The International Journal of Multi-Disciplinary Research
ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Assessing the Effectiveness of Teaching Methodologies of Mathematics on Learners' Performance in Mathematics at Senior Secondary: A Case of Luampa District of Western Province-Zambia.

(***Paper ID: CFP/2057/2020)***

1st Mukela Mukelebai
mukelamukelabai2@gmail.com
Dept. Education
School of Education
Information and Communications University,
Lusaka, Zambia

2nd Kabubi Marvin (Co-Author)
marvinkabubi@ymail.com
Dept. of Business Studies
School of Business/Humanities
Information and Communications University,
Lusaka, Zambia

ABSTRACT*-The aim of the study was to assess the effectiveness of teaching methodologies of mathematics on learners' performance in mathematics at senior secondary level in Zambia focusing on selected secondary schools in Luampa district which were Luampa, Mbanyutu, Mulamatila and Kaoma Secondary schools. Specific objectives were to assess the different types of teaching methodologies of mathematics, to examine learners' performance in mathematics at senior secondary school level, to determine the challenges learners face in mathematics at Grade 12 and to determine the role of the Government through the Ministry of General Education in mitigating the challenges learners face. The study adopted a case study research design and target population was 83 comprised of 40 pupils, 30 parents, 8 teachers, 4 head teachers and DEBS officer. The study used non- random procedure called purposive in selecting teachers, head teachers and DEBS officer. Purposive sampling, according to Kombo and Tromp (2006:82) is purposely targets a group of people believed to be reliable for the study. The study used random procedure called simple random sampling in selecting pupils and parents. The advantage of this procedure calls for a relatively small, clearly defined population with equal opportunity. Parents includes PTA members selected from surrounding communities of the four selected schools. For teachers, the researcher selected only teachers taught mathematics at senior level. The primary data collection procedure was by the way of interview guide and questionnaire for respondents. Secondary data were collected from journals, textbooks and other online publications from the web. The open-ended responses were analyzed thematically while closed ended responses were analyzed by the use of Anova and statistical package version 20. The study findings show that performance in mathematics was characterized by poor computational skills. Learners compute at a very low pace that is slowly and laboriously, which reflected lack of automaticity in decoding. It was observed that the learners had trouble in understanding mathematical concepts and using the principles effectively. On the part of performance, only six out of the ten managed to calculate without much labor. Through employed various methods in teaching mathematics such as inquiry, discovery, group work and demonstration at one of the schools, the study review that teachers often began the calculational instruction without tapping on the learners' prior knowledge to connect previous learning to the new mathematical skill. The study findings show that other contributory factors leading to poor performance in mathematics were home background, lack of texbooks in homes, poor reading culture and teaching methods employed by teachers. The study recommends the DEBS office in Luampa district ought to sensitize and encourage teachers to use teaching methods that promote the development of mathematical skills to the learners. The government should establish university/colleges for mathematics so that more qualified teachers must be trained. It should build libraries in schools to give learners an opportunity to read and study. The study recommends that the communities be sensitized on the need to compute with their children in homes and encourage their children to practice computing at home.*

Keywords*: Mathematics, methodology, Mother tongue, Numerical reading, Reading difficulties, District Education Board Secretary, Data, Home environment.*

I. INTRODUCTION

Mathematics has been in existence for ages giving and making the scientific work practical, industrious, profitable and of great influence on academic independence and performance in all spheres of human life. In modern societal existence, mathematics is the key to the open commercialization and general human livelihood (Chen and Denkla, 2012). Mathematics was invented long ago in Athens, its entry in African societies took longer period to be adopted as something useful and practical to human existence. Jekayinka (2011), while presenting a paper on reading habits promotion in the Association of South- East Asian Nations (ASEAN) libraries noted that we are not a reading society but a chatting society. He emphasized that traditional educators were great narrators of stories than numerical and literacy which they said out loudly and accompanied with dramatization and demonstrations. This explained pupils' failure to engage in computational skills and reading: most of them came from backgrounds where stories were told to them verbally rather than them having to read these stories.

Further still books and libraries are often seen as redundant in societies that are mainly based on oral traditions and practices. In such societies, people stop reading and generally frequent computations once formal education is completed because they derive more pleasure from the oral and performing arts like talking, singing, dancing, socializing than from the rather private and individual reading and computational skill development of a book. Since the majorities are illiterate, they affect the minority who can read and compute with the result that the oral mode remains prevalent" (Tietmeyer, 1994). Just like reading, mathematical skills do not develop suddenly but increases gradually, depending on exposure and background. This exposure can be through many practices for instance, people reading or compute for leisure, knowledge, information or interest. Mackenzie, as cited by Magara and Batambuze (2005), emphasized that in order to develop the reading culture in a society; people require knowledge in order to utilize existing information materials and resources.

Furthermore, Ribeiro (2001) emphasized that attitudes towards information use were very vital to improving the reading and computational culture of a society and concluded that a reading culture determined the success of a person and the nation as a whole (Magara and Batambuze, 2005). This is why there is need to explore opportunities for developing a reading or studying culture among pupils in secondary schools in Zambia. The development of a reading or studying culture in Zambia is influenced by the formal education system. The formal education system in Zambia can be traced in the late 1800s when missionaries arrived in the country.

The importance of mathematical methodology not only in Africa but globally cannot be over emphasized because its importance is actually attached to literacy as demonstrated by annual celebration of World literacy day commemorated on 8th September every year. The world literacy day was first declared in 1966 and serves as a reminder of the international community of the need to overcome issues about learning.

The main purpose of this study was to assess the effectiveness of methodology on the learners' performance in mathematics at senior secondary school level.

1.2 Statement of the problem

Recently, some reports from the office of PEO, Western province, have stated that, "the performance in mathematics is at its lowest levels at grade twelve examinations in spite of mathematics been the most wanted subject in colleges" (DEBS Luampa District). Among senior secondary school pupils in the province particularly has never been exciting.

The problem in this study therefore was that, there is poor performance in mathematics and low mathematical reading culture among pupils at senior secondary schools in Western province. "Reading and writing are basic skills that a child should master during their first school years to be able to assimilate new knowledge and skills in future" (Paananen, et. al.: p. 25).

1.3 Objectives

1.3.1 Main objective

To assess the effectiveness of teaching methodologies of Mathematics on the learners' performance in mathematics at senior secondary school level.

1.3.2 Specific objectives

(i) To assess different types of teaching methodologies in mathematics
(ii) To examine learners' performance in mathematics at senior secondary school level
(iii) To determine the challenges learners face in mathematics at Grade 12
(iv) To determine the role of the Government through the Ministry of General Education in mitigating the challenges learners face.

1.4 Research questions

(i) How effective are the teaching methodologies used in mathematics?
(ii) How is the performance of learners in mathematics at senior secondary school level in selected secondary schools of western province of Zambia?
(iii) What are the challenges learners face in mathematics at Grade 12 level?
(iv) What are the roles of the Government through the Ministry of General Education in mitigating the challenges learners face in mathematics?

1.5 Significance of the study

The ability to compute is an important skill in today's modern world where so much information is transmitted in written numerical form. It is important that people have mathematical skills whether they are in school or not.

The choice of this research topic emerged from an observation that numerical reading difficulties among school pupils are very high and Zambia is not an exception (Kelly, 1999). Zambia could possibly be having thousands of children who have severe mathematical problems which have not yet been detected. Therefore, the assumption is that by grade twelve pupils would have been competent numerical readers.
It is hoped that this study will to a reasonable extent help teacher in general, especially teachers of mathematics to apply appropriate methodologies. Further, the research gives guidance to both educational standard officer and parents on their roles in mitigating challenges learners face in their learning fields including mathematics.

The further hope is that this study will therefore contribute to generational information in this domain. It is one way of building up a far greater knowledge and evidence base of problems, interventions and what works with this group of young people.

1.5 **Theoretical frame work**

The study was guided by the social constructivist theory as proposed by Piaget (1977), Vygotsky (1978) and Bruner (1983). Key in this theory is Vygotsky's concept of the Zone of proximal development and Bruner's notion of scaffolding. The two are used in the classroom as teaching strategies or methodologies. Scaffolding instruction as a teaching approach originates from Lev Vygotsky's socio-cultural theory and his concept of the zone of proximal development (ZPD).

The distance between what children can do unaided and what they can achieve or do with assistance from those that know better is the Zone of Proximal Development' (Raymond, 2000, p.176).

Scaffolding as a teaching strategy provides individualized support based on the learner's ZPD (Dorn, 1996). Using scaffolding instruction, a more knowledgeable other provides help and thereby aids the learner's development. The scaffolds or support, facilitate a student's ability to build on prior knowledge and internalize new knowledge. This is important for children to be helped in acquiring reading skills, and the support should come from both teachers and parents.

Matafwali (2010) defines reading as the ability to obtain meaning from print. In this respect, the goal of any form of reading therefore is to understand and interpret printed material in order to fulfill one's needs. In order for this to happen one must be able to understand the language in which the material is printed. There should be a relationship between one's spoken language and the language into practice. The framework is linked to the study in that the researcher will look at both teachers and parents as the more knowledgeable others, and the pupils as the ones that needed scaffolding.

1.6 ***Operational definition of concepts***

1 **Data:** meaningful pieces of information used for making decisions.
2 **District Education Board Secretary**: The person who oversees all education programs in the district.
3 **Mathematics:** A science that deals with logic of shape, quantity and arrangement
4 **Medium of instruction:** A chosen regional or national language used in a class.
5 **Teaching methodology:** A chosen method to achieve a teaching goal
6 **Mother tongue**: A language that a child first acquires from parents or society.
7 **Primary school:** a school starting from pre to grade 7.
8 **Numerical reading:** a deliberate process of being able to interpret and write numbers as well as understanding its written language, (Banda, 1998).

II. LITERATURE REVIEW

2.0 overview

This section provides a review of the relevant literature to the problem under discussion. In other words, it acknowledged the earlier literature on performance levels of pupils in mathematics that has been done by other researchers who have addressed the same subject worldwide, in Africa and in Zambia as it has been found that there have been a number of researches on this study. Much has been written about the low levels of numerical reading among pupils. More researches have been tackled on the subject of mathematical difficulties among pupils for years now and different findings have come out depending on the areas they have studied. In this study, the researcher was interested in assessing the effectiveness of teaching methodology of mathematics in relation to low performance levels among school pupils at senior secondary school in Luampa district of Western province in Zambia.

2.1 Teaching methodologies

Different types of teaching methodologies used in all learning institutions trace their originality from the ancient philosophers. Some of these philosophers include Socrates, Plato, Aristotle and Isocrates. The study done by Finly (1963) in London titled "The *Ancient Greeks*" indicates that Socrates, despite of not having a school, he argued with his pupils in the market place. He developed the process of enquiry by question and answer method (Socratic Method). Different schools of thought, like idealism, pragmatism, realism, constructivism, behaviorism among others give direction in school on how to go about the learning processes, Hospers (1968). It is from these thoughts where teaching methodologies like learner centered, group work, discovery, demonstration, experimental, enquiry and many more drive their roots from. However, the studies conducted by Lerner (2000) in Boston titled Learning ***Disabilities****: Theory, Diagnosis and Teaching*

Strategies observed, experts in numerical reading agree that there is no best method to teaching numerical reading (Lerner, 2000; Snow et al., 1998, Goodman, (1990). Goodman (1990) opposes the phonics method which is also used in teaching English, believing it to be less engaging, with endless sounds to learn and simple books to read using regular numerals. They state that children like to read books by themselves. In line with the assertion above, it is vital that learners are exposed to a variety of numerical reading materials to practice on their own. Goodman (1990) supports the whole mathematics methods that help to compute, believing it can produce learners who understand the meaning of the figures and symbols that they are reading and so tackle books that are more interesting early on. However, Lerner (2000) and Snow et al. (1998) criticize it for leaving learners guessing when faced with an unfamiliar word, and for the limited number of words they can memories. The researcher contends, globally, while it is evident that teacher-training institutions prepare student teachers in all these approaches, methodologies and techniques in teaching mathematics, others do not follow everything once they leave colleges. Therefore, good use, of proper teaching methods can improve understanding in computations and motivate learners to compute.

From the study conducted by Singh (2007) in New Delhi titled *Philosophical Foundation of Education,* indicates that, *the* Principles of Pragmatism are; the first is on the changing nature of truth: Pragmatists do not believe in predetermined truths. According to them truth always changes according to time, place and situation. They also believe that a thing which is true to an individual at a specific time, place and situation, need not be true to others or to anyone else at some other place or time. Hence, a certain thing which was true to a person yesterday need not be the same for him today or will remain the same for tomorrow. In short, according to pragmatism, truth is always changing according to times, places and situations.

Influence of Pragmatism on Teaching and Learning, pragmatists generally believe that experience is the source of all knowledge. In the same way, they define education in terms of experience. Education comes as a result of experience; it is a lesson learnt from experience. But it is not every experience that is education. The experience that is educative is the type that makes possible other experiences in future. The experience must be productive and must not be a limiting experience. An experience is limiting, if it hinders other possible experiences. For example, the armed robber who faced the firing squad on the Lagos bar-beach was having an experience, but for him it could not be an educative experience, since the firing terminated any possibility. This could be the reason John Dewey, as cited by Akinpelu (1981), defined education as the continuous reconstruction or reorganization of experience which adds to the meaning of experience, and which increases the ability to direct the course of subsequent experience. Since knowledge comes through the processing of experience by intelligence, using the problem – solving method, the aim of education is therefore the development of learner's ability to deal with future problems. Education is the process of developing the habit of problem-solving, and there is no limit to the development of this ability. The more varied and the more complex the problems that a learner solves, the greater the growth of his intelligence is. Hence teacher must develop this in the learner. Thus, education is also defined as growth, the growth is not a biological or physical one, but rather mental, it is the growth in intelligence. Since the problems to be solved arise in the course of daily living, it means that the child is learning as he lives from day to day, and each day's experience, if it is educative, increases his power of solving his

problems. Learning in this sense is not an activity that should take place in a secluded spot or isolation from the child environment.

After this thorough criticism of the traditional and discipline – centered school education, Dewey also sketched out the pragmatic view of what the school, the curriculum, the teaching method and the role of the teacher.

On the issue of changing nature of truth, it is established by the pragmatists that truth is not constant; it is not every time a teacher could behave professionally and one could not see him as always reliable since truth itself is not constant. Therefore, a teacher must be ready to change in his act of teaching, knowing the appropriate method of teaching because the situation may change and students may also change. Teacher may not claim to know everything and even the subject content may change going through pragmatists' principles. Hence, he is bound to change since the students too are constantly changing, teacher must be prepared to change and be flexible in his teaching. For example, the way Mathematics was being taught in the olden days by the professional teachers could not be the same in this era of computer. In determining the experience to use, that which worked for teaching yesterday may not work today and the students' experiences are not the same. Since topics are not always the same, a teacher may teach a topic today proceed to another topic tomorrow. Hence, the assessment of the students' performance must not be constant. So also, there are individual differences in the students. Teacher should not be dormant but always ready to change to enhance his professionalism.

In teaching of any subject, one of the important things to be considered is the method of teaching. The teaching must be child-centered, that is, it must take the child as a person in his own right. If the child is treated as a means to an end or as someone else advantage, then one could not claim that the child is at the center of the education. In addition, the child readiness and development should be also taken into consideration. There is no point assuming that the child is able to do this or that, if he is psychologically incapable to do so on, the ground of efficiency and common sense. It should be realized that each child is a unique individual and as such should be treated differently. The present needs, interest and ability of the child, must also be taken into consideration though this should not stop with the present needs alone.

Also, teaching must also make the child actively involved in class activity. Learning by doing is a method which uses more than one of the senses in the process of acquiring knowledge and it is one in which the child obtains his theoretical knowledge abstracted from the solution of problems. Hence, that which is taught must involve practical activity or practical application of his knowledge. The subject must be brought to the level of the child, and the examples used must be within his present experience.

Group method or co-operative learning should also be encouraged.

The project-learning in which problems to be tackled are set for groups is the best method of encouraging group learning

The method has the advantage of allowing the children to display their free initiative and native intelligence in solving problems. More importantly, it is the major ground for the development of social and co-operative living, and of organized social intelligence. The method of teaching necessarily leads to the role of the teacher. The idealist and realist "schools" of philosophy of education have made the teacher into an authority figure, the embodiment of all wisdom, and the custodian of knowledge. Rousseau, Pestalozzi and Froebel had portrayed the teacher as an interested, but passive observer of the child's learning

activities. This is supported with the analogy of the gardener, whose contribution has nothing to do with the growth of the garden; in the same way, the child's natural abilities unfold on their own.

The study conducted by Hartney (2011) in Windhoek, Namibia, titled Investigating *Reading Difficulties in English Second Language of Grade 3 Learner in one Primary School in the Khomas Education Region of Namibia*, observed that once these student teachers graduate and are in the field, they hardly follow the methodologies acquired during their training. In support of the findings, the researcher states teaching skills and particular attention is needed in preparing learners to acquire new tactics and motivations from both teachers and parents hence teaching methodologies must observed before, during and after any learning session by educators.

A study by (Spaull 2013) found out that numerous educators in South Africa have an inadequate perception of teaching mathematics and reading. Many educators simply possess a modest understanding of teaching reading. Educators are not familiar with methods of teaching mathematics which may be suitable to the learning approach of all learners. The Reading Strategy (DoE 2008a) emphasizes that educators are not acquainted with how to motivate learning inside and outside the classroom. Rodgers and Richards (2001) argue as follows; our findings concerning low achievers suggest that apart from unfamiliarity with the language of instruction, the quality of training and probably the teachers' ability to apply phonics instruction may contribute substantially to pupils' success rate. To find a lead for further improvement of Zambian numerical reading instruction, we need to balance the various possibilities for enhancing instruction and select the most promising and practical innovations.

According to Ozmon and Craver (2008), the study conducted in Zambia, titled *Factors Affecting the Teaching of English Reading Skills in a Second Zambia's National Assessment Project.* Lusaka" MOE, established that established the reality changes whatever works will also change - thus, truth must also be changeable and no one can claim to possess any final or ultimate truth. In other word, pragmatism is the philosophy that encourages us to seek out the processes and do things that work best to help us achieve desirable ends. The researcher contends the theories, including that of pragmatism, promote the ideal that methodologies actually affect the learner performance.

2.2 learners' performance in mathematics at senior secondary school level

Acquiring competences in mathematics has been a big challenge in most parts of the world. Many studies, for instance, the National Assessment of Educational Progress (NAEP) of 2009 have indicated that globally, numerical reading levels by learners in early grades of school are low and this is a big challenge in many countries. The National Assessment of Educational Progress (NAEP) in their report carried out in America in 2009 reviewed that 'millions of American children reach fourth grade without learning to read and compute proficiently. It further comments that, numerical reading proficiently by the end of senior grade is a crucial marker in a child's educational development.

Another assessment carried out in the United States of America in 2003 found out that 37 percent of fourth graders and 26 percent of eighth graders could not compute well at the basic level. The National Assessment of Educational Progress of 2002 discovered that 26 percent of twelfth graders could not read numerical values at the basic level. This means that when reading numerical values these students could not extract the general meaning, make obvious connections between the values and their own experiences, or make simple inferences from the numbers. In other words, they could not understand what they read.

In Britain, a study conducted by the organization for economic cooperation and development (OECD), in 2001, indicated that about seven million British adults were unable to read, write or add up values to the level they would need to communicate in the world of business. Furthermore, Garner (2001) explained that the study also revealed that the gap between the performance of the top 10 percent of adults and the bottom 10 per cent in Britain was actually 153 points.

Mathematics, accounting to (Saiduddin, 2003:22; Themane, 1989: 151) regarding poor performance at high school; the results revealed that in many cases the level of academic performance in urban and rural areas is not the same. Adell (2002:91) argues that poor performance at secondary schools is an international problem that has been linked to the low Socio-economic background of the learners. It has also been found that urban students tend to perform better than those in the rural areas (Munn, 1996, cited by Louw, 1993:26).
In Zimbabwe similar study carried out in 2003 revealed that more than half (54%) of grade ten pupils could not achieve the minimum level of reading in mathematical problems; an indication that these pupils were eventually illiterate in both English and other subject areas. According to QUEST (2003), in Uganda a study conducted by the National Examinations Board in 2003 found that 98% of standard six primary school and senior secondary pupils failed to achieve the needed mastery in mathematics to comfortably pursue further education.

In fact, the reading levels among Ugandan pupils are very low. According to the Southern and Eastern African Consortium for Monitoring Education Quality – SACMEQ II Report (2000) the numerical reading achievement percentage of grade six pupils at each reading area, in Uganda, was as follows: pre – reading 7.2%; emergent reading 18.3%; basic reading 21.8%; reading for meaning 21.5%; interpretive reading 14.8%; inferential reading 8.2%; analytical reading 5.3% and critical reading 2.9%.

Researches that were done in Botswana also revealed that reading levels in mathematical knowledge among primary school and secondary school pupils are still low. According to Masalisa (2008) for Botswana, the SACMEQ research results report indicated that only a little over one half (56 percent) of detected pupils had reached a minimum level, and that less than one fifth (16 percent) of pupils had reached a desirable level.

Further, the Southern African Consortium for monitoring Learning Quality (SACMEQ) (1998) reported poor performance in mathematics at different grade levels in the Zambian Basic schools. These findings were consistent with those of Namibia, Zimbabwe and Mauritius. The National Assessment report by Kanyika and Kelly (1999) also revealed poor the same among grade twelve pupils in Zambian secondary schools. Consequently, a study by Kelly (2000) demonstrated that, grades who participated in the study performed considerably below the levels expected of those in their grades. For instance, the grade ten pupils who participated in this study performed within the level expected of grade nine while grade twelve pupils fell within the performance band expected at grade ten levels, whereas some grade eleven pupils both rural and urban schools fell within the performance band of grade nine pupils.

In Mozambique, the Education for All – EFA 2000 assessment country report, indicated that in the national evaluation study carried out in 1997involving grades senior grades, only 45.3% of the pupils could attain the basic objectives of the Portuguese arithmetic and language syllabus. In grade ten the rate was higher (65.1%), although according to the expectations was still low. Even after three years at school, around 50% of the pupils seemed not to have developed all the skills and

abilities required them to compute well in their grades. In this study, most difficulties were related to calculations, spelling, reading comprehension of simple texts and simple sentences. SACMEQ report (1995 – 2010) revealed that, the percentage of grade six pupils reading achievement at each reading performance level, in Mozambique, was as follows: pre – reading 2.3 %; emergent reading 3.9%; basic reading 11.2%; reading for meaning 28%; interpretive reading 32.7%; inferential reading 16.1%; analytical reading 5.0% and critical reading 0.1%.

Studies exploring literacy skills in Zambia have suggested that arithmetic difficulties are quite common among the Zambian school-going children (Williams; 1993, Kelly and Kanyika; 1999). The study by Williams (1993) revealed low performance in senior grades as it is with lower primary grades three, four and five both in English and mathematics. Another study instituted by Kapampwe (1990) in four primary schools in Lusaka reported poor levels of reading in these schools. In fact, it was estimated in this study that, approximately sixty percent of pupils leaving school at the end of grade twelve had extremely poor mathematical skills and were almost illiterate in English language.

The results of various scheduled educational assessments and examinations confirm this dismal picture. Pupils do not study for knowledge; the reading that is common is specific, short term and often examination focused. In fact, a study by Matafwali (2010) revealed that 'reading levels of majority of Zambian children were regrettably still low and that there was a downward performance even for children who had shown an initial boost at reading in grade nine. These results suggested that the majority of pupils at senior grades were weak in mathematics. Grade eleven pupils too were not overall very proficient enough to warrant any positive performance. The apparent weakness of the pupils in mathematics merited further investigations.

Diagnostic assessment in numerical reading is very important if children with computing difficulties are to be helped. The Inclusive Schooling Program (INSPRO) places those children with problems in the same class with those who do not have problems without taking into consideration the extent of the difference in terms of problem. As a result, most of the children with mathematical difficulties may go unnoticed more especially in the early stages of their primary education. For this reason, it is cardinal that children having computational problems are identified using available assessment methods so that they get positive results from early intervention (Matafwali, 2005). A problem is better solved while it is still in its infant stage unlike waiting until it gets worse because it might require a lot of time and intensive effort. This means that it might be very difficult to solve the problem.

In every class at senior secondary, there could be a learner with a mathematical difficulty. As such, during their career, every teacher meets several learners for whom mathematics is laborious, and even learners who think that they cannot compute. Teaching these learners is a challenge for the teachers and the entire school (Lynon., 2009). Classroom effectiveness of teachers heavily depends on their knowledge of the subject matter and their pedagogical skills. Unfortunately, most teachers are not oriented towards helping poor readers in their classes. In their training, they were not adequately prepared to teach all children according to their needs. Therefore, even in cases where mathematics materials are adequate, skills of poor readers are not improved. The most important person, who is the teacher in this case, does not know how to help the poor readers (Kalindi, 2005).

It is also important to bear in mind that, teachers have been working under difficult circumstances such as too many pupils in classes, erratic pupil attendance and others (MOE, 1992). When there are too many pupils in a classroom, it becomes difficult for the teacher to give individual attention especially to those who may be lagging behind in mathematical reading. Furthermore, the study conducted in Zambia, Lusaka, by MoE (2008), titled: *Learning achievement at the middle basic level: Zambia National assessment survey report*, established that serious shortages of teaching and learning materials, as well as poor staffing especially in remote areas also make it a challenge for teachers in teaching using appropriate methodology to help the learners. A teacher may have the required skills in teaching mathematics, but it becomes difficult for him/her to teach effectively if the necessary teaching and learning materials are not in place. Poor staffing levels means teachers have to attend to more than one class hence being overburdened. In turn, they will not be able to pay particular attention to those learners who have difficulties in mathematics.

2.3 challenges learners face in mathematics

There seems to be great controversy on what causes mathematical difficulties. Some scholars relate these difficulties to neurological factors while others relate them to environmental factors.

Discussions have been held in the United States of America and Scandinavian countries to find out whether numerical reading difficulties are caused by psychological or neurological factors (Maruyama, 2007). Computational difficulties are complex and the causes are difficult to pin point.

Maruyama (2007) cites three considerations which support the view that numerical difficulties are caused by neurological factors. These are disorientation and disorganization in the recognition of visual patterns due to brain damages, hereditary relationship of reading and interpretation disability in the interrelationship between visual, auditory, temporal and kinesthetic disorientation cognitive disorders and disorganization. Mando (2008) indicates that numerical reading failure is mainly caused by failure to acquire logical awareness and cognitive skills in alphabetical coding. Ayeni (2003) says numerical difficulty can be as a result of inadequate teaching or poor methodology. Teachers have a lot of work in teaching mathematical skills so that a lot of children would become fluent numerical readers. Environmental factors also contribute to one having computational difficulties such as home and school environments. If there is no one to motivate the child at home as well as in school, it will be very difficult for a child to develop interest in mathematics. Furthermore, teachers also have their own perceptions of what causes these difficulties.

According to Lehnann (1996), dividing the elements of mathematics into objects and actions has significant implications for curriculum:
To a large extent the arithmetic curriculum of the elementary school as well as the algebra curriculum of the middle and high school focus on the manipulation of symbols representing mathematical objects, rather than on using mathematical objects in the building and analyzing of arithmetic or algebraic models. Thus, in the primary levels, most of the mathematical time and attention of both teachers and students is devoted to the teaching and learning of the computational algorithms for the addition, subtraction, multiplication, and division of integers and decimal and non-decimal fractions. Later, the teaching and learning of algebra becomes, in large measure, the teaching and learning of the algebraic notational system and its formal, symbolic manipulation. Using the mathematical objects and

actions as the basis for modeling one's surround is a neglected piece of the mathematics education enterprise. (p. 39)

But before we can use mathematical objects to model our surround, we must first acquire them. For many reasons, this is an extremely difficult process. Mathematics truly is a foreign language for most students: it is learned almost entirely at school and is not spoken at home. Mathematics is not a "first" language; that is, it does not originate as a spoken language, except for the naming of small whole numbers. Mathematics has both formal and informal expressions, which we might characterize as "school math" and "street math" (Lehnann, 1996). When we attempt to engage students by using real-world examples, we often find that the colloquial or "street" language does not always map directly or correctly onto the mathematical syntax. For example, suppose a pre-algebra student is asked to symbolically express that there are twice as many dogs as cats in the local animal shelter. The equation 2A=B describes the distribution, but is it true that two spoons are equivalent to one folk?

Joan (2005) indicates that recasting the mathematics domain into objects and actions can also help to illuminate the similarities and differences between how we learn the language of mathematics and how we learn any other second language. In this line, this researcher observed and concluded that to be considered good in mathematics, simply means to be fluent in the mathematics language. As we compared our earliest memories of learning mathematics, one of us remembered being made aware of numbers as an abstract quantity by looking at the pattern of classroom windowpanes. Another, who characterizes herself as a very visual learner, recalled seeing boxes of six pansies apiece packed in cartons of four boxes apiece at her family's floral business an observation that triggered previously undiscovered ideas about addition and multiplication. Another member of the group, whose father was a banker, remembered dinner-table conversations filled with mental mathematics problems, yet she tends to rely heavily on writing as a learning tool. And one of us told of feeling suddenly "divorced" from the language of mathematics upon entering Algebra II, where everything became symbol-laden and obscure.

Another interesting commonality between mathematics and foreign languages lies in the relationship between rhyme and retention. Several in our group either did not initially speak English as a first language, or were essentially bilingual for a period of time in both a "home" language and a "school" language. What we tend to retain of the second language is most easily accessed through music or rhyme—we remember songs, prayers, and poems even though we can no longer perform even the most rudimentary task of written or spoken communication. This brings to mind students who are able to spout mathematical facts using jingles or mnemonics, but cannot use the facts in any extended way or for any new purpose.

Perhaps the greatest difficulty in learning the language of mathematics is that a double decoding must go on during the entire process. Particularly in the early stages, we must decode spoken mathematics words in the initial context of normal parlance, and then translate to the different context of mathematics usage. Double decoding also occurs when we first encounter written mathematics words or symbols, which must first be decoded, and then connected to a concept that may or may not be present in prior knowledge even in an elementary way.

As developmentally complex as double decoding is for most students, imagine how difficult it must be for second-language learners. The following anecdote illustrates the problem.

Another difficulty inherent in the decoding process stems from the fact that, although most mathematical nouns actually describe the things they refer to, their origins are usually Latin or Greek rather than English. The work of Berlinger William

(2007) has traced these connections. The mathematics words that we use in English come from many sources, and have assumed their current forms as a result of various processes; in addition, many contain more than one unit of meaning. Even though English, Greek, and Latin are all rooted in the Indo-European language—the common ancestor of the languages spoken by roughly half of the people in the world today—few American students currently have any exposure to either Greek or Latin.

An interesting example of how language can either illuminate or obscure concepts is the difference between the word "twelve" in English and the corresponding word in Chinese, the grammar of which is a perfect reflection of decimal structure. One day, as I was observing the piloting of a manipulative device designed to help students understand place value, I talked at length with a Chinese-born teacher who was using the device in his classroom. He told me that in his native language there are only nine names for the numbers 1 through 9, and three multipliers (10, 100, and 1,000). In order to name a number, you read its decomposition in base 10, so that 12 means "ten and two." This elegant formalism contrasts sharply with the 29 words needed to express the same numbers in English, where, in addition to the words for the numbers 1 through 9, there are special words for the numbers 11 through 19 and the decades from 20 to 90, none of which can be predicted from the words for the other numerals. To compound the confusion, the English word for 12 incorporates two units of meaning: The first part of the word comes from Latin and Greek expressions for "two," and the second part is related to an Indo-European root meaning "leave" (Wylde & Partridge, 1963). Thus, an etymological decoding would be "the number that leaves 2 behind when 10, the base in which we do our calculating, is subtracted from it" far from transparent to the novice learner!

It is also important to recognize the potential for enormous confusion that symbolic representations can create. As Ayeni (2003) note: In reading mathematics text one must decode and comprehend not only words, but also signs and symbols, which involve different skills. Decoding words entails connecting sounds to the alphabetic symbols, or letters.... In contrast, mathematics signs and symbols may be pictorial, or they may refer to an operation, or to an expression. Consequently, students need to learn the meaning of each symbol much like they learn "sight" words in the English language. In addition, they need to connect each symbol, the idea it represents, and the written or spoken term that corresponds to the idea. (p. 15)

The surprising potential of symbolic representation cannot be overstated. However, students can be quite confused by the fact that changing the orientation of a symbol—for example, from horizontal (=) to vertical (‖) can completely change its meaning. A collection of confusing words, symbols, and formats that we have encountered in the classroom. This is not an exhaustive list; rather, it is intended as a work-in-progress that teachers are encouraged to add to, and as an early-warning system for educators who are mystified by the misinterpretations particular students may attribute to a mathematical situation that, to others, has quite a different meaning.

"There's a great ratio disparity between teachers and the number of students to be taught. This makes it difficult for one teacher to manage teaching a large number of students. It also makes it difficult for all students to understand what is being taught, considering that mathematics needs a lot of concentration, exercise and repetition," he added.

Another reason is behind the failure in the subject, is the perception towards mathematics. Students have engrained it in their brains, that mathematics is a difficult subject. So, no matter how much a teacher tries to teach in class, such mentality makes it hard for students to grasp what is being taught.

"Another contributory factor is the lack of basic mathematics understanding right from primary education. Students graduate to secondary without understandings the basics of mathematics. "This is partly due to the fact that Standard Seven examinations are given in the format of 'multiple choice'. When a student passes, at times it's not because he understood everything as observed by Kittul.

Laziness is another factor that's been closely related to failure in mathematics. As a science subject, mathematics requires a lot of practice through exercises. A student must solve at least ten questions a day in order to fully understand the ins and outs of the subject. But this isn't being practiced by students, leading to failure in the subject.

Students cannot pass mathematics on their own, they need to be guided. At school, it's a bit easier due to the presence of teachers, but at home, parents need to take up this role – most don't. "Some parents don't have the culture of monitoring their children's progress at school, the students are given homework, but some don't even do the homework, and the parents don't even check to see how the child is coping with studies. "Parents should stop being over-reliant on teachers to do everything. They need to chip in too in an effort to help their child excel in academics," the teacher says.

The lack of permanent mathematics teachers is also another problem that has persisted for years. There are known situations where teachers from one school are compelled to go to another when they get extra time, just to teach mathematics. You find a school has one teacher who's responsible for teaching hundreds of students.

Mathematics' language is considered to be unique for it is full symbolic. According Lance et al (2005), "although researchers have paid lip service to the unique vocabulary of mathematics, they have done little to highlight the ambiguities, double meanings, and other "word" problems associated with the discipline." The deaf ear that have been given impaired communication at best, and seriously put mathematical misunderstanding at worst. I contend with the finding of Joan that 'to compound the difficulty, information in mathematics texts is presented in a bewildering assortment of ways; in attempting to engage students, textbook writers too often introduce graphic distraction, and format the pages in ways that obscure the basic concepts.'

In the world, we have over 4,000 languages and dialects, but all of them share one thing in common, like the category for words representing nouns, or objects as well the category for words representing verbs, or actions. Having this as a starting point, it provides a great desire of looking at the mathematical world and its language. It is, therefore, as stated by Lance et al (2005), "well to identify both content and process dimensions in mathematics, but unlike many disciplines, in which process refers to general reasoning and logic skills, in mathematics the term refers to skills that are domain-specific." ultimately, people tend to lump content and process together when discussing mathematics, calling it all mathematics content. In real sense, it is important to maintain a distinction between mathematical content and process, because the distinction shows something very important about the way humans approach mental activity of any sort.

African study, by Steven Wambura, University of Dar es Salaam, student pursuing a Bachelor of Science in Microbiology, talked about the negative perception towards mathematics. He traces the mental state right from childhood, and blames it on the wrong notions imparted to children by their older siblings. "Our old siblings made us believe mathematics is a difficult subject. So that perception sticks in our minds, we grow up believing that mathematics is difficult. This makes us lose belief that we can conquer the subject," Steven says.

"Mathematics is easy to forget, it needs a lot of revision, many students do not spare time for revision and practice, the resultant effect is failure," the teacher adds.

"This is the biggest reason for many students failing mathematics, it is not about teachers, learning environment or anything else, the biggest reason is mindset," she says. Jenifer further explained that being good in mathematics involves the ability to explain and think logically. "Many students are not capable of thinking logically, they are too messy with their lives and their books, they do not give themselves time to solve problems," Jenifer adds.

In Nigeria, literacy is recognized as a basic tool for personal and national development. The National Policy on Education (2004) had placed inculcation of permanent literacy and numeracy, and ability to communicate effectively as one of the objectives of school education. Many studies have appeared in the last few years indicating that access to books not only has a positive effect on reading achievement, but also that the positive impact of access is as large as the negative impact of poverty. This suggests that a good library can offset the effects of poverty on reading achievement. The library must provide resources to complement education. These resources can take children and youth far above technical literacy to developing reading culture, that makes permanent literacy attainable.

Deficiency in functional libraries, a library plays an important role in the retrieval of formidable information and enhancing literacy. Reading has been seen as a rather solitude activity towards numerical skill development and is contrary to traditional values. All over the world libraries are dedicated to providing free and equitable access to information for all, is it in written, electronic or audio-visual form. According to the studies conducted by Lisa (2000) in Lusaka titled 'Setting-up Primary School Libraries in Belize. In: *Impact: Journal of the Career Development Group'* libraries play a key role in creating literate environments and promoting research skill by offering relevant and attractive reading material for all ages and by offering adult and family literacy class.

Librarians can help children and youths develop critical and independent thinking through their exposure to a wide variety of instructional resources and learning opportunities. As stated by Masalisa (2005: 34), apart from the development of creative and critical thought, the role of the library in the promotion of reading culture can be seen in the readers' development of values, attitudes, and appreciation. These are difficult to teach in the classrooms.

Home background, the most important factor in a child's acquisition of literacy is the reading practices of the parents. This has been shown in numerous studies, including the 2001 Progress in International Reading Literacy Study (PIRLS), which showed that, in the case of Sweden, the number of books and reading material in a family was the deciding factor influencing the reading scores of pupils (Dewey, 2004: 56). Similarly, a study of the German Foundation Dewey on "Reading Behavior in Germany in the new Century" revealed that the positive attitude of parents and the availability of reading materials at home are the most important factors in creating positive lifelong reading motivation in children. Children have different reading needs at different stages of their lives, but they need access to enjoyable reading materials from the very beginning. Parents have to be encouraged to read to their children while they are small, sing with them and play creative language games with them as part of their everyday life. Furthermore, parents have to be a good example by being active readers themselves. (Dentol et al, (2001: 30) explained that Children who grow up in a literate home environment are at an advantage when entering school and are more likely to be successful

throughout formal schooling as compared their peers from non- or semi-literate home environments. Several authors (Bourdieu, 1986; Taube, 1988; Elley, 1994; Lehmann, 1996; Fredriksson, 2002) emphasize that parents' level of education, socio-economic position of the family and cultural heritage play an important role in the learning achievements of children. The analysis of the data among the fourth graders in Latvia reveals the similar coherence between parents' education, study aids at home, financial position of the family and children learning achievements.

Parents do not always give encouragement or home support when it comes to reading and mathematical skills. Makotsi (2004) explained that homes are often overcrowded, noisy and after sunset too dark for the printed figure to be encoded. Many within the educated elite are non-readers, "content only to use the printed word to pass exams. Family is an important factor in development of numerical reading as well. If parents are not well educated, they may ignore the significance of counting skill development and learning. Most of the time, families are too busy to care about this issue, as a result, they may have never bought any reading material. This has negative effect on reading culture of pupils who only read when they are in class and eventually fail to develop their reading levels but remain static.

Lack of necessary mathematics textbooks, **t**he phonetic of every language is important in improving reading levels. Holte, (1998) indicated that, over 180 researcher studies to date have proven that phonics is the best way to teach numerical reading like in English to all students. This can be achieved through practice of reading different mathematics books.

The World Education Forum in Dakar in 2000 identified that "in many schools that are trying to meet government targets for Universal Primary Education, there is an acute lack of textbooks, let alone supplementary reading materials. It is common for one textbook to be shared between six or more pupils, and often there are no textbooks at all" (Makotsi, 2004:6).

In a study carried out in Zambia, it was established that the major challenges were lack of reading materials for pupils. The District Administration acknowledge the lack of teaching and reading materials in mathematics which they attributed to be in short supply and they hoped that the Ministry would supply the district with enough materials. A study conducted by Imasiku (2012) in Lusaka on *a comparative study of performance of grade 9 pupils in the junior secondary school leaving examinations in selected rural and urban basic schools in Senanga district, Dissertation (M.Ed.)* indicates that shortage of books affected the performance of pupils as they had no books to read in all the subjects especially mathematics.

Use of different dialects, language of instruction is one of the primary determinants of effective classroom communication. UNESCO (1953, 2003) observed that reading skills and levels in most developing countries were drastically going down. Globally, many countries with multiple languages had required a single language to dominate their education sectors. This phenomenon is particularly prevalent in Zambia and Africa at large. Depending on different estimates and definitions, the number of languages spoken in Africa ranges between 1,000 and 2,500 (Makuwa, 2004). However, only 176 of these African languages are used in education, and for many languages, their use is often limited to informal education programs. In formal education, most African countries use the language of their historical colonizers or the language of a dominant ethnic group. The use of unfamiliar languages as a medium of instruction is often mentioned as an important source of low enrolment rates, retention rates and academic achievement (Tihtina Zenebe Gebre 2014). Pang etal (2003:273) observed, "Real progress in mathematics depends on oral language

development, an observation that suggests that children learn to calculate by associating the written form with numerals". Some studies in South Africa (Alexander 2005) have blamed the poor achievements of learners from African language speaking homes on the early transition to English, while others see a negative attitude by African parents towards African languages that makes it difficult to enforce mother-tongue education (De Wet 2002).In Nigeria, the majority of the children in the Ogonngo circuit speak Oshimbalanu, Oshikwaaludhi or Oshingandjera as their primary languages. However, when they start school, they are taught Oshindonga as the L1 and subsequently English as a second language. Although these languages share similar lexical features with Oshindonga, they are quite different in numerous linguistic terms, and this would suggest poor transfer of reading skills, Cummins (2000).

In the same vein, Lerner (2000) argues that when a person attempts to speak a language in which he or she has not yet become automated, he or she will necessarily have to divide attention between the content of the message and the language itself. This also applies to reading and if the skill in reading is automated, it will not be disrupted by concurrent processing of the language because this does not take up the attention resources. She stresses that a person in whom the language is not automated will read with great difficulty, being forced to pay all the attention to word recognition and none to decoding the written numbers, thus impeding comprehension.

Zambia is a multilingual country with 72 ethnic groups who use different dialects. Western province is comprised of ethnic groups that include Mbundas, Nyengozi, Kwangazi and some Luvales. Practicing numerical reading in an indigenous language that differs from the language spoken at home and in the playground interferes with learning to read simple words in a Zambian language, even though the language of instruction and the most familiar language are both Bantu languages that have words and grammar in common. Tambulukani and Bus (2011) in their article 'Linguistic Diversity: A Contributory Factor to Reading Problems in Zambian Schools', explained that pupils were more familiar with the vocabulary of another local language than with the vocabulary used in the reading method. In the pursuit of ways to improve reading instruction in multilingual countries such as Zambia, it was tempting to blame learning to read in a language that differs from what constitutes the home and playground language of the students as the major cause of a low success rate in learning to read. People first learn to speak a language before reading it and Oral language abilities stimulate phoneme awareness that lay a foundation for emergent literacy and subsequent reading skills (Dickinson et al., 2003). Researchers argue that, vocabulary and other oral language skills play an important role in the emergence of phonological sensitivity, phonological memory and phonological naming, and these skills uniquely predict mathematical skills once children enter school. The present research confirms that numerical reading proficiency is substantially improved when there is a close fit between the students' home language and an indigenous language serving as a medium of instruction.

Studies, done by other scholars to test the benefit of a familiar language from selected similar public schools from districts where the overlap between the official language of instruction and the language spoken by the children was found to be varying. Study done by Kashoki (1990) in Lusaka titled '*the factor of language in Zambia*' estimated that the overlap in vocabulary would be rather good in Mongu (Western Province) but very poor in Lusaka Province, with Chipata (Eastern Province) scoring in between. In Mongu most pupils are assumed to be familiar with Lozi, the official Zambian language in that place although some children may be more familiar with Mbunda, another local language with a different vocabulary.

2.4 The role of the Government through the Ministry of General Education in mitigating the challenges learners face.

The John Templeton Foundation Report (2009) revealed that while African countries differ from one another in many features, they are broadly similar in the issues that hinder mathematical development. The report indicates that in most African countries, mathematical development is limited by low numbers of qualified teachers of mathematics and mathematicians at the masters and PhD levels. The report revealed that by 2007, Djibouti and Cape Verde each had only one doctorate holder in mathematics. Libya, Somalia and Angola had two doctorate holders in mathematics each. With few professors to train the next generation of leaders in the field, countries cannot meet the growing demand for mathematicians with advanced up-to-date training.in line with this report, university mathematics departments in Africa were seriously under-resourced and understaffed. The report further highlights large classes, lack of access to text books and poor infrastructure in the universities as major challenges faced by learners and lecturers across the continent of Africa.
Mclntyre and Layne (2011), in his study, observes that mathematics is one of the core subjects in any engineering field, including engineering technology and science fields. It is also known as the backbone of success in these fields. A student who masters the subject of mathematics is perceived to be bright and is assured of graduating from the university. However, students entering secondary education, particularly in the field of mathematics are found to have insufficient basic mathematics skills and knowledge.

It is important that schools should include extra-curricular activities in their timetables so that learners can explore other activities besides being taught in class. Participation in extra-mural activities refreshes the learners' minds and increases their motivation. Research done by (Louw, 1993: 24) indicates that people with healthy bodies usually develop characteristics such as adventurousness, energy and assertiveness. The state of health exerts an influence on your confidence to perform academically and be assertive during one's entire lifespan. If the learner's health status is poor, he/she will be absent from school owing to consultations with doctors or going for check-ups at clinics or hospitals. Several lessons will be missed and this may result in poor performance. The individual's state of health influences not only the person's physical development, but is also closely linked to his/her energy level, ability as well as enthusiasm to do things and explore the world which could enhance the learner's academic performance. The situation in the South African schools is that most of the schools do not have facilities for some of the extra-curricular activities (dancing, table tennis, tennis, drama etc.) to accommodate those learners who do not play netball and soccer so that they too can develop the ability to explore the world (Kaplinsky, 1992:8).

Researchers contend that the adolescent's value judgments are often influenced by fear of rejection by the group (Sharry, 2004:1-3). Childhood and adolescence are times of first encounters and intense experiences in the present. They are periods full of joy and sadness, excitement, and fear, as well as rapid growth and new learning. These are critical times when certain events and relationships greatly impact on an individual's life and determine the future.
Peer pressure results in negative decisions, rebellious, and moody behavior, which in turn result in poor academic performance since they are

not cooperating and, in the process, they lose a lot of time for their lessons (Sharry, 2004: 1-3).

Think in words: In an effort to help students understand mathematics better, the article talks about "thinking in words". It states that not everyone prefers visual thinking. "Some people may prefer to think about mathematical concepts in words, or it may be more convenient to communicate a particular idea in words. At times teachers expect to see words in mathematics solutions. Mathematical arguments are often best described by sentences that tell a coherent story, with equations and diagrams included at appropriate points." The researcher contends that the government through the ministry of education, as great roles to play in view of mitigating the cited challenges faced by learners. The government should establish more college and universities that will train more teachers for mathematics with suitable teaching techniques.

2.5 Researcher's opinion on Literature Review

The reviewed literature was mainly from primary sources, journals, secondary sources; education

Policy documents, articles, and newspapers. The Zambian perspective is not different from the international perspective since poor performance of learners at high school affects all high school learners from a poor socio-economic background. Therefore, poor performance of learners should be looked at holistically due to factors such as poverty, which has spatial, racial and gender dimensions, which in turn have determined settlement patterns of different racial groups in all provinces. The literature that was reviewed revealed that factors contributing towards poor performance are linked to socio-economic problems, poverty, and politics.

A preliminary literature review also shows that past studies are primarily focused on the understanding of mathematics as a powerful tool in the world today and that misunderstanding it actually also models a particular type of constraint, such as technological, contractual, resource, spatial and information constraints. Limited progress in mathematics has been made on classifying various constraints according to their characteristics in a comprehensive manner. In terms of modeling and resolving constraints, various approaches have been recommended. For example, many methods are applied to deal with time-related mathematical constraints; knowledge-based systems were used to automate work plan generation; numerical-based optimization algorithms were developed to resolve constraints; and databases and visualization techniques, such as methodology Virtual Reality (VR), that are used to communicate and visualize constraints to learners. What is missing from the past studies is a comprehensive and structured approach in managing constraints. For the purpose of carrying this study, four research questions are formulated to guide the study in selected secondary schools.

However, in this study, poor performance refers to scores below 50%, which is the benchmark for university entrance. This 50% was an average of a learner's marks. Any mark from 49-40% translated in to the majority of learners passing with an S symbol; that is, School Leaving Certificate that does not allow learners university entrance. The new curriculum (Revised Curriculum Statement 2005) came with a new benchmark, Bachelor that allows a Learner university entrance. The difference was that the new benchmark for University entrance does not recognize the average mark of a learner, as it was the case with. Exemption, instead the learner must pass all approved subjects with a minimum percentage.

Taking it up from Wohlstetter and Mohrman (1997), who contends that site-based management is an innovation that had its roots in the private sector, which encourages self-management and empowers the employees leading to improved morale and higher productivity. Site-based management theory was transferred from the corporate world to the realm of public education,

giving schools authority over budget, personnel, and curriculum.

It is important that schools should include extra-curricular activities in their timetables so that learners can explore other activities besides being taught in class. Some learners might be gifted in athletics, soccer, dancing, netball or tennis. Participation in extra-mural activities refreshes the learners' minds and increases their motivation. Research as alluded to indicates that people with healthy bodies usually develop characteristics such as adventurousness, energy and assertiveness. The state of health exerts an influence on your confidence to perform academically and be assertive during one's entire lifespan. If the learner's health status is poor, he/she will be absent from school owing to consultations with doctors or going for check-ups at clinics or hospitals.

The impact of these factors on the academic performance of learners is applicable to all learners; especially those who are from poor socio-economic backgrounds, irrespective whether the country is classified as developed or underdeveloped, such as Zambia. Similarly, this is a global problem as highlighted by international and local literature.

According to other scholars, poverty has spatial, racial, and gender dimensions. Poverty is deliberated in provinces that have a high rural population which is predominantly Black. Their high poverty levels are due to their high illiteracy and unemployment levels. These perpetuate the problems that influence poor school performance by the children in mathematics and other subjects.

The school environment might also be the source of poor performance if learner holds up materials are not adequate. The arguments concerning lack of facilities and resources in rural based schools are always raised where there is serious under performance in schools. Such schools often serve underprivileged learners who are from families that are not educationally supportive.

Although there are arguments that the difference between rural and urban areas is political; the researcher wishes to indicate that there was a need to take stock of what the current situation is, especially now that our country has been democratic for the past many years. Despite the differences between rural and urban schools, there is a need to acknowledge that some high schools in the rural areas excel in mathematics performance while some urban-based high schools perform poorly which denies learners' entrance to university.

The findings of this study assisted the researcher to recommend remedial measures that would address the problem relevant to the source of poor performance of Grade 12 learners in mathematics.

Many pupils also suffer from unpredictable home environments such as parents being arrested for always quarrelling due to substance abuse. The presence or availability of parents is crucial since they provide information, learning opportunities, behavioral models, and connection to other resources. The absence of such support severely limits these transactional protection processes and results in learners having a low self-esteem. Going by what others said, educators need to create a positive school environment for learners to feel at home at school in such a way that they can openly discuss what prevents them from performing to the required standards.

Hence, the involvement of parents would allow the school to seek assistance from relevant authorities to provide the necessary intervention.

Generally, various studies that attempt to explain academic failure start with the three elements that intervene in education: parents (family causal factors), educators (academic causal factors), and learners (personal causal factors). Among personal variables, the most studied are motivation and self-concept.

Attitudes are learned throughout life and are embodied within our socialization process. All of us observe others and assess attitudes on the basis of communication style (verbal and nonverbal) and behavior. This is an example of an informal

approach, which is spontaneous and based on our understanding of social cues. We may be wrong in our judgment of learners who turn up late for classes and do not ask questions, but they may still hold very positive attitudes towards the subject that was being presented at that time. The negative attitude towards learning could result in learners performing poorly preventing them from obtaining required results for university entrance.
herself/himself.
In conclusion, the researcher's literature review highlighted several factors that contribute to poor performance as researched by different researchers internationally, including Zambia. Most Grade 12 learners are unable to perform at a level that would allow them university entrance. The impacts of these factors on the academic performance of learners are applicable to all learners; especially those who are from poor socio-economic backgrounds, irrespective whether the country is classified as developed (America) or underdeveloped, such as Zambia. Similarly, this is a global problem as highlighted by international and local literature.
The study is embarked into this kind of research, with the aim of producing a detailed picture or a profile in words and numbers of participants.
In this case, Grade 12 learners, educators, principals, and parents who held a particular view regarding the poor performance of learners at the schools under study. The study used a carefully selected number of participants to make it a qualitative study that should rely on spoken words for the provision of a more sensitive and meaningful way of collecting human experiences.

2.6 The gap

It is therefore imperative to appreciate the different researchers globally, African and Zambia for the availed facts about causes of the low performance in mathematics among learners, especially learners at senior secondary school level. However, despite various researches that have been conducted so far, a little have been done in assessing the effectiveness of teaching methodologies of mathematics on learners' performance in mathematics. This being the established gap, this research focused on covering the gap by assessing the teaching methodologies of mathematics.

III. METHODOLOGY

3.1 research design

In this research a case study was used, this is because of the nature of the research and the type of data needed. This design was appropriate because the study is attempting to describe some aspect of a population by selecting the sample of who were asked to complete the questionnaires. The design was also chosen as it was considered the most appropriate, relevant and provided the needed data at less financial cost and in the shortest possible time.

3.2 Target population

Population size is the number of people that the researcher is going to contact in carrying out this study. Therefore, in this study, the researcher's interest included parents, teachers, senior secondary school pupils in selected schools in the district and District education board officer.

3.3 Sample size and sampling procedure

3.3.1 Sample size

The sample size for the study is eighty-three (83) respondents from the four selected secondary schools and their surrounding communities including the DEBS office.
From this total number, there were one (1) representative from DEBS office, eight (8) teachers from the selected secondary schools, six (6) village headmen from selected secondary schools, eight (8) P T A members from selected schools, four (4) head teachers in those secondary schools, twenty (16) parents from various selected schools and forty (40) pupils from selected different schools. Every school has one school manager, two teachers of

mathematics, one village headmen, two PTA members, five parents and ten pupils respectively. The ratio of pupils was five girls to five boys drawn from grade 12 class (es) from each selected school. All these respondents were the key informants who actively participated in the study.

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3.3.2 Sapling procedure

The researcher has chosen to use both random and non-random procedures in choosing the respondents for this study. For selection of schools, the researcher considered reachable secondary schools. Teachers, head teachers and DEBS officer were selected through non- random procedure called purposive. Purposive sampling, according to Kombo and Tromp (2006:82) is purposely targets a group of people believed to be reliable for the study. On the other hand, pupils and parents were selected using random procedure called simple random sampling, for this procedure calls for a relatively small, clearly defined population with equal opportunity. Parents includes PTA members were selected from surrounding communities of the four selected schools. For teachers, the researcher selected only teachers who have taught mathematics in grade 12 at least for more than a year in each school with the help of the head teacher.

3.4 DATA COLLECTION METHODS AND PROCEDURES

3.4.1 Data collection instruments

The instruments used were developed by the researcher for the purpose of the study.

The research used the end of topic test, interviews and observation checklist.

Teachers Questionnaire - The teachers' questionnaire were used to get particulars of the teachers as well as their educational qualifications. In addition, the teacher questionnaire was used to assess how teachers identified learners with difficulties in mathematics.

Checklist on failure in mathematics-The checklist on results of pupils was used by teachers to bring out the problems that they face in dealing with pupils who are unable to solve mathematical problems as well as the performance of pupils in class

3.4.1.1 Questionnaire

The questionnaires were used to collect data from the pupils, Parents and teachers of mathematics.

The use of the questionnaires was arrived at because it helps create rapport and explains the purpose of the study. Questionnaires are sharply limited by the fact that respondents must be able to read the questions and respond to them. In addition, the availability of many respondents at a time made it possible for the researcher to collect data within a short period and get a high response rate as well as reducing the financial expenses. Mathematics end of topic assessment: This structure achievement test results. Additionally, practical method of teaching using different forms of teaching methodologies was employed in different classes.

3.5 Data analysis

Data collected was analyzed through qualitative and quantitative methods. The reason for using Quantitative approach in the analysis of data was that this method uses numbers with tables coupled with frequencies and percentages, graphs, pie charts and themes for explanatory situations. So, the method was satisfying the proper demonstration of what really happens on the ground due to its validity of explicit data. The option to use quantitative data also lies in the usefulness of the approach in summarized statistical information. As for qualitative approach, this method signifies proper and surety of the data collected as valid and reliable because it involves direct or recorded collections that are later quantified. Ngoma (2006:81) significantly reviews that, "Statistical methods enable the researcher to reduce, summarize, manipulate, interpret and communicate quantitative

data". Furthermore, data analysis was also through content analysis of the questionnaire responses. Therefore, the data collected was analyzed using Anova and Statistical Package for Social Sciences (SPSS version 20).

3.6 Limitations of the study

Any research study is expected to have challenges. The researcher had limited time to conduct the study because of other commitments with classroom work. This limits the researcher to reach only few secondary schools in western province on the expense of pupils. Geographical barriers such as rivers and floods were also preventing the researcher from reaching far places away from the road, as it was difficult to find transport into such areas. The other challenge was for respondents to be interviewed. They were highly reluctant to tell the truth and time limit for some institutions may not allow them give the factual information.

3.7 Ethical consideration

Bellieni and Buonocore (2011) states that the reasons for considering ethical issues are many. First, norms promote the aims of research which include, truth, avoidance of error and knowledge. For instance, prohibitions against fabricating, falsifying, or misrepresenting research data promote the truth and avoid error. Ethical issues were considered in this study. Before any assessment was carried out in any secondary school, permission was sought first from the DEBS office for involving their schools in the study. At school level, further permission was requested from the school head teachers to allow them give the consent to the pupils, teachers, school community members and themselves participating in the study. The respondents were assured of the highest confidentiality of the responses obtained from the study. The information gathered from the participants/respondents were treated with confidentiality. Lastly, the researcher also avoided questions which might cause psychological harm to the participants / respondents.

IV. FINDINGS/RESULTS

This section presents key findings of the research findings in relation to the objectives. The questionnaires, interviews, demonstrations and observation methods were used to collect data. The respondents comprised of the pupils, teachers of mathematics, head teachers and DEBS officer. Pupils from Luampa secondary school, Mbanyutu secondary school, Mulamatila secondary school and Kaoma secondary school were interviewed.

4.1 respondents by gender

Gender	Respondents	Response rate
Female	39	47%
Male	44	53%
Total	83	100%

4.2 Performance levels in mathematics

For determining performance levels in mathematics, mathematics achievement test was given to the pupils to measure their computing levels. The test was in two parts, simple and complex computing. On simple, a child who was able to compute from the total of ten was said to know how to calculate. From this, only ten pupils managed to compute after a regular test from grade eleven. On the part of complex, only six out of the ten who managed to solve. The achievement test indicated that only ten pupils out of forty could effectively calculate both the simple and complex representing 25% of those who could and 75% of those who cannot calculate.

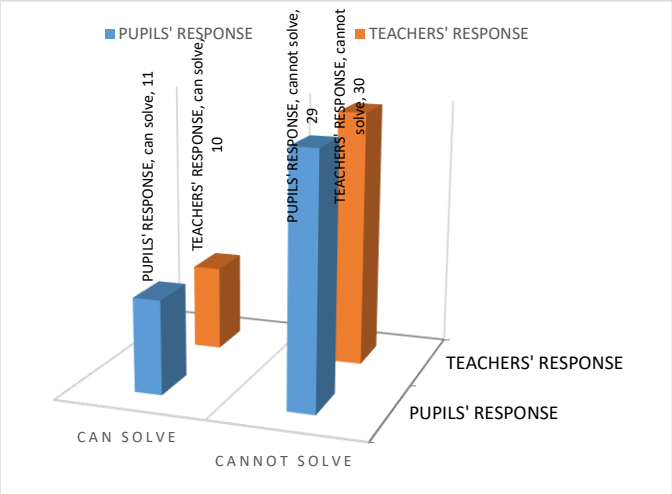
The achievement test alone could not be trusted to give true results, as some pupils could be afraid to solve. Therefore, the study gathered information from the pupils' topical test after the topic taught for two week and teachers on pupils' performance levels through some analysis of results. In addition, for the teachers, they were asked to indicate the number of those who could among the participants

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

of this study. The results are shown in figure 1 below.

Figure 1: Ability to solve a mathematical concept

From figure 1, eleven Pupils (28%) indicated that

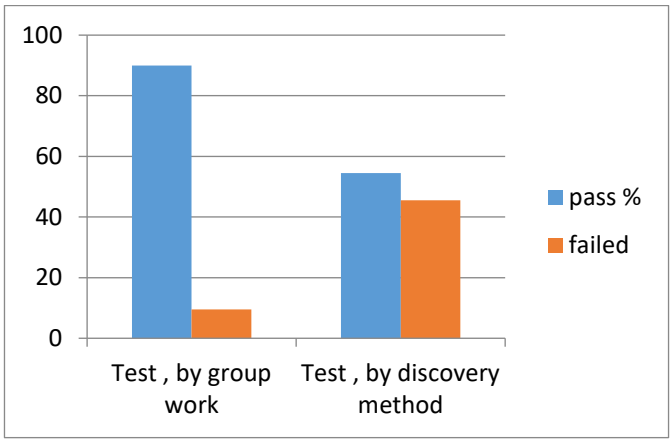


they could calculate mathematical concepts. Twenty-nine (73%) of them indicated that they did not know mathematics. The results from teachers were almost similar although two teachers (25%) indicated that their pupils were able to solve and six teachers (75%) had shown that their pupils could not.

4.4 variations of results

The graph below shows a variation between two classes performance when methods were used differently. The other used group work while the other used discovery method.

Figure 2 shows variations of results in two classes



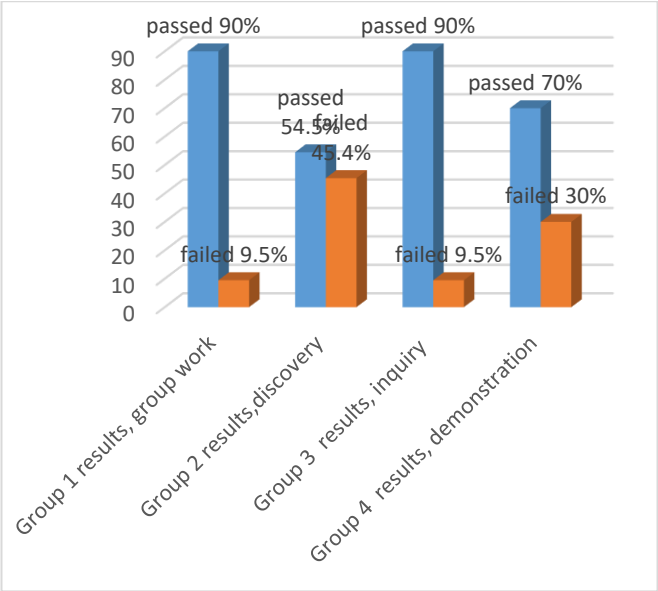
Source: Field by Reseacher

The above analyzed the two methods from the displayed results lists from actual manual class lists for grade 12C and 12B classes

Table 5 showing a list of pupils' test results after using various methods (Anova analysis)

C	D	E	F	G	H	I	J	K	L	M	N
Group1 Re	Group2 Re	Group3 Re	Group4 Results								
90	100	100	98								
76	100	96	88				Group mean	48.4	39.5	64.2	54.6
74	72	98	88				Stdev	20.5	31.9	20.8	25.4
72	60	94	76				Grand mean	51.7			
70	60	88	74				n	21	22	21	20
66	60	76	74								
54	58	72	70								
52	56	64	64								
50	54	62	60					Fstat	Fcrit		
48	52	58	58		Between	6973.24		0.137533	2.6802		
44	52	58	52		Within	50702.45					
44	48	56	50		Total	57675.68					
42	38	56	50								
42	26	54	46								
42	18	54	38			Conclusion:					
34	10	54	38			Accept the Null Hypothesis: the results are not affected by the teaching metho					
32	4	52	28								
30	0	50	18								
26	0	44	12								
16	0	38	10								
12	0	24									
	0										

The above table has a null hypothesis that the results are not affected by the teaching methods. In reaction to the accepted hypothesis, the researcher has also gathered a variety of factors that somehow agree and others that give the opinion in a different dimension on the hypothesis or assumption. With the theories that qualify the fact that no one is dull, methods play a vital role in shaping and motivating learners of different background and interest levels. The graph below shows the variance in relation to four test groupings of four different methods used in four classes.



Source: Field by Reseacher

In all the tests conducted, the picture is that the selection of methods to use is also critical even if the methods cannot make pupils pass the mathematics test alone. There are many other factors to be considered such as the following findings too.

The diagram analyzed using **Anova** below in relation to the results collected after actual class demonstration gives a clear indication that it's not only a method that affect pupils performance in mathematics. The methods used during lesson presentations are also vital. Though there are other factors that affect learning, good selection of methods and motivation cannot be left out in the process of lesson presentation.

Despite having seemingly good results in the weekly tests, there are other distractions to a better performance at the end of the year. Those other factors are included in the discussions of findings and a few under findings collected from individual teachers and pupils.

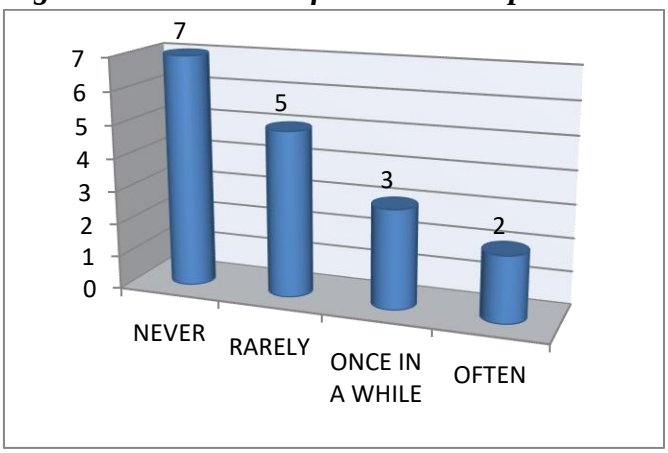
However, ignoring them and rely only on the class demonstrations would somewhat leave a gap in collective involvement of stake holders in the way they perceive the subject matter.

See in the diagram that has an assumption that methods have no effect due to the innovation of selecting practical methodology. The lists above give us the variations in the way two classes performed in relation to the methods employed in presenting the lessons in those classes.

Nevertheless, we cannot overlook the individual pupil ability to assimilate the content. But a reasonable picture is perceived in the results obtained bearing in mind that some scholars have asserted that no one is dull.

In general, we may say both assertions as to whether or not the methods have effects on the learners' performance; selection of methods can help both learners especially if it is a learner- centered one and teachers to help learners perform better.

Figure 4: Illustration of Recorded Responses



Source: Field by Reseacher

In figure 2 above, seven (41%) parents indicated that they did not compute for pleasure in their homes. And 29% of parents indicated that they rarely compute for pleasure. The percentage of parents who compute occasionally stood at 18 and 12% of parents' often-read books of mathematics in their homes.

Furthermore, parents were asked if they read together with their children at free times in their homes. The answers were similar to the question of how often they would. It seemed those who did not compute on their own do not do with their children as well according to data results.

Further, Pupils were also asked to indicate if at all they could read any books with their parents at home. The responses were shown in the table as displayed below.

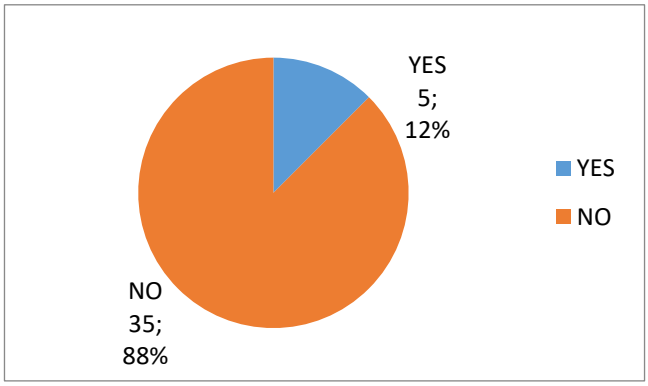
TABLE 7: Reading books at home with parents

RESPONSE	*FREQUENCY*	*PERCENTAGE*
YES	*5*	*12%*
NO	*35*	*88%*
TOTAL	*40*	*100%*

Source: Field by Researcher

The information in table 3 above demonstrates that 88 % (35) of the respondents who were pupils confirmed that they never read books at home with their parents and 12% (5) of them affirmed that their parents helped them with their mathematical problems. Therefore, the study revealed that many parents had no time to sit down and help their children in enhancing mathematical skills. Probably they themselves had not acquired proper education; they were either semi- literate or illiterate.

Figure 5: Shows the frequency of reading books at home with parents



4.5 Lack of literature books

To ascertain if lack of literature books affects pupils' level of performance in mathematics, participants who included both parents and teachers were asked to give the number of books in their homes and schools respectively. In responding to a question regarding how many books they had in their homes, seventeen parents indicated their answers as shown in table5 below.

Table 8: Number of numerical books in the home which pupils may read

Number of Books in Home	**Frequency**	**Percentage**
None	10	59%
1 - 4 Books	3	17%
5- 8 Books	2	12%
More **Than** 8 Books	2	12%
Total	17	100%

Source: Field by Researcher

According to data in table five above it clearly demonstrates that 59% (10) of the respondents that there were no books in their homes in any subject. The study still shows that only 17% (3) of them had 5 - 8 books in their homes 12% (2) revealed that they had 1- 4 books displayed in their homes and 12% (2) of the respondents disclosed that they had more than eight (8) books in their homes which their children could read at their spare time at home.

Figure 6 shows the number of numerical books in the homes which pupils may read

Table 9: Number of literacy books per class

Mulamatila Secondary	**Luampa Secondary**	**Mbanyutu Secondary**	**Kaoma Secondary**
GRADE 12	17	15	21
TOTAL 18	17	15	21

Source: Field by Researcher

The data in the table above shows that most of the secondary schools in Luampa districts lacked text books in many subjects.

Further, teachers were asked if they can afford giving mathematics text books to the pupils to read at their own free time especially at home. All the teachers indicated that they could not give books to pupils. Teachers gave reasons for this. Most of the teachers explained that they had few textbooks in their respective subject areas, which they depended on in their teaching and doing so would disturb their lesson planning.

Figure 7

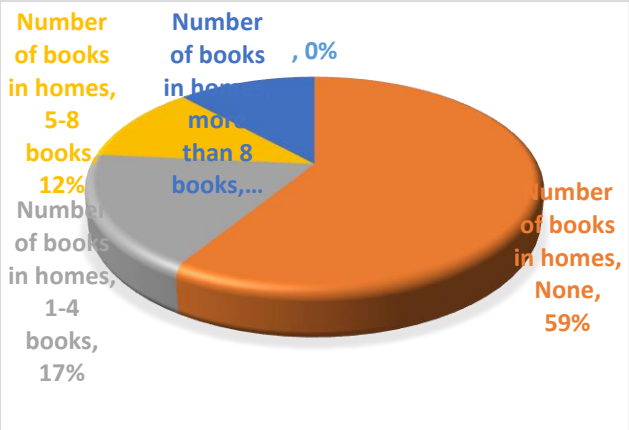
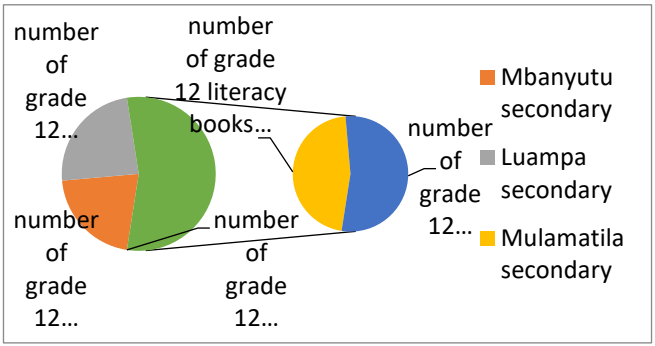


Figure 7: Shows approximate number of grade 12 literacy books per class in selected school



Source: Field by Researcher, 2019

4.6 Use of different dialects

Respondents showed that the use of different dialects could be to some extent lead to poor performance in mathematics since the district was multi- lingual. Building from grade 12 pupils' responses to a questionnaire regarding writing computational difficulties, there performance was not to the standard results are shown in table 4 below.

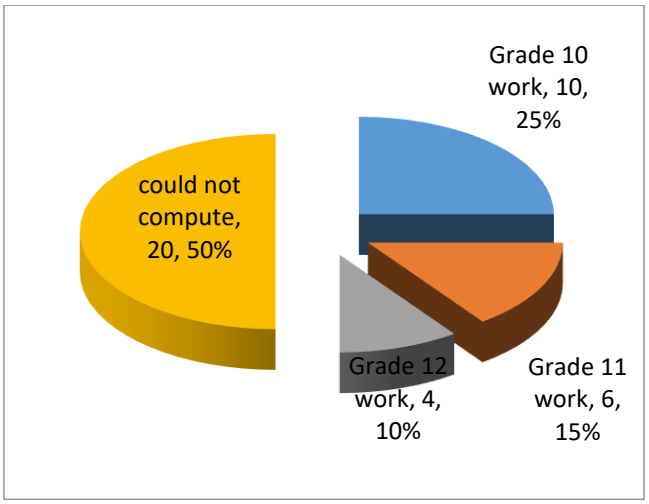
Table 10: Those able to compute mathematics at the end of 3 years

Response	Freq	Percent
Grade ten work	10	25%
Grade eleven work	6	15%
Grade twelve work	4	10%
Could not compute	20	50%
Total	40	100%

Source: Field by Researcher

Table 10 above indicates that 50% (20) of the respondents could not do even simple calculations from the work coverage from grade ten to twelve, 15% (6) of them could only try grade eleven work, 25% (10) of the respondents could do only grade ten and only 10% (4) of them were able to do grade twelve. Therefore, the study demonstrates that the majority of the learners had serious problems in mathematics, which could be a hindrance from performing better in mathematics at the end of the year's examinations.

Figure 8 shows the number of those able to compute mathematics at the end of 3 years



Source: Field by Researcher, 2019

DISCUSSION

Performance levels in Mathematics

From the data collected from the field based on both tests analysis and answers from the questionnaires, the performance was characterized by poor computational skills and before deconstructing the figures valuable units on their analysis of results. They compute at a very low pace that is slowly and laboriously, which reflected lack of automaticity in decoding. It was observed that the learners had trouble in understanding mathematical concepts and using the principles effectively. They On the part of performance, only six out of the ten who managed to calculate without much labor. The

performance was expected to be better and much easier especially that they are Grade 12learners; however, only six of the learners seemed to do well. Looking at this number, the percentage of pupils who could not perform well is bigger than those who could.
In percentages, the mathematics tests indicated that 20.8% of pupils could solve mathematical problems and 79.2% of pupils could not.

In determining the performance levels of pupils in mathematics, teachers were also able to bring out a number of challenges pupils face who can at least compute. All the eight teachers gave their views. The responses from the pupils were correlating with results from the tests. The findings from this study showed that the performance of pupils was really poor and supported by other researches done in Zambia on performance levels of secondary school pupils.

Home background

The participants also responded to questionnaires regarding how often they study even at least during a week. The results from the field also revealed that most of the parents do not help and encourage their children to study since most parents also had computational problems in their homes. In general, it could be interpreted through neither examining the data that parents did not have extended amounts of time for their children nor giving them time to study on their own. The low performance could be due to a variety of reasons including multiple jobs or low parental education levels. If parents do not see mathematics as a source of pleasure or entertainment, they may be less likely to promote individual study practices for their children. The act of observing a guardian reading is positively linked to a child's own study motivation. Parental reading habits are proven as powerful indicators of reading routines for children. Pupils alluded to that they have no time to study at home and can't see their parents read books in their homes

. Further, this study recognized that most of the pupils who managed to pass the tests came from homes where parents read and encourage their children study. This study therefore established that home background regarding poor study habits in mathematics had effect on pupil's performance levels as children who came from homes where reading is not practiced could not study at all. These findings are in line with (Fredricksson 2002) who states that children who come from homes with good reading practice have no challenges when given books to read in schools, but reading problems are common with those who do not practice reading at home. Further, the findings are supported by Kapampwe (1990) who explains that Children who have not been read to before they enter school may not have experience listening to rhythms and sounds. They may also not have developed an interest in reading; that is, they may not be motivated to learn to read

4.8.3 Use of different dialects

The study also wanted to establish the effect use of different dialects on performance levels in mathematics. This study has discovered that the use of different dialects is not the many cause of pupils' poor performance in mathematics

Although research done by other scholars had found that use of dialects affects the performance levels of children. A study that was done in Netherlands, found a relation between majority and minority language on effect of pupil numerical reading. Admiraal et al (2006) explains that a foreign language aims at developing skills in teaching mathematics as well that may be alien to them, but which governs daily life outside school. It may also refer to "immersion", in which an alien language, for example a language that is not the language of the larger society, is the medium of instruction. Instructions in a language foreign to them contribute to the poor performance in value decoding and writing abilities of these learners.

4.8.4 Lack of libraries

The study also examined that lack of libraries contributed to poor performance of pupils in mathematics. This study had proved that lack of libraries affects pupils reading and computing levels at senior secondary school level. Parents also libraries recognized that fact and said there is nothing in their local areas. All the parents indicated that they had no libraries in their areas. The same response was recorded from the teachers who indicated that their schools had no libraries. In order to determine the poor causes of performance among secondary school pupils, the researcher included a section in the questionnaire that both teachers and pupils need to suggest reasons that contribute to poor performance of pupils in mathematics. From the data obtained, all the eight teachers (100%) indicated that lack of libraries contribute to pupils' poor performance in schools. Further, thirty-eight pupils (79.1%) indicated that lack of libraries was a cause for their poor performance in mathematics and other subjects. These findings were in line with Lisa (2005), who stated that libraries play a key role in creating literate environments and promoting literacy by offering relevant and attractive reading material for all ages and all literacy levels and by offering adult and family literacy classes.

However, a total number of ten pupils (20.8%) indicated that lack of libraries does not contribute to poor performance in mathematics. Looking at the number of teachers and pupils who stated that lack of libraries contributed to poor performance levels among pupils in mathematical subjects in Zambia, particularly in Luampa district. There searcher found this to be true and supporting evidence is that no single library was seen in the district during the course of this study. This shows that these districts had no single library that could offer learners an opportunity to practice and develop acquired mathematical skills.

4.8.5 Lack of literature books

The findings of this study reviewed that lack of literature books contributed to poor performance of pupils in mathematics. The researcher included a provision in the questionnaire that asked both teachers and pupils to suggest reasons that contributed to poor performance of pupils in mathematics that is why these issues were captured. Both teachers and pupils agreed that lack of literature books contributed to poor performance levels of pupils in Zambia not only the districts and schools involved. The study established that most of the homes where pupils come from do not have language books. Data from the field also represented in table three shows that forty (10) homes did not have books in their houses, three homes had books in the range of one to four and 5parents indicated that they had books in the range of five to eight in their homes. Only two homes had more than eight books in their homes. Interesting, most of the pupils who managed to pass the tests came from homes with books. This alone suggests that those pupils practice reading at their own. This is consistent with Matafwali's (2010) assertion that lack of books in homes and schools' hinder children from developing local languages that they learn at school. Further, the study revealed that no schools involved in this study had enough literature books to cater for pupils. Data from the field also represented in table four showing the number of books per class in each school shows that each class had less than twenty literature books against forty or fifty pupils. To ascertain this all the teachers indicated that they do not give books to pupils to read at their homes. Most of the teachers explained that they had few books in their classes, which they also depended on in their teaching, and doing so would disturb their lesson in a case a number of children fail to come for school the other day. Teachers also explained that this was a cause of poor performance levels as books were not enough. The findings are also supported by Kafata (2016), in a study carried out in Zambia on teaching

mathematics. He explains that the major challenges were lack of follow up materials in mathematics for pupils.

4.8.6 Teaching methodologies

As already portrayed and analyzed in chapter four of this research, the researcher had an opportunity to interact and employ various methods in teaching mathematics such as inquiry, discovery, group work and demonstration at one of the schools so as to have some visible proofs of learning atmosphere. The researcher needed to validate methods that can possibly bring about learners proper aquisition of proper mathematical skill and knowledge.

Nevertheless, the study aimed at exploring the effect of teaching methodologyon learnersperforance levels pupils in mathematics at senior secondary schools. It was observed that teachers often began the calculational instruction without tapping on the learners' prior knowledge to connect previous learning to the new mathematical skill.

Preparation of the lesson materials is of outmost importance, and as Lerner (2000) writes, learners should be prepared to compute with understanding by identifying the main ideas, details, and sequenceas well as be able to organize patterns of concepts. During observations in most schools, teachers concentrate much on decoding and alculations, but no attention is given to identifying main ideas or details and to developing comprehension mathematical skills. The researcher expected the teachers to use discussion or groupwork most of the times. To develop mathematics use, the teacher should prompt learners to identify the their need to compute and motivate participation so that they would practice applying the generalization of the concept to their real life experiences. These findings are in agreement with Ojanen (2007) who after noticing the difficulties that teachers had in teaching New Breakthrough To Literacy (NRPL) and which she thought affected the pupils negatively suggested that teachers should be educated in numerical values so that they could have a firm understanding of the subjectbeingtaught. If a wrong teaching approach is used with the learners, it discourages their willingness to learn to decode in future. Although the responsibility for imparting effective teaching to compute lies with the teachers, Moats and Forman (2003) believed that some teachers lack the capacity to handle all the required skills and have not been taught them during their training.

The tests that were physically conducted attested several ability expositions among grade 12 learner in a selected topic. Though the test was actually topical, the performance does not seem to favor other pupils despite it being short.

The analysis portrayed some picture of variance in achievements as alluded to in chapter four. The table below authenticates that methods are to some extent critical or key to pupil involvement to academic work.

CONCLUSION

The issue of performance in mathematics in Zambia has, for some time been a subject of concern due to the low poor results each year observed among Zambian pupils, particularly those in public senior secondary schools.

It has been noted that proper use methodology in the sharing of instruction, particularly at the secondary level may enhance educational gains. This has been reflected in examination reports where pupils have done poorly in mathematics during examinations. The findings of this study had demonstrated that performance levels of learners in mathematics were still poor in Luampa district. The poor performance levels in mathematics could be attributed to a number of reasons including methodologies used in teaching.

Firstly, home background coupled with lack of literature books in homes and poor reading culture of parents. Parents who read with their children motivate them to study.

Secondly, lack of libraries and literature books contributed to poor performance levels of pupils in mathematics. Computational fluency and understanding comprehension need practice. For learners to develop their mathematical ability there is need for them to practice all the time. However, Luampa district is one of the districts without a library and most of the schools do not have enough mathematics textbooks to cater for all the learners. This does not give learners an opportunity to develop their mathematical skills.

Thirdly, teaching methods employed by teachers may have also contributed to poor performance of learners in mathematics.

From the findings of this research, the researcher had concluded that many factors contributed to learner's low performance levels in mathematics at senor secondary schools. Libraries to enhance the reading skills of learners and the availability of literature books in secondary schools are critical in improving the performance. In appropriate use of teaching methods, does not also promote mathematical skill practicing culture, which could allow learners develop their reading levels in numerical values. All these factors combined could lower the performance levels of learners in mathematics if not taken into consideration.

RECOMMENDATIONS

Based on the findings in this study, the researcher had a series of recommendations to make.

The research being conducted in Luampa district, the DEBS office in Luampa district ought to sensitize and encourage teachers to use teaching methods that promote the development of mathematical skills to the learners. As we have seen and observed that teaching methodology applied by a teacher play a vital role in enhancing learners' understanding.

As noted, that learners' parents/ guardians have a role to play in the learning circle of their children, the researcher recommends that let the communities be sensitized on the need to compute with their children in homes and encourage their children to practice computing at home. In this vain, all the stakeholders should work together to make sure that they promote the culture of reading of the mathematical literatures in any Zambian official local language or English.

The government has series of roles to play through the ministry of general education. Basing on what have been noted in the research, this researcher recommends that government should establish university/colleges for mathematics so that more qualified teachers will be trained. Above, it should build libraries in schools to give learners an opportunity to read and study. Libraries provide learners with an opportunity to play with books, which are not found in their homes if possible mobile libraries could do in secondary schools.

Furthermore, the government should encourage people to write books especially those that are based on mathematical contents to benefit learners in the school community. Further still, the researcher recommends that the ministry of general education should ensure that more books are provided to secondary schools to allow smooth and effective teaching of mathematics. This should be done to minimize pupil book ratio that is high in mathematics.

V. ACKNOWLEDGEMENTS

I thank the almighty God for the good care and protection given to me during my research time. Secondly, I thank all my dear ICU lecturers, particularly Mr. Kabubi Marvin for direct supervision for me to completed this research work. I thank my work mates at Luampa secondary school you for your encouragement and spiritual support offered to me during my study and research time. Lastly, I would like to record my deep appreciation to my dear parents, dearest wife, Mubyana Akokwa Mukela and children, Blessings Mukela, Mukela Mukelabai Jr. and Mukela Akokwa whose support, patience and understanding made this work possible. May God alone bless you!

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