(26.7%) agreed, 2(13.3%) undecided and 1(6.7%) disagreed. It's evident that majority of the respondents 53.3% strongly greed that they motivate learner to develop positive attitude towards mathematics while 6.7% disagreed. This can be interpreted to mean that most teachers motivate their learners develop positive attitude towards mathematics. On interview most teachers responded that

> "i*f the attitude of the pupil's, teachers' and parents' is positive, you need to support and strengthen it for the better performance and achievement in the learning of mathematics. However if the attitude is negative one should try to change this through relating mathematics to everyday life, use of games during learning of mathematics, use of appropriate resources, use of models, in service training and team work teaching".*

Teachers' should promote equal opportunities in learning mathematics through class interaction in mathematics lesson, sitting arrangement, use of language and positive relationships

The research findings on learners take long time more than the stipulated time to solve word problem were as follows; 9(60%) agree, 3(20%) undecided, 2(13.3%) disagreed and 1(6.7%) strongly disagreed. It is evident that majority of the respondents 60% agreed on the issue on learners take long time more than the stipulated to solve word problem while the minority 6.7% strongly disagreed. This could be interpreted to mean that most teachers agreed that learners take a long time to solve word problem. Most teachers when asked on learners difficulties on solving multi-steps questions, the responded as follows;

> "*Most learners struggled to turn words into a set of steps leading to a solution by using informational cues, identifying variables, recognizing unknowns in expressions, and explaining their reasoning*'.

4.6 Interview guide for Mathematics teachers

The main aim of this interview was to seek opinion on influence of mathematical language in solving word problem among class seven learners in Cheptiret zone. The findings were presented as follows;

4.6.1 Gender of the respondent

Table 4.4 Gender of the respondent

Gender	Frequency	Percentage (%)
Male	9	60
Female	6	40
Total	**15**	**100**

(Source: Researcher, 2019)

The findings on the gender of the mathematics teacher were as follows male 9(60%), female 6(40%). Majority of the mathematics teachers were male 60%, this can be attributed to the

fact that mathematical courses are mostly male dominated. The illustration is as shown above in table 4.4.

Table 4.5 Experience of a Mathematics Teacher

Experience	Frequency	Percentage (%)
0-5 years	4	26.7
6-10 years	2	13.3
11-15 years	5	33.3
Above 15 years	4	26.7
Total	**15**	**100**

(Source: Researcher, 2019)

The findings on the experience of the mathematics teacher were as follows; 0-5 years 4(26.7%), 6-10 years 2(13.3%), 11-15 years 5(33.3%), above 15 years 4(26.7%). Majority of the mathematics teachers 33.3% had an experience of between 11-15 years, which meant that they had enough experience to have understood the influence of mathematical language on class seven learner's ability to solve word problems.

4.6.2 How Mathematics Language affects Problem Solving Ability

4.6.2.1 Best Method for Teaching Word Problem

Most teachers said that "*we employ the method of isolating a single mathematical topic and approaching it from every possible angle*". Another method employed was group discussion on the topics the learners had difficulties in. Teachers often give students guided practice by having them work on a range of problems from the internet, math contests, and previously

published standardized tests. Sort the problems into difficulty levels or themes, and begin with a one-step problem before moving on to two- or three-step difficulties.

4.6.2.2 Difficulties Learners Have When Working Mathematical Problem

The majority of teachers cited learners' carelessness as a cause of difficulty when it came to handling word problems. Some people may copy the number wrong. Rather than writing 1500, they replicate it as 500 or even add a digit to make 11,500. Even if they comprehend the given and what procedure to perform, mistakenly copying the given numbers will result in an inaccurate answer (Dela Cruz & Lapinid, 2014). According to some respondent

> "*Some students have a tendency to mix up the sequence of the numbers in the question. Subtraction and division are not commutative operations. The minuend, like the divisor and dividend, cannot be inserted in the place of the subtrahend. For example, subtracting 48 from a number yields ten*".

The majority of teachers cited learners' carelessness as a cause of difficulty when it came to handling word problems.

When students fail to translate the problem, they arrive at an incorrect solution (Dela Cruz & Lapinid, 2014). Furthermore, some students have a tendency to use the incorrect operation. My mother, for example, intends to purchase 12 $35 house decorations. How much will she be required to pay in total? Some students prefer to use addition over multiplication. When solving a word problem, it is critical to plan ahead. Reading skills, according to Pearce, Brunn, Skinner, and Lopez-Mohler (2013), had a substantial impact in solving word problems.

4.6.2.3 Mathematical terms that acts as an hindrance to the learners when solving word problems

Most learners identified place value: positional notation for numbers, allowing the use of the same symbols for different orders of magnitude, e.g. the "one's place," "ten's place," "hundred's place," and so on, arithmetic: the part of mathematics that studies quantity, especially as a result of combining numbers (as opposed to variables) using the traditional operations of addition, subtraction, multiplication, and division, prime numbers: The most common word problems encountered by most learners when doing mathematics are integers bigger than 1 that are only divisible by themselves and 1.

4.7 Teachers perspective on difficulties learners have when solving word problem

Most teachers indicated that "*we feel good while teaching maths, and perceive maths as an enjoyable subject to teach, and this was in contrast to the learners' perspective who viewed mathematics as a difficulty subject to learn*". Motivated learners, according to (Barwell, 2011), are more eager to interact and learn. Teachers must detect students who are disengaged in class and devise motivational tactics for them. Another idea is to give them a word problem based on a historical event or a sporting event to increase their class participation (Barwell, 2011).

On the performance in mathematics paper that has more word problem the teachers responded that

> "*most learners performed fairly, others said that they performed poorly while the minority said that they performed excellently*".

Most teachers rated their success as meets requirement, while minority rated their success as exceptional, these rating were attributed to the performance of the learners in this subject. Teachers need to encourage their learners. Any educator's job in the classroom is to educate the students and help them prioritize what they should study. It might begin by instilling self-assurance in each child. It's not easy to teach word problems. Working on the problem alone was the most frequently mentioned classroom practice (Pearce, Bruun, Skinner, & Lopez-Mohler, 2013).

When teachers were asked whether the topic that has more mathematical word problem make them take a lot of time in syllabus coverage, most of them said yes. They said that

> "*we create more time especially during the remedial to cover the syllabus; we also give learners some extra work to go and work out at their own time at home or during their free time*".

CHAPTER FIVE

SUMMARY OF THE FINDING, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter covers the summary of the study, summary of research findings, conclusion drawn from data and recommendation. The chapter also provides suggestions for further studies.

5.2 Summary of the study

The purpose of the study was to assess the effects of mathematical language on word problem solving among class seven learners in Cheptiret Zone, Kesses sub-county. The study had three objectives which were to establish the language difficulties learners' face when solving mathematical word problem, to find out how mathematical language affect problem solving ability and to determine teachers perspectives on the difficulties their learners have when solving mathematical word problem.

The study adopted constructivism paradigm, concurrent triangulation design and mixed method approach. The study had a target population of 1292 class seven learners derived from public school population within the Zone and 31 mathematics teachers. A sample of 388(30%) class seven learners who were selected randomly using balloting of odd numbers while 15 teachers who were selected purposively using balloting of even numbers. Piloting was done in three schools in Keiyo Sub-county, Metkei zone. Data was collected using questionnaires and interview schedule.

To determine the reliability of the instruments, the researcher used Cronbachs' Coefficient Alpha method. A reliability coefficient level of 0.7 or more would indicate that the instrument is reliable enough to solicit for the specified information. Statistical Package for Social Science was used to tabulate code and process data into data base.

5.2 Summary of the findings

The majority of respondents (50%) to a research on the linguistic barriers that students encounter when answering mathematical word problems claim that being able to read and having a basic knowledge of facts enable them to succeed. If a student is able to read and understand the word problem, the appropriate mathematical operation will be chosen and the computation will be completed without difficulty. Due to a lack of understanding of the target language and an inability to comprehend the written content, learners are unable to answer mathematical problems correctly and smoothly in a written format.

Additionally, they don't see written mathematics as a language, so they don't read it to understand it. The results will meet expectations once the student has received enough education in how to answer mathematical word problems. Additionally, students who were given sufficient time by their instructor to read and understand word problems were able to resolve this issue and thus overcome the challenge.

Performance in math and reading abilities are closely related, and difficulties in math are linked to the development of reading skills. Mathematics difficulties have little impact on a learner reading development, while reading disabilities can predict how well a child would do in math. Languages differ widely in the semantic content of items that appear to be similar, and the same meaning can be expressed in multiple ways depending on the

language. The majority of the math teachers saw that learners' ability to read and comprehend word problems was significantly hampered by language barriers. Students use both the issue model method and the direct translation strategy to interpret literary works. The former relies on key words rather than creating mental models of the challenges. In order to keep trying to understand the supplied word issue, learners must rely on their understanding of specific essential phrases.

The majority of respondents (58.8%) agreed that most learners perform well when the questions are not wordy; this indicates that most learners have more difficulty understanding wordy questions than questions that are expressed numerically. This was one of the main findings on how mathematical language affects problem-solving ability. Students reported that practice and listening have helped them become more adept at solving mathematical word problems. An excellent way to involve students is by having them work together to solve problems. When solving word puzzles, the teacher and students must work together.

Students' ability to solve problems will be enhanced through teaching and studying heuristic tactics, ideas, and tools, which will give them a sense of direction in challenging situations. The following recommendations were made by the learners based on their research on how to distinguish mathematical terminology from everyday English; encourage pupils by giving them examples of how math is applied in everyday situations. Explain how math operates, reassuring children that it is more than simply arithmetic, and encouraging them to give it a try. This will help them feel comfortable experimenting with new approaches to problem-solving, even if they don't always succeed. When possible, the teacher incorporates tactile artifacts that students can touch and move around with in addition to verbal explanations, work displays on the board, and tactile artifacts.

Learning can be aided by sensory input since it makes it easier for students to engage with a lesson and helps them retain it. This is especially important when dealing with a topic that can seem a little ethereal. Story issue solving is challenging because it calls for students to comprehend the problem's language and factual information as well as turn the problem into an acceptable mental image. The students must then develop and supervise a solution strategy and do accurate technical calculations.

According to Griffin and Jitendra (2007), awareness of semantic structure and mathematical linkages is necessary for learning how to solve story problems. They stress that students need a basic grasp of arithmetic concepts and strategies in order to solve problems in a written fashion. Story word problems are essential for helping kids connect mathematical concepts with meanings, understandings, and relationships. The majority of teachers reported using the strategy of focusing on just one area of mathematics and exploring it from every viewpoint.

The use of group discussions on the subjects that the students struggled with was another technique to enhance quick mastery of the concept. In order to provide pupils with guided practice, teachers frequently assign them a variety of problems from the internet, math competitions, and previously released standardized tests. Sort the issues according to their level of complexity or theme, starting with one-step issues before going on to two- or three-step challenges. The results showed that rephrasing a word problem in a different way can aid pupils in understanding it. The research also showed that utilizing a learner's or sibling's name can assist a learner in understanding a challenging word issue and encourage the learner to take responsibility for the challenge.

Learning outcomes in mathematical problem-solving thinking were significantly influenced by reading accuracy and comprehension. It also showed that reading proficiency and problem-solving competency are strongly related.

A greater knowledge of the barriers that students had to overcome in order to solve an issue was achieved through the dissection and reconstruction of those challenges. On the other hand, mathematical language has an impact on how well learners understand word problems. Although it is impossible to separate the problem of language from word problems in mathematics, vocabulary knowledge affects how well one can solve word problems. Additionally, learners' main difficulty stems from their general inability to understand relational expressions like "more than" and "less than." Successfully solving a word problem requires the problem solver to grasp or comprehend the question that is being posed to them. This raises the question of language acting as a barrier to resolving mathematical word problems.

It is crucial to include reading skills in mathematics lessons because when reading strategies are incorporated into mathematical teachings, mathematical comprehension increases. This study looks at how students were able to understand what was required of them and advance to the next level. The ability to conceive word problems in a schematic way might assist students' gain deeper understanding as well as greater flexibility and accuracy while solving word problems.

Additionally, it was shown that the method gave teachers a fresh approach to dealing with difficult curriculum issues as well as numerous opportunities to link classroom mathematics with real-world applications. It was necessary to teach students how to approach word

problems in mathematics. To know how to approach the challenge of converting text into mathematical equations, they must be introduced to various approaches. One arithmetic word problem can be solved using a variety of tactics, and those strategies can be taught to students while keeping in mind that learning only happens when students process new information or knowledge in a way that makes sense to them in their particular frames of reference. This means that learners must approach mathematics word problems as non-routine problems and solve them in accordance with their conceptual understanding.

Despite not having the necessary knowledge, students try to solve word problems. Due to their weaker non-verbal reasoning, students also exhibit less flexibility in their mathematical word problem solutions and offer qualitatively different answers. Word problem solving is difficult for learners, who frequently err in the process. The failure of learners to solve word problems is caused by their lack of understanding of the problem, their lack of strategy knowledge, their inability to convert the problem into a mathematical form, their inability to use the proper mathematics, and their inefficient use of strategies.

Additionally, when it comes to using a variety of attributes to solve a problem, students lack versatility. Word problems are challenging for learners for a variety of reasons, including the fact that they cannot read with comprehension and as a result do not know what is required of them.

Students need to be able to relate to mathematics in order to understand it, and they should make an effort to personalize and interpret what they study. This is only achievable if the teachers' intended mathematical principles are incorporated into situations that let pupils draw connections to prior experiences, information, and needs.

Findings on teacher's perspectives on the difficulties their learners have when solving Mathematical word problem. The research findings indicated that most teachers motivate their learners develop positive attitude towards mathematics. If the attitude of the pupil's, teachers' and parents' is positive, you need to support and strengthen it for the better performance and achievement in the learning of mathematics. However if the attitude is negative one should try to change this through relating mathematics to everyday life, use of games during learning of mathematics, use of appropriate resources, use of models, in service training and team work teaching. Teachers' should promote equal opportunities in learning mathematics through class interaction in mathematics lesson, sitting arrangement, use of language and positive relationships.

Most teachers felt good while teaching maths, they perceived maths as an enjoyable subject to teach, and this was in contrast to the learners' perspective who viewed mathematics as a difficulty subject to learn. Motivated learners are more eager to interact and learn. Teachers must detect students who are disengaged in class and devise motivational tactics for them. Another idea is to give them a word problem based on a historical event or a sporting event to increase their class participation.

On the performance in mathematics paper that has more word problem the teachers responded that most learners performed fairly, others said that they performed poorly while the minority said that they performed excellently. Most teachers rated their success as meets requirement, while minority rated their success as exceptional; these rating were attributed to the performance of the learners in this subject. Teachers need to encourage their learners. Any educator's job in the classroom is to educate the students and help them learn the most important things. It can begin with each child developing self-confidence. It is a difficult

effort to teach word problems. Working on the problem alone was the most commonly reported classroom practice but most learners put less effort in attempting to do more exercise on word problem. The majority of teachers cited learners' carelessness as a source of difficulty when it came to solving word problems. Some people may copy the number wrong. Rather than writing 1500, they replicate it as 500 or even add a digit to make 11,500. Even if they comprehend the given and what procedure to perform, mistakenly copying the given numbers will result in an inaccurate answer.

5.3 Conclusion

Based on the findings, the study made the following conclusions

This study found out that learners face a number of challenges that influence how they solve mathematical word problem; key among them are solving mathematical word problem is hard to most class seven learners, the difficult part of solving mathematical word problem appears to be the process of understanding a problem and deciding what operations needs to be performed. Actively reading a problem helps people grasp it, but the depth and quality of a learner's decoding and subsequent comprehension of the material has an impact on their achievement. Ability to read and know basic facts helped most learners be successful at solving word problem.

Most learners do rarely seek assistance in word problem questions in mathematics, the teachers should encourage their learners to seek assistance in case the learners are experiencing problems in solving mathematical problems.

Language barrier was cited, as a major hindrance to learners’ ability to read and comprehend word problem Mathematical language is a major cause of poor performance in mathematics.

The causes of poor performance in mathematics can be attributed to lack of enough instructional materials, libraries, poor attitude of learners, improper teaching methods, anxiety, home background, overcrowded classrooms and interrupted teaching.

Most students identified arithmetic: the branch of mathematics that studies quantity, particularly as a result of combining numbers (as opposed to variables) using the traditional operations of addition, subtraction, multiplication, and division, and place value: the branch of mathematics that studies value as a result of combining numbers (as opposed to variables) using the traditional operations of addition, subtraction, multiplication, and division. Positional notation for numbers, which allows the same symbols to be used in different orders of magnitude, such as "one's place," "ten's place," "hundred's place," and so on, as well as prime numbers: integers greater than 1 which are only divisible by themselves and 1 were identified as word problems most learners experience while solving mathematics.

The study findings on how to differentiate mathematical terms from ordinary English the learners suggested the following; Motivate students by demonstrating real-life instances in which math is used outside of the classroom.

Explain how math works, reassuring students that it isn't just about arithmetic, and encouraging them to try it out and feel comfortable trying out new approaches to problem solving, even if they don't always get the right answer. The teacher gives verbal explanations, displays work on the board, and, if possible, incorporates tactile artifacts that students may touch and move around with. The study concluded that math language affects problem solving skills among learners in the following ways; listening and practising help learners learn maths at ease, words used in mathematics have different meaning in ordinary English and lastly most learners score high when the questions are not wordy.

The study also concludes that teachers perspective on class seven learners are as follows; solving mathematical problems is hard to most learners, mathematical language is a major cause of poor performance in mathematics among class seven learners, varying teaching methods helps in solving mathematical word problem and maths teachers don't avoid word problem questions during lesson presentation. Collaborative teaching can be used to teach problem-solving skills and techniques. It allows teachers to engage in more philosophical conversations and to benefit from one another's experiences and teaching approaches. Despite the fact that collaborative teaching has drawbacks, such as exposing each partner's professional and personal points of view more than the traditional one-teacher-per-classroom model, it allows engaged teachers to blend their teaching styles and expertise to overcome the challenges they face in teaching problem solving in particular.

The study finally concludes that learners language affects learners ability to solve word problems, language difficulties prevent learners from comprehending text of the word problem ,learners among class seven seek assistance in word problem questions from their teachers in order to comprehend the word problem and most learners usually skip and come back if they get stuck on word problem. Problem solving, as demonstrated in this chapter, is the process by which an individual applies previously acquired mathematical knowledge, skills, and understanding to solve a problem. Mathematics problem solving assignments, according to the research, have the potential to give intellectual challenges for improving learners' mathematical knowledge and growth.

Beyond what problem solving entails, it's critical that mathematical problem solving tasks are assigned in accordance with the objectives, which can be defined as fostering learners'

conceptual understanding, fostering their ability to reason and communicate mathematically, and capturing their interest and curiosity. Problem solving is especially crucial to teach since it trains students not only to think mathematically, but also to tackle life's obstacles with confidence in their capacity to solve problems.

5.4 Recommendation

Based on the findings and conclusion of the study recommends that:

1. The study recommended a wide exposure to mathematical language from the lower classes and the use of simple and appropriate language during teaching, learning and assessment process. Teachers must be willing to consider new ideas. They should allow themselves to seek help in portions when they are unsure how to proceed. Learners should not only be given word problem assignments to work on in class or at home, but they need also be taught how to solve them. Teachers must also persuade students to keep their minds open to new ideas that will help them become better problem solvers. They should be encouraged to read and comprehend materials on a regular basis. This will aid in their comprehension and vocabulary development, allowing kids to understand issue statements presented to them. They must be made aware that a word problem cannot be addressed without a thorough comprehension of the problem material.
2. The study informs the Kenya Institute of Curriculum Development to place a premium on the presentation of mathematical language in approved textbooks prior to its application in mathematical texts and queries.

3. The study advises the Ministry of Education to ensure that mathematics teacher trainers be equipped with appropriate definition of mathematical language when presenting content to learners.

5.5 Suggestion for Further Research

The study recommends the following for further research to be undertaken on Effects of English language proficiency on learners' mathematical performance, or the impact of teacher credentials, attitude, and school characteristics on learners' mathematics performance, or the effects of motivation on learners' mathematics performance.

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APPENDICES

APPENDIX 1: LETTER OF INTRODUCTION

Dear Sir/Madam,

TO WHOM IT MAY CONCERN

I am a student undertaking a master's degree programme in Mathematics Education of Moi University. My research study is **ASSESSMENT OF EFFECTS OF MATHEMATICAL LANGUAGE ON WORD PROBLEM SOLVING AMONG CLASS SEVEN LEARNERS IN CHEPTIRET ZONE, UASIN-GISHU COUNTY, KENYA.**

Any information given will be accorded utmost confidentiality

Kindly allow me to carry out the research in your institution.

Yours Sincerely,

Biwott J Nancy

Reg. No. EDU/PGCM/1010/16

APPENDIX II: LEARNERS' QUESTIONNAIRE

Dear Respondent,

I am a candidate of post graduate studies at Moi University conducting a research on **Assessment of effects of Mathematical language on word problem solving among class seven learners in Cheptiret zone, Uasin-Gishu County, Kenya.** You have been appointed as one of the key respondents to be part of the associates in carrying out this study. Assurance is guaranteed that any information that you will provide to us will be accorded maximum confidentiality and will be used for the purpose of academic reasons only.

SECTION A: Challenges learners face when solving mathematical word problem

Statement	**Level of Agreement**				
	SA	**A**	**UD**	**DA**	**SD**
Mathematics language affects my ability to solve word problems					
I often seek assistance in word problem questions					
Ability to read and knowing basic facts help me be successful at solving mathematics word problem					
Am given time by my teacher to read and interpret word problems					
I usually skip and come back if I get stuck on a word problem					

Kindly give your opinion in the following questions:

1. What helps you learn math's the best?

……

……

2. How important is your comprehension and application of math's concept?

……

……

……

3. How do you determine which mathematical processes to use to solve a problem?

……

……

……..

4. How do you determine if you have chosen the correct method to solve a mathematical problem?

……

……

……

.

SECTION B: How mathematical language affects problem solving ability.

The following questions will guide us to recognize the influence mathematics terms has in problem solving. Please tick ( ) in the grid of your choice. SA= Strongly Agree, A= Agree, UD = Undecided, DA = Disagree SD = Strongly Disagree.

Statement	**Level of agreement**				
	SA	**A**	**UD**	**DA**	**SD**
Mathematics as a subject is difficult					
Listening and practice helps me learn mathematics at ease					
There are words that means differently in mathematics and ordinary English					
Most learners score high when the questions are not wordy					
Whenever I see mathematical word problem questions I just read and guess the answers					

Kindly give your opinion in the following questions:

1. What learning experience makes mathematics become difficult?

   ……

   ……

2. What do you think should be done to help you do well in mathematics?

   .....

   .....

3. What activities best help you learn how to do mathematics?

……

……

4. How best do you differentiate mathematical terms from ordinary English?

……

……

TEACHERS QUESTIONNAIRE

Please read through the questions and kindly respond to the best of your knowledge by making a tick on the appropriate choice of response. Please tick ( ) in the grid of your choice. SA= Strongly Agree, A= Agree, UD = Undecided, DA = Disagree SD = Strongly Disagree.

	Level of Agreement				
Statements	**SA**	**A**	**UD**	**DA**	SD
Solving mathematical word problem is hard to most learners					
Mathematical language is a major cause of poor performance in mathematics					
I often vary my teaching methods of problem solving					
Learners rarely seek assistance in word problem questions in mathematics					
Most mathematics teachers avoid word problem question during lesson presentation					
I always motivate learner to develop positive attitude towards mathematics					
Learners take a long time more					

than the stipulated time to solve word problem					

APPENDIX III: INTERVIEW GUIDE FOR MATHEMATICS TEACHER

The main reason for this interview is to seek for your opinion on influence of mathematical language in solving word problem among class seven learners in Cheptiret Zone. The information you give will be confidential and will not be shared by any other person without your consent.

SECTION A: Demographic Information

Name of school ……

Gender Male: ( ) Female: ( )

Please indicate your experience as a mathematics teacher

0-5 years [ ] 6-10 years [ ] 11- 15 years [ ] above 15 years [ ]

A. How mathematical language affects problem solving ability

i. What would you consider your best method for teaching word problem

……

……

……

ii. Describe any difficulty that your learners have when working mathematical word problem

……

……

……

iii. Which mathematical terms acts as an hindrance to the learner when solving word problems

……

……

……

iv. If mathematics questions are symbolic or not wordy do learners performance become outstanding

……

……

……

B. Challenges learners face when solving mathematical word problem

i. Is reading and comprehension of the word problem an hindrance to learners performance in mathematics

……

……

ii. What specific strategies do you use when teaching word problem

……

……

iii. Do your learners have difficulties in solving multi-steps questions

……

……

……

C. Teachers perspectives on difficulties learners have when solving word problem

i. How do you feel about teaching mathematics word problem

……

……

ii. What are the performance in mathematics paper that has more word problem

……

……

iii. How would you rate your success in teaching learners to solve word problem

……

……

iv. Does the topic that has more mathematical word problem make you take a lot of time in syllabus coverage

……

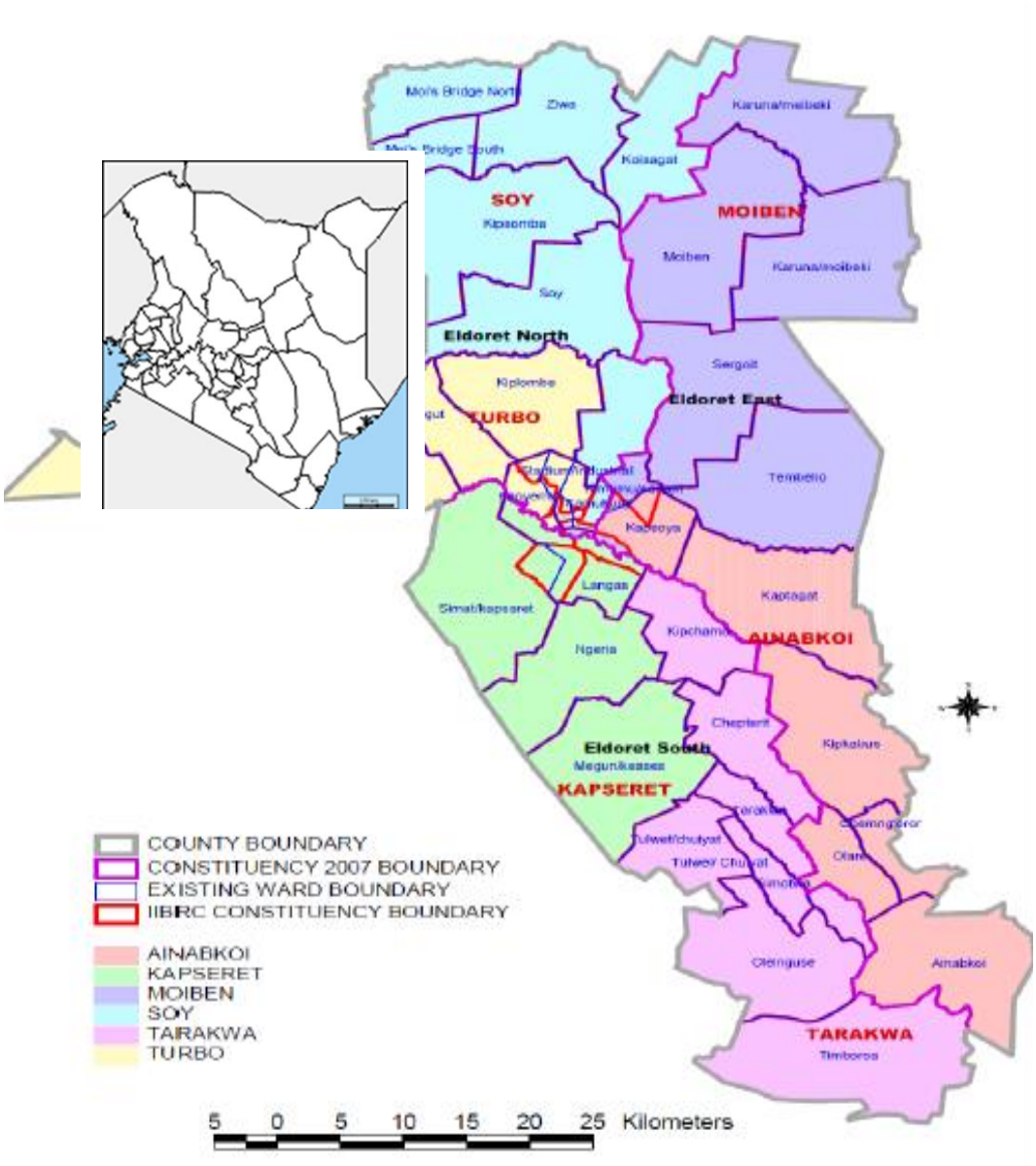
……

v. if yes how do you go about it? ……..

……

…….

APPENDIX IV: MAP OF STUDY AREA



APPENDIX V: INTRODUCTION LETTER

MOI UNIVERSITY
Office of the Dean School of Education
Tel: (053) 43001-8
(053) 43555
Fax: (053) 43555
P.O. Box 3900
Eldoret, Kenya

REF: EDU/PGCM/1010/16 **DATE:** 18th June., 2019

The Executive Secretary
National Council for Science and Technology
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH PERMIT IN RESPECT OF BIWOTT J. NANCY – (EDU/PGCM/1010/16

The above named is a 2nd year Master of Education (M.Ed) student at Moi University, School of Education, Department of Educational Management and Policy Studies.

It is a requirement of her M.Ed Studies that she conducts research and produces a thesis. Her research is entitled:

"Influence of Mathematics Language to Problem Solving among Class Seven Learners in Cheptiret Zone, Uain-Gishu County, Kenya."

Any assistance given to enable her conduct research successfully will be highly appreciated.

Yours faithfully,

MOI UNIVERSITY SCHOOL OF EDUCATION 18/6/2019

For PROF. J. K. CHANG'ACH
DEAN, SCHOOL OF EDUCATION

APPENDIX VI: RESEARCH AUTHORIZATION FROM MINISTRY OF EDUCATION

MINISTRY OF EDUCATION

State Department of Basic Education

The County Director of Education
Telegrams: **"EDUCATION"**, Eldoret
Telephone: **020 2112779**
Email: scdekesses@gmail.com

The Office of Sub County Director of Education,
Kesses sub-county,
P.O. Box 65,
MOI UNIVERSITY.

When replying please quote:

Date:22nd March, 2019

TO WHOM IT MAY CONCERN

REF: RESEARCH

The bearer of this letter **Nancy Jelagat Biwott** from **Moi University** is undertaking her Master's Programme Research.

The purpose of this letter is to request that you accord her the necessary assistancein the course of her research.

Any assistance given to her will be appreciated.

SUB-COUNTY DIRECTOR OF EDUCATION KESSES

ALICE SITIENEI

SUB COUNTY DIRECTOR OF EDUCATION

KESSES SUB COUNTY.

APPENDIX VII: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 857944

Date of Issue: 04/October/2019

RESEARCH LICENSE

This is to Certify that Ms.. NANCY BIWOTT of Moi University, has been licensed to conduct research in Uasin-Gishu on the topic: INFLUENCE OF MATHEMATICAL LANGUAGE TO PROBLEM SOLVING AMONG CLASS SEVEN LEARNERS IN CHEPTIRET ZONE, UASIN-GISHU COUNTY, KENYA. for the period ending : 04/October/2020.

License No: NACOSTI/P/19/1893

857944

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

APPENDIX VIII: PLAGIARISM REPORT

SR

MOI UNIVERSITY

EDU 999 TIIESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

BIWOTT J NANCY

EDU/PGCM/1010/16

In recognition for passing the University's plagiarism

Awareness test with a similarity index of 3% and

Striving to maintain academic integrity

Awarded by:

Prof. John Changách, CERM-ESA Project Leader

30th/03/2022