

An Assessment of Factors Influencing the Performance of Grade 12 Pupils' in Mathematics: A Case Study of Kitwe District

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Abstract -Performance in Mathematics by pupils' in Zambia has persistently been poor. This study sought to investigate the factors contributing to the poor performance and investigate the effect of Motivation on pupils' performance in Mathematics. The study also sought to establish the strategies that can be employed to improve the performance in Mathematics by grade twelve pupils' in Kitwe District in Zambia. Descriptive survey design was adopted for the study. The research was conducted in 10 secondary schools in Kitwe district on the Copperbelt province of Zambia. The study comprised of 60 grade 12 pupils from targeted secondary schools, 30 mathematics teachers and 10 administrators making 100 participants. Purposive sampling was used to select administrators and teachers while Simple random sampling was used to select the pupils. Data was collected by use of questionnaires and three questionnaires were used: students' questionnaires, teachers' questionnaires and administrators' questionnaire.

The findings of the research show that pupils' lack of interests and their negative attitudes towards Mathematics affects their performance in Mathematics. The study further established that motivation has an impact on pupils' performance in Mathematics. Teachers' attitudes towards pupils' and towards Mathematics as a subject have an impact on pupils' performance. If teachers have

positive attitudes towards pupils', they will create a good learning environment that will make it easier for pupils to approach them. The findings of the study also revealed that the socio-economic factors of the pupils' parents have an impact on the pupils' academic performance, school-based factors like teacher experience, and knowledge of subject affects the pupils' performances. The study further established that the big numbers of pupils' make it difficult for teachers to attend to all the pupils' individual needs.

Remedies to improve performance of students in mathematics include; Proper guidance to change the students' negative attitude towards mathematics, teachers Motivating the learners so that they have a drive towards achieving their goals. More qualified teachers of Mathematics be employed to reduce the teacher pupil ratio in schools. Reducing the amount of paper work for the teachers to give them time to prepare and to increase the number of hours for the final examination, use of a variety of teaching methods and the formation of mathematics clubs in the schools would be a great booster to the achievement of students in the subject. It is anticipated that the findings of this study will give curriculum developers new insights into emerging issues on performance and influence the Ministry of Education on policy formulation.

Key words: Mathematics, factors influencing Performance.

I. INTRODUCTION

Mathematics is intimately connected to daily life and everybody's life-long planning (Umameh, 2011). Therefore, in modern Education, Mathematics is a compulsory subject. Prior to Zambia attaining her independence, education was left in the hands of the missionaries who taught Zambians how to read and write for evangelization purpose. When the Zambian government was installed in October 1964 after attaining independence, it faced many problems, major among them were; shortage of manpower and segregated education system favouring Europeans against Africans. Zambia quickly prepared strategies for intervention which was meant to correct the wrongs by the previous governments and hence they decide to embark on expansion of educational facilities in primary and secondary schools with a view of achieving quality education (Mwanakatwe, 1974). At independence, education was viewed as the means of eradicating poverty from Zambia. Achieving quality education is an everlasting challenge and quality education emphasizes every child's literacy and numeracy. Numeracy is highly connected to mathematics (Nagisa, 2012). Hence, in the Zambian school curriculum, mathematics is featured as one of the core subjects in all the career pathways. As a result, there is always a greater pressure on learners to succeed in mathematics than there is in any other subject as is the case with England and Wales (Cockcroft, 1982).

Zambia has been aiming at improving qualitative aspects in the educational sector since the 'Education for All' policy of which international community made an agreement in 1990 (Nagisa, 2012). The National development plan from 2006 to 2010 (Republic of Zambia, 2006) regarded education as a key factor and held up educational goals and

objectives. However, pupils' academic achievement has been severely low according to both international and national assessment (SACMEQ, 2000; ECZ, 2008).

Despite the perceived usefulness of mathematics, there has been repeated failures in the subject by many learners in Zambia (MOE, 1996). According to the Curriculum Development Center (2013) with regard to performance, there is more improvement in the achievement levels of practical subjects, but Mathematics and Science continue to record unsatisfactory results. On average, less than two-thirds of the candidates who sit for the Junior Secondary school leaving Examinations or the School certificate Examinations pass mathematics each year (CDC, 2013). This paper will therefore discuss the performance of grade twelve pupils' in mathematics in Kitwe district of Zambia

Statement of the Problem

The problem at hand is that there is poor learning achievement in as far as teaching and learning of mathematics is concerned (Nagisa, 2012). Despite the important role that Mathematics plays in society, there has always been poor performance in the subject at national level (CDC, 2013). The poor performance of pupils' in mathematics has been a thing of concern to mathematics educators, parents and government. The chief examiner's annual reports in mathematics in the Joint Examinations for the School Certificate and General Certificate of Education Ordinary level (JESCGCE) conducted by the Examinations Council of Zambia (ECZ, 1993; 2005; 2012) are good evidence of those facts. Mathematics educators have put in efforts aimed at identifying the major problems associated with secondary school mathematics. Despite all these noble efforts, the problem of poor achievement in mathematics has continued to rear its head (Koji,

Mulenga & Mukuka, 2016). This study therefore focused on assessing the performance of grade 12 pupils' in mathematics.

Purpose of The Study

The purpose of this study was to assess the factors that contribute to poor academic performance of grade twelve pupils' in Mathematics.

Objectives

- i.To assess the impact of pupils'' attitudes towards Mathematics on the academic performance
- ii.To investigate the effects of Motivation on pupils'' performance in Mathematics
- iii.To examine the influence of teachers' attitudes on pupil's academic performance
- iv.To establish strategies that can be adopted to improve performance in mathematics by students in secondary schools

Research Questions

- i.What is impact of pupils'' attitudes towards Mathematics on the academic performance?
- ii.What are the effects of Motivation on pupils'' performance in Mathematics?
- iii.How do teachers' attitudes influence pupils'' academic performance?
- iv.What are some strategies that can be employed in order to improve performance in mathematics in secondary schools?

Significance of the Study

It is hoped that the research will provide answers to the questions- particularly those contributing to the academic performance in mathematics at grade 12 level. The findings are expected to provide useful information that can be used by the Ministry of General Education to reflect on ways to improve the performance in mathematics at grade twelve level. It is hoped that the findings of the research will enable teachers and learners alike draw not only satisfaction

but also confidence in the teaching and learning process respectively. The study is expected to shade more light on why grade twelve pupils perform poorly in mathematics and also provide awareness to the government to take remedial measures in the education sector. This research can additional be used by other researchers in similar study cases.

Theoretical Framework

The study was guided by two theories: the motivation theory and the Social Cognitive Theory (SCT). The framework assumes that when pupils' lack interest and have negative attitudes towards learning Mathematics, they will not actively be involved in the learning process and therefore no learning would be evident. SCT refers to a psychological model of behaviour that emerged primarily from the work of Bandura (2001). Initially it was developed with an emphasis on the acquisition of social behaviours. Social Cognitive Theory rests on several assumptions about learning and behaviour, one of which is that personal behavioural and environmental factors influence one another in a bidirectional, reciprocal fashion (Hakalo, 2014). This means that an individuals' on-going functioning is a product of a continuous interaction between cognitive, behavioural, and contextual factors. Learning is affected by students' own thoughts, self-beliefs and their interpretation of the classroom context (Bandura, 2001).

According to Bandura (2001), self-efficacy refers to peoples' judgment of their ability to organize and carry out certain actions in order to achieve goals. Students' behaviour is shaped by what they think and how they feel. Mathematics self-beliefs have an impact on learning and performance on several levels: cognitive, motivational, affective and decision-making (Hakalo, 2014). Mathematics self-

beliefs determine how well students motivate themselves and persevere in face of difficulties, they affect the choices students make about coursework, educational and career paths and they influence students' emotional life (Wigfield & Eccles, 2000). If students are given the necessary learning experiences, they will have high self-efficacy. Students with greater self-efficacy in Mathematics are confident in their abilities to be successful in Mathematics and they develop positive attitudes towards Mathematics when compared to their peers with lower self-efficacy.

Motivation is "the drive to seek a goal such as food, water and friends and so on" (Roman et al, 1994). In this circumstance, the drive is meant to facilitate the learning of mathematical concepts. This theory purports that satisfactory learning of mathematics is unlikely to take place without sufficient motivation. There are two types of motivation; intrinsic and extrinsic. Intrinsic motivation involves seeking satisfaction that comes from within the individual (Fontana, 1988). In relation to Mathematics, students' curiosity can motivate students to learn and develop interest and positive attitudes towards mathematics. Extrinsic motivation involves seeking a reward from outside the organism behaviours (Fontana, 1988). This type of motivation may include teacher's approval, test scores and grades. Success in these things might help a student to develop interest and positive attitudes in the presence of teachers, which might assist a student to develop achievement motivation. Students who lack motivation may develop negative attitudes towards the learning of Mathematics leading to lower achievements.

1.8 Operational Definitions of Terms

1. **Academic Performance:** scores obtained by students in a given task, in this case, at grade 12 national examination level.
2. **National examination:** refers to examination that is written by all pupils' in a particular grade at the end of a school course throughout the country.
3. **Grade 12 Certificate Examinations:** Examinations written by grade 12 pupils at the end of the year to proceed to tertiary education.
4. **Students' attitudes:** students feeling or opinion about something or a way of behaving that is caused by this
5. **Teaching and learning materials:** refer to equipment and facilities used in the teaching and learning process like charts, textbooks.

II.LITERATURE REVIEW

2.1 Concept of Teaching and Learning of Mathematics

Mathematics is a subject that affects all aspects of life at different levels and it is seen by society as the foundation of Scientific and technological knowledge. Mathematics is one of the most important subjects in the school curriculum worldwide because it is a subject that has a direct relationship with other subjects especially sciences and technical subjects. Mathematics is a subject that cuts across primary and secondary school as a compulsory subject. Mathematics is seen as an important subject not only from the point of view of getting an academic qualification at school or college, but also it is a subject that prepares the students for the future irrespective of which work of life they choose to be part of (Davies & Hersh, 2012). Mefor, (2014) summarized it all by saying

that mathematics relates to everything in the universe from the smallest to the largest. Umameh, (2011) added that mathematics is intimately connected to daily life and everybody's life-long planning. Hence, mathematics is a subject that is human life highly needs for effective functioning. However, it is disheartening to note that with all the importance attached to mathematics, poor performance is recorded in public examinations.

Mathematics teachers from Early childhood education through to senior secondary school level have an individual goal of providing learners with knowledge and understanding needed for them to survive in the world dependent upon application of Mathematics. Studies have shown that different factors affect the teaching and learning process. According to Bandura (2001), learning is affected by students' own thoughts, self-beliefs and their interpretation of the classroom context. Students' behaviour is shaped by what they think and how they feel. Self-beliefs have an impact on learning and performance on several levels: cognitive, motivational, affective and decision-making (Hakalo, 2014). On the other hand, Motivation is another factor affecting the teaching and learning process.

2.1.1 Students' Attitude and performance in Mathematics

Students beliefs about their competence and their expectations for success in school has been directly linked to their levels of engagement, as well as to emotional states that promote or interfere with their ability to be academically successful (Akey, 2006). Kinanee (2004) says that self-concept is the sum total of ideas, feelings and attitude that one has about their self and therefore self-concept lays a foundation for academic performance. The attitudes of students

towards a certain subject may affect their performance in that subject because they will influence the efforts they put in when it comes to understanding the subject. According to Marsh (2004), students' self-perception of academic ability or achievement will affect their school performance. Therefore, the attitudes of students towards mathematics will affect how they perform in mathematics. Students with a positive attitude towards mathematics are likely to perform better in the subject. If students have negative attitudes towards learning mathematics, the chances of them underperforming are very high.

Newbill (2005) argued that students' attitudes are psychological, emotional, cognitive and behavioural constructs that serve as functions such as expressions, value expressions, utilitarian and defensive functions for learners. Newbill holds that to change the learners' attitude, the old attitude must be eliminated first and therefore teachers should emphasize on instructional designs to create instructional environments and effect attitude change. In social psychology, attitudes are affective domains that form a large part of motivation. Barton (2000) noted that positive attitude towards Mathematics play a crucial role towards learning Mathematics. Teachers teaching methodologies should incorporate support structures for learners' environment and hence affects students' positive attitude towards Mathematics. Wills (2010) asserted that positive attitude towards a subject was related positively to performance.

In a study done in Malaysia by Al-Agili and others (2012), the researchers sought to determine the key factors influencing Libyan students' achievements in mathematics. A questionnaire of 30 items was distributed for Libyan students in Kuala Lumpur,

Malaysia. The total number of the respondents was 201 (74 male and 127 female). One hundred and five students were in grade 4-6, eighty-one students grade 7-9 and fifteen students from secondary school. Students were asked to respond to a 5-point Likert scale (Al-Agili et al, 2012). The results showed that the teachers' attribution and students' attitudes towards mathematics were the highest and lowest factors influencing the students' achievement respectively. There exists a significance positive relationship between teaching methods and practices and students' achievement in mathematics (Al-Agili et al, 2012). The study showed a positive relationship between teacher attribution and their characteristics such as teaching experience and students' achievement (Al-Agili et al, 2012). The researchers concluded that the outputs of the study may enable teachers to identify the gaps in their instructional methodology and assist educational authorities to prepare educational development programs, designed to enhance teaching effectiveness (Al-Agili et al, 2012).

A study conducted by Umoinyang (2004) to establish the relationship between students' attitudes and their academic achievement in mathematics indicates that there is a positive correlation between students' attitudes towards mathematics and their academic achievement in the subject suggesting that attitudes towards a subject is related to performance. According to Ademola (2014), since a significant relationship exists between grades obtained in the subject and students' attitudes and interest in the subject throughout the lesson period, innovative teaching methods should be introduced by the teachers, so that student's interest in the subject is sustained throughout each lesson period.

In Kenya, research done by some key stakeholders (Nui & Wahome, 2006) in secondary education, has showed that consistent failure in Mathematics and sciences might be attributed to attitudes of students and teachers had towards the subjects. Based on this research, it means, attitude is a key component that influences performance. In agreement to this Manoah, Indoshi and Othuon (2011) in their study observed that attitudes played a critical role in students' performance. Students with positive attitude tended to perform well in an exam which was an indicator that it was a very essential element in the Mathematics curriculum.

In another study on Mathematics performance, Sa'ad et al (2014) investigated the cause of poor performance in Mathematics among public senior secondary school students in Azare Metropolis of Bauchi State, Nigeria. The study sample was 361 in which 300 were students and 61 teachers, which were from the population of 5,545. Descriptive survey design was used and questionnaire was used to collect data. The researchers used frequencies and percentages in the analysis of data. The results of the study indicate that students' negative attitude towards mathematics, anxiety and fear, inadequate qualified teachers of mathematics are some of the main causes of poor performance in mathematics among public senior secondary schools (Sa'ad et al, 2014). The study indicates that developing positive in the learners can help in improving their performance.

In a study done by Mwape and Musonda (2014) in Solwezi District, the study investigated the teaching and learning of mathematics at Senior Secondary school level in Solwezi District. The research focused on effective mathematics teaching. The research described various kinds of pedagogical

approaches that engage learners and lead to desirable outcomes. The main aim of the research was to deepen understanding of practitioners, teacher educators, and policy makers and assist them to optimize opportunities for mathematics learning (Mwape & Musonda, 2014). The researchers target population was drawn from grade eleven pupils at secondary schools of Solwezi district. Sampling procedure was based on all the grade eleven pupils' and from each school; a reasonable number of boys and girls were picked using simple random sampling procedure (Mwape & Musonda, 2014). Administrators and heads of department for mathematics were picked using purposive sampling. The researchers used observation schedules, questionnaires and interviews to collect data. The researcher analyzed data qualitatively and quantitatively. To analyze data qualitatively; the researchers sought to provide understanding of the research problem from the respondents' perspective (Mwape & Musonda, 2014). The data obtained by administering questionnaires was quantitative in nature and was subjected to statistical analysis using SPSS.

The findings of the research indicate that learners do not have interest in mathematics, they have bad attitude towards the learning of mathematics and they believe mathematics is a difficult subject (Mwape & Musonda, 2014). It is an enormous task for teachers to change the way of thinking of pupils to start believing that actually mathematics is not difficult.

The role of attitude from these literatures showed that it had a key factor in determining how well a curriculum is implemented in learning institutions and in particular Mathematics subject.

2.1.2 Motivation and Performance

Motivation is among the many factors that affect the student's achievement in school. Tucker, Zayco and Herman, (2002) refer to motivation as an educational commitment, with behavioral, emotional, and cognitive indicators of student speculation concerning education. A person who is highly motivated puts in much effort in doing his/her job. Lack of motivation may contribute to ineffectiveness and inefficiency in academic work leading to poor academic performance (Enu et al, 2015). Etsey (2005) states that lack of motivation and professional commitment produce poor attendance and unprofessional attributes towards students, which in turn affect the performance of the students academically.

Motivation has been shown to positively influence study strategy, academic performance, adjustment and well-being in students in domains of education (Vansteenkiste et al, 2005). Achievement-based motivation can be viewed as autonomy to succeed in whichever activities one embarks in (Julius, 2016). Therefore, both teachers and students need to be highly motivated in this regard so that teachers can put maximum effort into their jobs as teachers and students can study and practice more, leading to good academic performance. Use of media is essential in the teaching of Mathematics because: It increases learners' motivation by creating a conducive atmosphere, which is stimulating, interesting and intellectually rewarding (Wekesa, 2013). Motivation increases because of the learning resources' concreteness and appeal. The level of motivation will depend on how the teacher organizes the class for the utilization of the resource, it leads to sharing of ideas, thought, feelings and knowledge (Wekesa, 2013).

2.1.3 Teachers' attitudes and performance

The sole responsibility of teachers is to impart knowledge to learners. To achieve this, teachers should give assignments, projects and tests to their pupils' and discuss the results with them (Wachira, 2016). The attitude a person has is likely to influence the way one will perceive the objectives, content, methods and even evaluation strategies used in Mathematics. For instance, a teacher's beliefs will influence his choice of Mathematics content, which he perceives comfortable or easy to teach. The methods and techniques applied when teaching Mathematics and evaluation strategies will be guided by his self-efficacy (Adino, 2015).

Schmidt, Houang and Cogan (2002), found out that USA teachers practiced text book teaching which meant that they strived to complete work in the text books which were wide and hard to be completed given the limited teaching time. Teachers therefore ended up chasing wide books at the expense of learners learning vital concepts. This resulted to teachers not developing deeper concepts in Mathematics. Abuseji (2007) argued that teachers' commitment to work has an impact on the learners learning ability. The level of commitment that teachers show in their work is an influencer to learners' perception and success in what they undertake. A teachers' commitment towards work determines work performance, influences burn out level and to a great extent influences a students' academic performance (Wachiru, 2016).

Kalumbi (2005) in his study carried out in Central province of Zambia on attitudes of primary school teachers towards teaching Mathematics, states that basic School teachers had negative attitudes toward teaching Mathematics since most of them had not done well in the subject at Grade 12. This may be the

reason why some students go to school with negative attitudes towards learning Mathematics as they inherit it from their teachers. The performance of grade 12 pupils' in O-Level examinations in mathematics in Zambia has been poor and efforts have to be made in order to improve the pass rate.

2.2 The Influence of Cultural Backgrounds on Students' Performance in Mathematics

According to Smith (2004), it is identified that students' cultural backgrounds differ and can affect students' influences to study mathematics. Students from different cultural backgrounds are influenced differently based upon parental experiences, interests in mathematics and cultural views and attitudes of mathematics education. Additionally, Smith's research indicates that students who are studying higher-level mathematics are influenced differently as compared to students who are studying lower level mathematics or chose not to study mathematics at all.

A research carried out by Likando (2017) on school and home factors contributing to poor academic performance among female secondary school pupils' in Lusaka indicates that family's socio-status contribute to poor female academic performance and that students waste study time at home on gadgets such as phones instead of studying.

2.3 Other scholars work

In a study done in Pakistan, Jameel and Ali (2016) sought to explore the major causes of low achievement in Mathematics by the perception of students, teachers and parents. The study was designed to find out the underlying causes behind low achievement in Mathematics and District Faisalabad was chosen as the population of the study. The study sample included students, teachers and parents and the participants were chosen using a

simple random sampling method. The researchers used a structured questionnaire with close-ended form of questions for collecting specific information (Jameel and Ali, 2016). The data collected was tabulated and results were interpreted through descriptive statistics by using S.P.S.S (Statistical Package for Social Sciences). Mean values, frequencies, standard deviations and percentages were found to highlight the results.

The findings of the research revealed that teachers used learning methods that learners did not easily understand and ultimately unable to follow the abstract theories when teaching mathematics (Jameel and Ali, 2016). Some of the methods teachers used to teach mathematics do not help students develop conceptual understanding of mathematics. The study further revealed that the majority of the participants indicated that their teachers were not having enough potential to teach mathematics (Jameel and Ali, 2016). Findings of the research also revealed that participants comprising mothers and fathers felt that the students were not given keen and thorough attention to overcome their difficulty in mathematics and were not assigned homework on regular basis that surely enhances fundamental mathematical knowledge. Jameel and Ali (2016) research showed that most of the participants did not get enough support from their parents or guardians when they were doing homework of mathematics. Home background and community values can make effective learning that leads towards achievements (Jameel and Ali, 2016). The researchers recommended that the understanding of mathematics should be given through clearing of the concept of logic and reasoning to the students. The researchers recommended that teachers should be assigning home task to their children in order to develop self-efficacy and sense of mastery in them and parents

should give them proper time and attention in order to understand their problems in mathematics in their actual essence. Both teachers and parents should try to be frank with the students in order to develop confidence in them to minimize the threat of becoming dull and passive in mathematics (Jameel and Ali, 2016).

In another study done by Michael (2015) on performance in mathematics, the researcher assessed the factors leading to poor performance in mathematics in Kibaha district secondary schools, Tanzania. The researcher applied a survey research design where the researcher employed cross-sectional survey. The study applied both qualitative and quantitative research approaches. Quantitative approach helped the research to quantify the problem by way of generating numerical data. Qualitative approach helped the researcher to study attitudes, opinions, behaviours, and other defined variables of the population (Michael, 2015). The study involved 4 secondary schools, 8 mathematics teachers and 60 students. Four academic masters and four head of school from the four schools were purposively selected. Data collection was done using questionnaires, interviews, focus group discussions, observations and documentary review. Statistical Packages for Social Sciences (SPSS) was used to analyze quantitative data, and qualitative data obtained using interview, focus group discussion and documentary review was analyzed by considering major themes to extract relevant information. This helped the researcher to make description of the data collected from the field basing on the research objectives (Michael, 2015).

The findings indicated that the teaching and learning of mathematics was facing challenges such as poor teaching environment, mathematics departments

were not well-managed, inadequate self-practice and students' poor background in mathematics (Michael, 2015). Results of the study also revealed that there was a significant difference between the teacher participants' preference of instructional strategy and the student performance in mathematics. Though teachers claimed to apply participatory and student centred methods, it was not there in actual practice (Michael, 2015). Teachers were exposed to number of workshops and attended many seminars, yet they did not bring any changes in students' performance in mathematics. The researcher recommended teachers to make assessment on the background of their students in order to decide teaching methods that can help students perform better in mathematics. Lastly, the researcher recommended future research on individual factors that affects students' learning of mathematics (Michael, 2015).

In another study on performance in Mathematics done by Gitaari, et al (2013), the researchers sought to establish the factors that lead to students' poor performance in Mathematics. The study was carried out in Tharaka South District, Kenya, which has 14 public secondary schools. The study adopted a descriptive survey research and the population was sampled using the stratified sampling technique so that all categories of schools were included in the study and then proportionately sampled to give a sample size of 248 respondents (Gitaari et al, 2013). The researchers used 4 questionnaires, the head teachers', heads of Departments, teachers and students' questionnaires. Data collected was analyzed using Statistical Packages for Social Sciences (S.P.S.S) and then presented in form of frequency tables and percentages (Gitaari et al, 2013).

The findings of the research revealed that the significant factors contributing to students' poor performance in Mathematics include: inadequate teaching force, low entry marks at form one, students' negative attitudes, chronic absenteeism of students and an overcrowded syllabus (Gitaari et al, 2013). The research further revealed that poor assessment techniques and poor teaching methods also contribute to students' poor performance in Mathematics. The remedies to improve performance of students in Mathematics established by the study include: proper guidance to change the students' negative attitude towards Mathematics, use of a variety of teaching methods, guided group discussions, inviting motivational speakers. The researchers also concluded that the formation of Mathematics clubs in the schools would be a great booster to the achievement of students in the subject (Gitaari et al, 2013). The researchers also stated that there should be frequent in-service seminars and provision of adequate teachers in order to improve the performance of students in Mathematics. They further advocated for the review of the overcrowded syllabus in order to make the Mathematics syllabus student-friendly and motivate students to perform better (Gitaari et al, 2013). In their recommendations, the researchers recommended that the Teachers Service Commission balance teachers in all the schools and recruit more teachers in schools where there is acute shortage. They also recommended that the ministry of education provide bursary schemes for students in Tharaka South District to alleviate the chronic absenteeism of students due to high poverty levels (Gitaari et al, 2013).

In the study on Mathematics performance, Sa'ad et al (2014) investigated the cause of poor performance in Mathematics among public senior secondary school students in Azare Metropolis of Bauchi State,

Nigeria. The study revealed that overcrowded of mathematics classes, lack of supervision and inspection of mathematics teachers and lack of parental participation in the education of children are some of the causes of poor performance in mathematics among public senior secondary school students in Azare metropolis of Bauchi state (Sa'ad et al, 2014). The study indicates that developing positive attitudes, motivation and proper guidance toward mathematics, provision of qualified and adequately trained mathematics teachers, proper supervision and inspection of mathematics teachers are some of the ways of improving mathematics performance among public senior secondary school students (Sa'ad et al, 2014). The researchers recommended that frequent inter-schools' competition in mathematics should be organized and that parents should be enlightened on the importance of their involvement in the education of their children (Sa'ad et al, 2014).

In a study done in Namibia by Mateya, Utete and Ilukena (2016) on factors that cause poor performance in mathematics, the researchers sought to investigate factors that cause poor performance in mathematics at National School Secondary Certificate level compared to Junior Secondary Certificate level in four selected schools in the two Kavango Educational regions. The study was based on complementary approaches of qualitative and quantitative approaches and was conducted in two Kavango regions. The data was collected from a total of 200 learners in Grade 10 (2011) and 170 grade 12 (2013). The study indicates that it was the same cohort of learners that were followed from Grade 10 in 2011 until 2013, when they wrote their Grade 12 November final examinations. The study studied documents recording the 2011 Grade 10 and 2013

Grade 12 final examinations results (Mateya, Utete & Ilukena, 2016).

The findings of the research indicate that one of the reasons for poor performance in Mathematics is that teachers of mathematics skip topics that they are not comfortable with and, instead, focus on those they know (Mateya, Utete & Ilukena, 2016). Pupils' fail to perform better in mathematics at grade 12 level because they could not master the basic mathematics competencies they learnt at Junior secondary. The researchers recommended teachers to move away from emphasizing on how to get that answer but focus on why the procedure works that way to get the answer (Mateya, Utete & Ilukena, 2016). Furthermore, the researchers recommended that teachers should move from being dispensers of knowledge, and rather play the role of a facilitator as learners discover, gather, process and construct knowledge (Mateya, Utete & Ilukena, 2016).

The issues in Mathematics education in Zambia have indicated that students in Zambia have very low performance due to teachers' low competence and limited views on Mathematics lessons (Nonaka, 2013). According to Nakawa (2011), students' low achievement is a major issue in Mathematics education.

The earlier mentioned study done by Mwape and Musonda (2014) in Solwezi District, the study investigated the teaching and learning of mathematics at Senior Secondary school level in Solwezi District. The research also revealed that secondary schools in Solwezi had inadequate mathematics textbooks; in most cases about four to five pupils were sharing a book (Mwape & Musonda, 2014). Most schools lacked reprographic equipment which were supposed to be procured so that depleted books are replaced. Some schools did not even have

a mathematics syllabus. The research also revealed that over-enrolment in classes contributes to the problem at hand. The researcher observed that individual attention for learners was not there because the teachers had challenges teaching overcrowded classrooms (Mwape & Musonda, 2014). Most of the Schools in Solwezi district had dilapidated school infrastructure. It is either the school had a library or not. If the library was there it had outdated and depleted books which pupils could not use. In the recommendation section, the researchers recommended that teachers should be encouraging and giving hop to under-achievers in mathematics. The researchers also recommended that teachers should be giving examples which relate to real life situations (Mwape & Musonda, 2014).

In a study carried out in Sesheke, Hakalo (2014) investigated the factors contributing to girls' performance in mathematics in light correctional measures taken ta Sesheke secondary school in western province of Zambia. Purposive sampling was used to select parents and girls and four teachers of mathematics were asked to take part in the study since they were the only teachers of mathematics present at the time of the study (Hakalo, 2014). 25 purposively selected members of the community were asked to provide the study with data. The first priority was given to parents who had both daughters and sons at Sesheke secondary school because it was easy for them to compare the performance of their children (Hakalo, 2014). However, in the event that parents of both sons and daughters were not found, parents who previously had both sons and daughters at the school were also given chance to take part in the research. The researcher used questionnaire guide, focus group discussion guide, semi-structured interview guide as well as lesson observation checklist to collect the data (Hakalo, 2014). Data was

analysed qualitatively. However, since there were numbers involved, quantitative methods were also employed in such cases.

The research findings revealed that most of the classes were overcrowded and delivery by mathematics teachers in classes was affected as there was reduced individual pupil attention (Hakalo, 2014). Teachers in most cases concentrated on the active participants because they could not manage to reach all the pupils. The research further revealed that teacher centred method was commonly used, a method which was not favourable to all the pupils' especially girls. The method favoured active participants who in most cases were boys (Hakalo, 2014). Furthermore, the study established that, though single sex classes were formed, the performance of most girls in single sex classes especially in mathematics did not improve while of boys did improve. This implies that girls learning in single sex classes alone might not improve their performance in mathematics. The study also concluded that the negative attitudes of the pupils towards the learning of mathematics contribute to their poor performance in mathematics at Sesheke secondary school (Hakalo, 2014).

III. METHODOLOGY

3.1 Research Design

Research design is defined as a plan used to study a problem or questions (Hines and Viliant, 2000). Orodho (2003) further defines a research design as the scheme, outline or plan used to generate answers to the research problems. There are different types of research methods used. Some studies may employ the use of a combination of different features from several research designs. This study used a descriptive survey design. The design was descriptive by nature because it was concerned with describing, analysing and interpreting conditions that existed. Both qualitative and quantitative approaches were used to survey, interpret and collect information on the academic performance of grade twelve pupils' in mathematics. The reason the researcher used both approaches is because they complement each other and qualitative approaches gives a deeper understanding to the problem.

3.2 Population

The subjects of the study were drawn from Kitwe district on the Copperbelt province of Zambia. Kitwe is the second largest city in Zambia in terms of size and population. The participants were both male and female pupils', Mathematics teachers and administrators from government schools in Kitwe district.

3.3 Sampling Procedure and Sample Size

The study comprised of 60 grade 12 pupils from targeted secondary schools, 30 mathematics teachers and 10 administrators making 100 participants. Purposive sampling was used to select administrators and teachers- The researcher chose the sample based on whom they think will be appropriate for the study

(Amia, 2005). This type of procedure is used primarily when there is a limited number of people that have expertise in the area being researched. Simple random sampling was used to select the pupils.

3.4 Data Collection Tools

A number of methods can be used to collect and record data. Both qualitative and quantitative data was collected, and questionnaires were used to collect the data. Self-administered questionnaire was preferred because of the number of respondents, costs and nature of the topic (Kothari, 2004). This research used both primary data and secondary data; primary data was collected using questionnaires while secondary data was collected from books, Newspapers, Journals as well as the internet. The major aim of secondary data is to review the related literature and acquaint the researcher with existing knowledge and know what other researchers have done.

3.5 Data Analysis Tools

Data was analyzed both quantitatively and qualitatively using descriptive statistics. Descriptive statistics will be in form of frequencies, percentages, tables, bar graphs and pie charts. Microsoft EXCEL and Statistical Package for Social Sciences (SPSS) software was used to interpret and analyze data.

3.6 Data Triangulation

The researcher crosschecked the data using the data collection instruments in order to validate the data. Validity is the degree to which results obtained from the analysis of the data actually represents the phenomena under study (Mambwe, 2016). Kombo and Tromp define validity as a measure of how well a test measures what it is supposed to measure.

3.7 Ethical Considerations

Ethical issues of research were applied to all phases of the research process. The researcher explained the purpose of the study to the participants so that they understand the need to participate. The participants were assured of confidentiality and there was no coercion whatsoever as a form of making the respondents participate in the research.

3.8 Limitations of the study

Some of the participants asked for money before answering the questionnaires and the researcher did not get the responses from the respondents on time. Some questionnaires were lost and the researcher had to reprint more questionnaires. Because of this, the number of participants reduced. Some head teachers were not available to and others assigned their deputies to answer the questionnaires.

IV. FINDINGS OF THE STUDY

4.1 Background information of the respondents

This section presents the background information of the respondents.

4.1.1 Gender of the respondents

The gender of the respondents is as illustrated in the table below:

Table 4.1: Gender of the respondents

Gender	Frequency	Percentage
Male	54	54
Female	46	46
Total	100	100%

Source: Field data (2019)

Out of the 100 participants (Administrators, Teachers and Pupils'), 54% were male and 46% were female. Below is the graphical representation of the information:

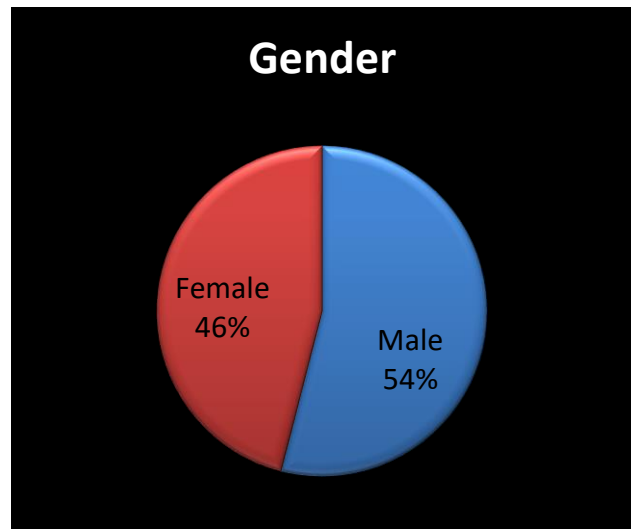


Figure 4.1: Gender of the respondents

Source: Field data (2019)

4.1.2 Level of Education of the School Administrators and the Teachers

The researcher sought to investigate the level of education of the school administrators and teachers of mathematics and the results were as presented below:

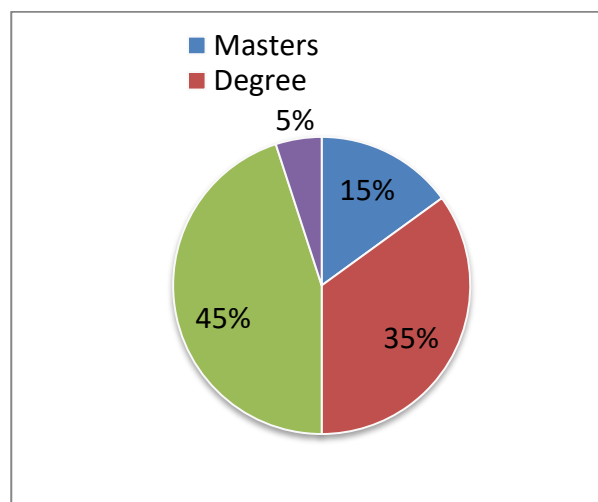


Figure 4.2: Professional qualification of the respondents

Source: Field data (2019)

From the figure above, 15% of the respondents (administrators and teachers) had a Master’s degree while 35% of the respondents had a Degree. 45% of the respondents had a Secondary diploma while 2% had other qualifications.

4.1.3 Distribution of respondents by school

The table below presents the distribution of the respondents by school

Table 4.3: Distribution of respondents by schools

Name of school	Percentage
Chibote Girls	10
Chimwemwe	8
Helen Kaunda Girls	13
Lulamba	13
Kawama	15
Kitwe boys	8
Mama Monty	4
Mindolo	9
Mukuba	10
St Francis	10
Total	100%

Source: Field data (2019)

As shown in the table above, majority of the respondents came from Kawama Secondary school and the least came from Mama Monty secondary schools. This could be because Mama Monty secondary school was recently upgraded to a secondary school and they were few senior secondary school pupils. The number of respondents was not equally distributed because some respondents did not answer the questionnaires and only 100 of the intended 150 respondents answered the questionnaires

Below is a graphical presentation of the results:

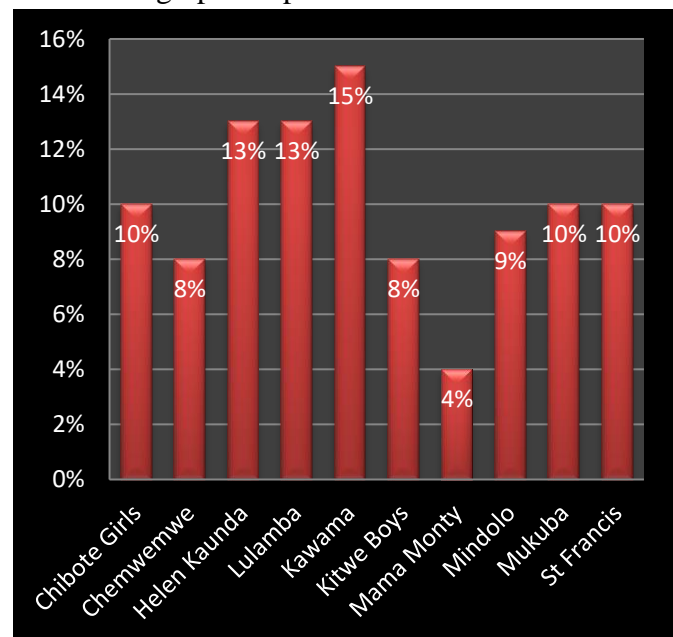


Figure 4.3: Distribution of respondents by school

4.1.4 Years of experience of the respondents in their current position

The researcher also sought to establish the years of experience of the school administrators and Mathematics teachers in their current and respective positions. The findings are as shown in the table below:

Table 4.4: professional experience of the respondents

experience (Years)	Teachers (%)	Administrators (%)
0-5	37	50
6-10	40	20
11-15	10	0
16-20	7	10
21-25	3	0
26 and above	3	20
Total	100%	100%

As shown in the table above, majority (40%) of the respondents (teachers and administrators) were falling in the range of 6-10 years followed by 37% of the respondents who were in the range 0-5 years professional experience in their respective positions.

4.1.5 Respondent age distribution (pupils')

The table below presents the age distribution of the pupils':

Table 4.5 Respondents age distribution

<i>Age range</i>	<i>Frequency</i>	<i>Percentage</i>
Below 17	18	30
17-20	32	53
21 and above	10	17
Total	60	100%

4.2 Academic performance

The researcher sought to investigate the general performance of pupils' in Mathematics. The results are presented in the table below:

Table 4.6: Academic performance

<i>RESPONSE</i>	<i>PERCENTAGE</i>
Very satisfactory	10
Satisfactory	20
Unsatisfactory	60
Very unsatisfactory	10
Total	100%

Majority (60%) of the administrators said that the academic performance in Mathematics was unsatisfactory while 20% of the respondents said the general performance was satisfactory. 10% of the respondents said that the performance was very satisfactory and the other 10% said that the performance was very unsatisfactory.

4.3 Objective Number 1: To assess the impact of pupils' attitudes towards Mathematics on the academic performance

4.3.1 Students interest

Students were asked if they had interest in Mathematics and below were their responses:

Table 4.7: students' interest in Mathematics

Interest in Mathematics	Frequency	Percentage
Yes	36	60
Sometimes	4	7
No	20	33
Total	60	100%

As indicated in the table above, majority of the pupils' (60%) said they had interests in mathematics while 33% of the respondents said they had no interests in Mathematics. The remaining 7% of the respondents (pupils') said they sometimes had interest and sometimes not.

When asked to give reasons for their answer to the question asking them about their interests in Mathematics, those who answered 'sometimes' gave the following reasons:

"Sometimes I have interest in Mathematics and sometimes I do not because even if I try my best, I never get a distinction in Mathematics and this has made my interest in Mathematics to reduce."

Commenting on the same, another pupil said:

"Sometimes I have interest in Mathematics; the problem is with our teachers they do not know how to teach."

Asking the pupils' who said they had no interests in mathematics to give reasons, majority of the pupils' said Mathematics is naturally a difficult subject.

One pupil gave the following comment:

"I do not have interests in Mathematics because it is too difficult for me."

Another pupil gave the following comment:

"I have no interests in Mathematics because the teacher uses a difficult method of calculation or when teaching."

Another pupil said:

"I do not have interests because our teacher is too boring, Mathematics is difficult so the teacher is supposed to be very exciting when teaching this difficulty subject."

Asking the pupils' who said they had interests in Mathematics to state why they did, some gave the following comments:

"I have interests in Mathematics because with Mathematics I can go very far in my educational life."

Another pupil said:

"Mathematics is an important subject and it is needed if one wants to go to college or University so I just have to develop interests so that I can learn it and have good grades."

When asked if there is something that makes some pupils' dislike Mathematics, majority of the pupils' said that Mathematics is difficult to understand and this makes it a challenge to like the subject. Some pupils gave the following responses:

"I dislike Mathematics because I don't understand it even if I try to."

Another pupil said the following:

"The way our Mathematics teacher explains the concepts make me dislike Mathematics. It is difficult to like Mathematics if you do not know the concepts."

The researcher further the pupils' if they spare time to study Mathematics and their responses are as presented in the figure below:

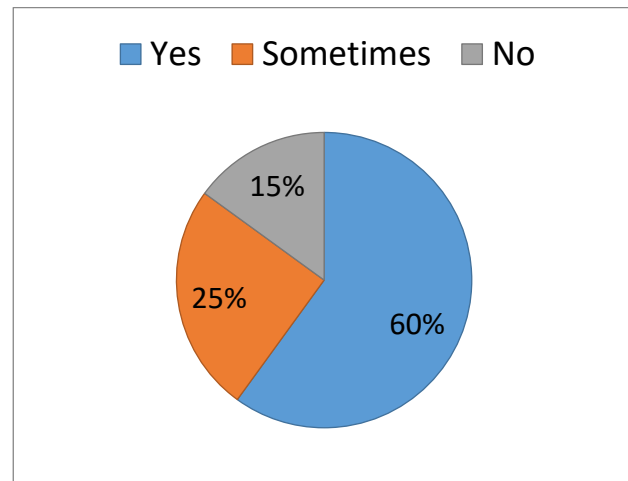


Figure 4.7: Pupils' responses to whether they spare time to study or not.

As shown in the figure above, 60% of the pupils' said that they spared time to study Mathematics while 25% of the pupils' said that they sometimes spared time to study. The remaining 15% of the pupils' said they did not spare time to study Mathematics. When those who responded with a 'No' or 'Sometimes' were asked to give reasons, below are some of their responses;

"Some concepts are difficult and make the subject not to be interesting do it is not easy to spare time to study what you do not know."

Another pupil said;

"I do not spare time to study Mathematics because I dislike the subject, so studying does not make sense."

4.3.2 Students attitudes towards Mathematics

The researcher also asked the teachers to respond to a question on whether pupils’ developed negative interests in Mathematics, and below are their responses:

Table 4.8: Teachers’ responses on students’ negative attitudes towards Mathematics

<i>Response</i>	<i>frequency</i>	<i>percentage</i>
Yes	27	90
No	3	10
Total	30	100

When asked to explain why students developed negative attitudes towards Mathematics, some teachers gave the following comments:

“Learners develop negative attitudes towards Mathematics because of the wrong belief that Mathematics is a difficult subject.”

Commenting on the same, another teacher said the following;

“Pupils’ develop negative attitudes in learning mathematics because some think it is difficult to understand some concepts and because of some teaching methods teachers use.”

Another teacher said the following;

“Learners develop negative attitudes towards Mathematics when the method of teaching do not stimulate interests in them.”

Majority of the teachers who agreed that students develop negative attitudes towards mathematics attributed that to the idea that Mathematics is naturally a difficult subject. Most of the teachers said that pupils develop negative attitudes due to some teaching methods teachers use when teaching Mathematics. From the teachers’ perspective, it was

found that students had negative attitudes towards Mathematics as those who said yes to the question made a percentile of 90%. Only 10% of the teachers said students do not develop negative attitudes in learning Mathematics.

The results presented in the table above confirmed that students in secondary schools had negative attitudes towards Mathematics. These negative attitudes towards Mathematics hamper the progress of the students in Mathematics. Barton (2000) concluded that positive attitudes lead students towards success in Mathematics.

The researcher asked the pupils’ if Mathematics is naturally a difficult subject, and 100% of the pupils’ said Mathematics is naturally a difficult subject. Majority of the students said that they lose interests in mathematics because it is a difficult subject. Commenting on the same one pupil gave the following comment;

“Mathematics is naturally a difficult subject. Even if you study hard, it’s a challenge to pass Mathematics that’s why I have no interests in learning this subject.”

The researcher further asked the teachers if they tried to improve pupils’ interests and attitudes towards Mathematics and their responses were as highlighted in the table below;

Table 4.9: Teachers response on whether they have tried to improve pupils’ interests and attitudes towards Mathematics

<i>Response</i>	<i>Frequency</i>	<i>Percentage</i>
Yes	24	80
No	6	20
Total	30	100%

The table above shows that 80% of the teachers answered yes to the question asking them whether they have tried to improve pupils' interests and attitudes towards Mathematics. 20% of the teachers said that they did not try to improve pupils' interests and attitudes towards Mathematics. When asked to explain how they tried to improve pupils' attitudes and interests in Mathematics, some teachers gave the following comments:

"I try to help the pupils' by using a variety of teaching methods that involves hands on

"I help the pupils' by motivating them, telling them how possible it is to get a distinction in Mathematics. I also encourage them and tell them that no one is dull if others did it, they can also do it."

Another teacher said the following;

"I help my students by emphasizing on the practical application and real-life situation."

Majority of the teachers said that they try to improve pupils' attitudes and interests in Mathematics by trying to explain Mathematics concepts in simpler ways and using a variety of teaching methods as well as helping the pupils' understand the importance of Mathematics. This proves that using a variety of teaching methods can help the teachers to effectively teach Mathematics.

4.4 Objective number 2: To investigate the effects of Motivation on pupils' performance in Mathematics

The researcher further sought to investigate whether motivation affects pupils' achievements. The teachers were asked if motivation affects pupils' achievements and their responses are highlighted below;

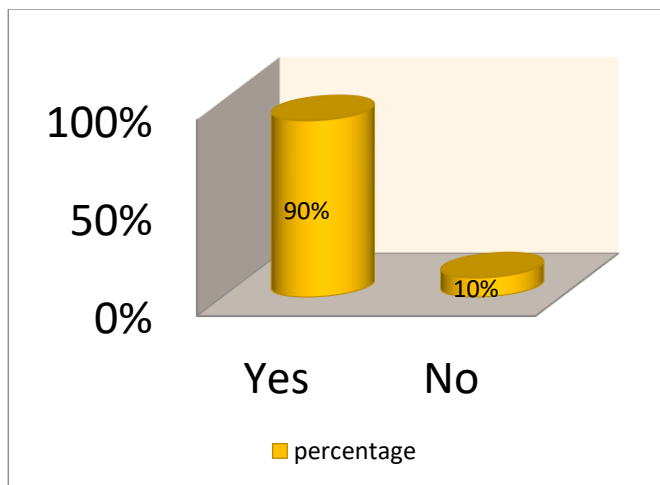


Figure 4.8: Teachers response on the effect of motivation on pupils' achievements
Source: Field Data (2019)

As shown in the figure above, majority (90%) of the teachers said that motivation has an effect on pupils' achievements. Only 10% of the teachers said that motivation has no effect on pupil's achievement. This indicates that pupils' need to be motivated for them to achieve more with regard to the learning of Mathematics in secondary schools. When asked to give reasons for their responses, some teachers gave the following comments:

"Motivation is an important force to empower someone to meet personal goals, so if pupils' have motivated, they can perform better in Mathematics."

Another teacher gave the following comment:

"Motivation acts like a drive in one's life, so if pupils' are not motivated, they tend to have no reason to work had because they have nothing driving them towards achieving goals."

Another teacher gave the following comment:

"Motivation helps students to exert effort and energy in achieving their goals. Motivation has an impact on their performance."

4.5 Objective number 3: To examine the influence of teachers’ attitudes on pupil’s academic performance

The researcher investigated school-based factors affecting pupils’ performance.

4.5.1 Impact of Teachers’ attitudes towards Mathematics on performance

The researcher further investigated the influence of teachers’ attitudes on pupil’s academic performance. The teachers were asked if teachers’ attitude towards Mathematics had an impact on pupil’s performance and the following were the responses:

Table 4.10: Teachers’ responses on whether attitudes towards Mathematics has an impact on pupil’s performance

Response	Percentage
Yes	77
No	23
Total	100

Source: Field data (2019)

The information above shows that majority (77%) of the teachers agreed that the teachers’ attitude towards Mathematics affects the academic performance of the pupils. When asked to explain most of the teachers said that if teachers have negative attitudes towards Mathematics then they will not give the pupils’ the necessary motivation and encouragement to perform better. Some teachers gave the following comments:

“A teacher is a role model, if a teacher has positive attitudes towards Mathematics, their pupils’ will equally develop positive attitudes towards the subject.”

Another teacher gave the following comment:

“If the teachers themselves have negative attitudes towards Mathematics, how possible is it that they can teach it effectively for the learners to understand. If the teachers have positive attitudes towards Mathematics then they can motivate the pupils’ and help them grasp Mathematical concepts and excel in the subject.”

4.5.2 Impact of Teachers attitudes towards pupils on performance

The researcher investigated the impact of teachers’ attitudes towards pupils on performance. School administrators were asked whether the attitudes of the teachers towards pupils had an impact on performance, their responses are illustrated in the following table:

Table 4.11: School administrators’ responses on whether teachers’ attitudes towards Pupils’ has an impact on pupil’s performance

Response	Frequency	Percentage
Yes	8	80
No	2	20
Total	10	100

The information is illustrated graphically below;

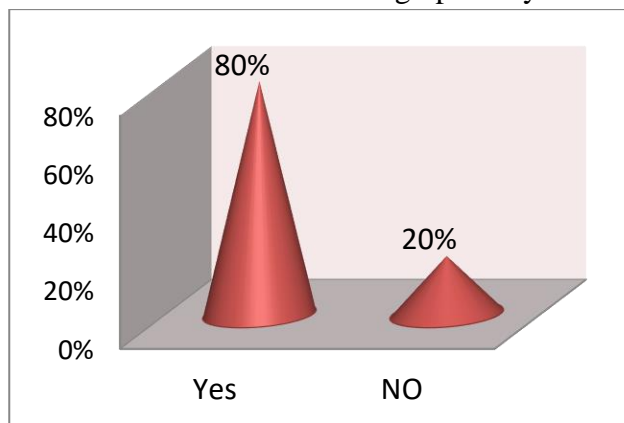


Figure 4.10: School administrators’ responses on whether teachers’ attitudes towards Pupils’ has an impact on pupils’ performance

Source: Field data (2019)

As shown above, majority (80%) of the school administrated agreed that teachers’ attitudes towards pupils had an impact on performance. When asked to explain how teachers’ attitudes towards pupils’ affects pupils’ academic performance, majority said that if there is no good relationship between teachers and pupils’ then pupils will grow negative attitudes towards the subject these teachers teach and this will make it difficult for them to learn. One administrator gave the following comment:

“If teachers have negative attitudes toward pupils’ then most likely they will have no motivation to teach and they will not care whether pupils’ have understood the concepts or not and this affects the teaching and learning process.”

Commenting on the same, one administrator said the following:

“There is a direct relationship between teachers attitudes and pupils’ performance. If teachers have positive attitudes towards their pupils’, they will create a very good learning environment that will make the learning process enjoyable and as such, pupils’ will perform better.”

On the other hand, 20% of the school administrators disagree to the question asking if teachers’ attitudes towards the pupils’ have an impact on performance. When asked to give reasons for their responses, one school administrator gave the following comment:

“Pupils’ should know why they go to school. The attitudes teachers have towards pupils cannot affect a pupil who is serious with school and knows his/her reason for being in school.”

4.6 Student based factors affecting performance in Mathematics

The researcher further investigated other student-based factors affecting the performance of grade 12 pupils’ in mathematics.

4.6.1 Socio-economic factors of the pupils’ parents/guardians

The following information was obtained on socio economic factors affecting the performance of 12 pupils’ in Mathematics.

4.6.1.1 Status of the pupil

Table 4.12: Status of the pupil

Status	Frequency	Percentage
Double orphan	9	15
Single orphan	19	32
None	32	53
Total	60	100%

The information in the table above shows that 53% of the pupils had both parents alive while 32% of the pupils were single orphans. The remaining of the respondents were double orphans.

4.6.1.2 Gender of the Parent/Guardian

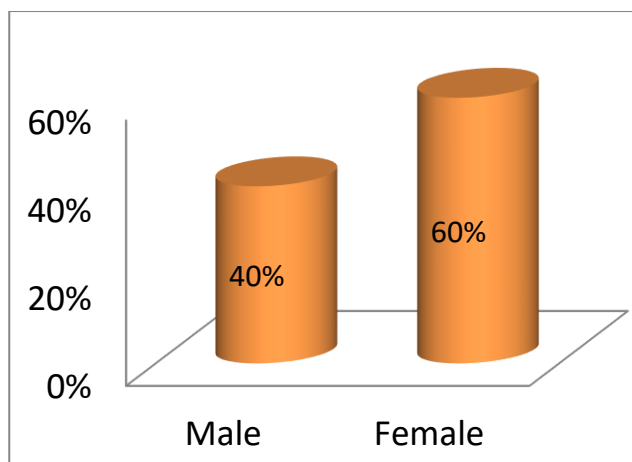


Figure 4.11: Gender of the parents/guardians

Source: Field data (2019)

The figure above represents the gender of the parents/guardians of the grade twelve pupils' in the study sample. From the results, majority of the students' parents/guardians were female.

4.6.1.3 Highest level of education of the parents/guardians

The researcher sought to establish the level of education of the pupils' parents/guardians and the results are as presented in the table below:

Table 4.13: level of education of parents/guardians

Highest level of education	Frequency	Percentage
Never been to school	6	10
Primary	12	20
Secondary	24	40
Tertiary	18	30
Total	60	100%

As shown in the table above, 40% of the parents/guardians do not have education beyond secondary school education, 30% have tertiary education, 20% have do not have education beyond primary school education and 10% have never been to school. Thus, they may not be good role models for their children in academic matters because parents/guardian's involvement has an impact on the child's academic performance. Desarrollo (2007) indicated that the extent to which parents or other family members are actively engaged in a student's education had appositive influence on the student's achievement.

4.6.1.4 Main profession of the Head of the household and level of family income

The following table presents the findings on the main profession of the Head of the household:

Table 4.14: Main profession of the head of the household

Profession	Frequency	Percentage
Farmer	4	7
Business	22	36
Civil servant	20	33
Private sector employee	10	17
Other	4	7
Total	60	100%

As shown in the table above, students' parents/guardians' sources of income are farming (7%), Business (36%), Salary (33%) private sector (17%) and others (7%). Below is a graphic presentation of the findings:

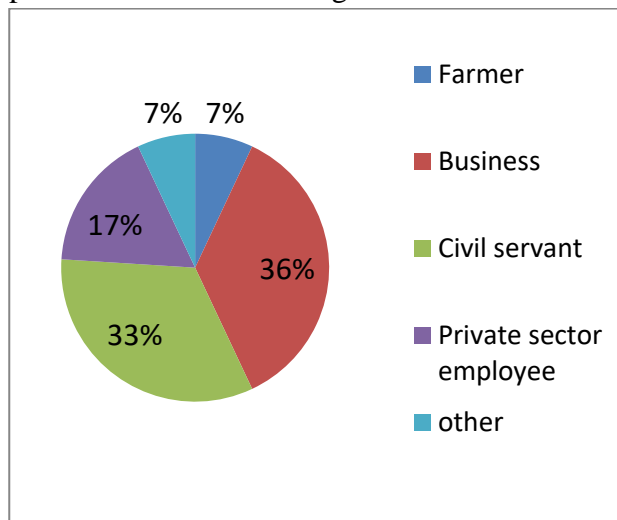


Figure 4.12: occupation of the head of the household: Source: Field data (2019)

The study sought to establish the level of family income because the income of the parents has an effect on the pupils' performance. When asked to list the things that affect pupils' performance, 70% of the teachers said that family income has an impact on pupils' academic performance.

According to Conger et al (1992, 1993 & 1999), low parental socio-economic status is associated with diminished resources hence contributing to lower academic achievement. 70% of the pupils' said that they were from middle-income families while 20 % were from low-income homes and 10% were from high-income homes. Below are the findings:

Table 4.15: level of family income

Level of family income	Frequency	Percentage
Low	12	20
Middle	42	70
High	6	10
Total	60	100%

4.6.2 School based factors affecting pupils' performance

4.6.2.1 Teachers qualification

The researcher asked the teachers if their level of qualification did not count with regard to pupils' academic performance and the figure below shows how they responded:

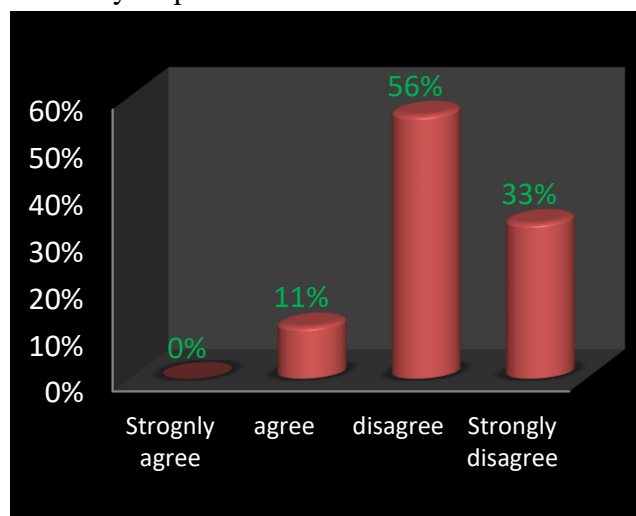


Figure 4.13: Teachers' responses on whether qualification of teachers counts in pupils' performance

Source: Field data (2019)

The data indicates that majority of the teachers disagreed to the question asking them if the qualification of the teacher does not matter in terms of pupils' academic performance.

The researcher also asked the teachers if pupils' with less qualified teachers perform better in Mathematics and 100% of the teachers disagreed to that. When they were further asked if a highly qualified teacher is required to teach Mathematics in secondary school, the teachers responded as below;

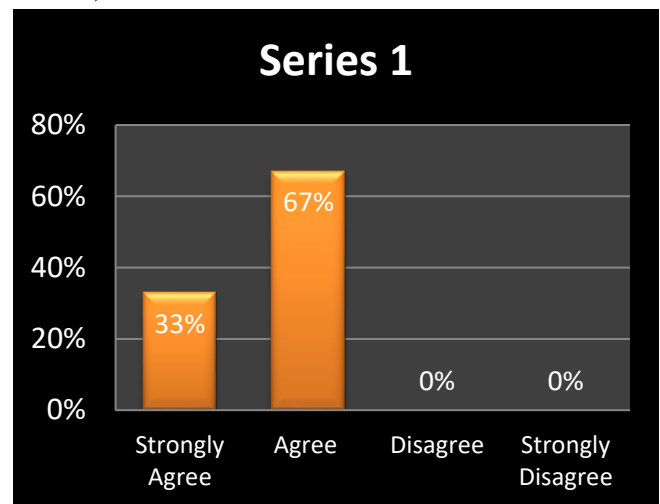


Figure 4.14: Highly qualified teachers should teach Mathematics in secondary schools.

Source: Field data (2019)

As shown in the figure above, 67% of the teachers strongly agreed when asked whether highly qualified teachers are required to teach Mathematics in secondary schools in Kitwe. The remaining 33% of the teachers agreed to the question. This shows 100% of the teachers think that highly qualified teachers should be teaching Mathematics in secondary schools.

The researcher also asked the school administrators if the qualification of teachers of Mathematics affects grade pupils' performance in Mathematics and they gave the following responses:

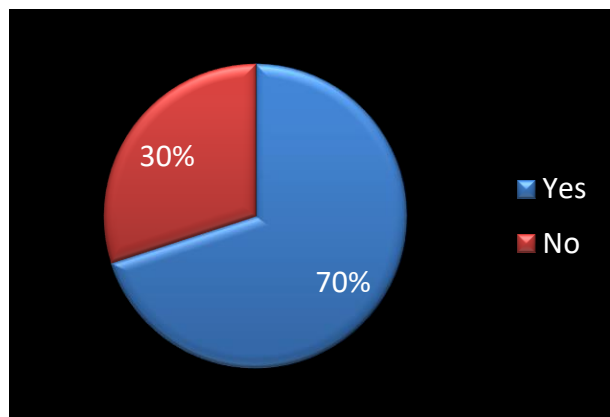


Figure 4.15: School administrators' views on whether teachers' qualification affect pupils' performance or not. Source: Field data (2019)

Majority of the school administrators said that teachers' qualification does affect pupils' academic performance. When asked to explain how teachers' qualification affects pupils' performance, some school administrators gave the following comments:

"A less qualified teacher may not be very confident in his/her lesson delivery, on the other hand, a highly qualified teacher may feel out of place and hence performance is affected."

Another school administrator gave the following comment:

"Qualification of a teacher enhances the content and pedagogical knowledge and this affects the performance of both teachers and pupils."

Commenting on the same, another administrator gave the following comment:

"A qualified teacher knows the best method to use for a specific topic and this will help the learners to fully understand the topics and perform better."

4.6.2.2 Knowledge of subject Matter

The researcher sought to investigate whether a teachers' knowledge of subject matter affects pupils' performance. The figure below shows their responses:

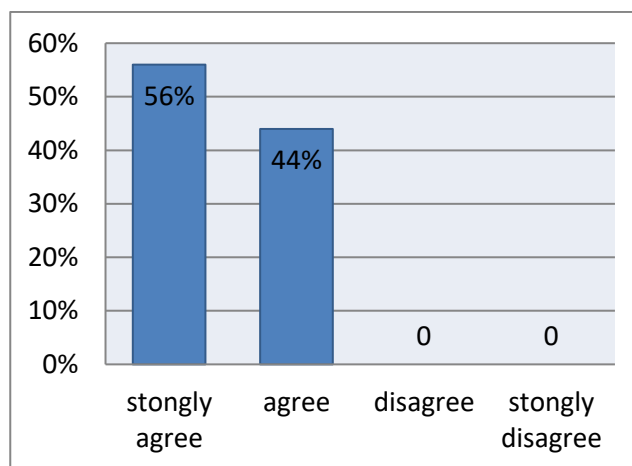


Figure 4.16: Teachers responses on the effect of teachers' knowledge of subject matter of pupils' performance Source: Field data (2019)

The figure above shows that 56% of the respondents strongly agreed that a teachers' knowledge of subject matter affects pupils' academic performances. This shows that pupils' whose teachers' knowledge of subject matter is high tend to perform better than those with teachers who have less knowledge on the content. ‘

4.6.2.3 Teaching methods

The researcher asked the respondents (teachers) if the teaching methods used by a teacher affect pupils' performance. The responses from the teachers are as shown in the table below:

Table 4.16: Teachers’ views on effects of teaching methods on pupils’ performance

Response	Frequency	Percentage
Strongly Agree	7	23
Agree	17	57
Disagree	0	0
Strongly Disagree	6	20
Total	30	100%

As indicated in the table above, majority (57%) of the teachers agreed that teaching methods used by teachers of Mathematics affects pupils’ achievements. 23% of the teachers strongly agreed while the remaining 20% strongly disagreed. The researcher asked the teachers if their presentation of instructions could influence pupils’ achievements and 100% of the teachers agreed to the question. This shows that teaching methods used by teachers of Mathematics affect the academic performance of pupils’ in secondary schools.

The researcher asked the school administrators if they had teaching/learning strategies aimed at improving performance in schools and 100% of the respondents said they had strategies aimed at improving performance.

4.6.2.4 Teachers’ professional experience

The researcher further sought to find out if the experience of a teacher influences pupils’ achievement and below are their responses:

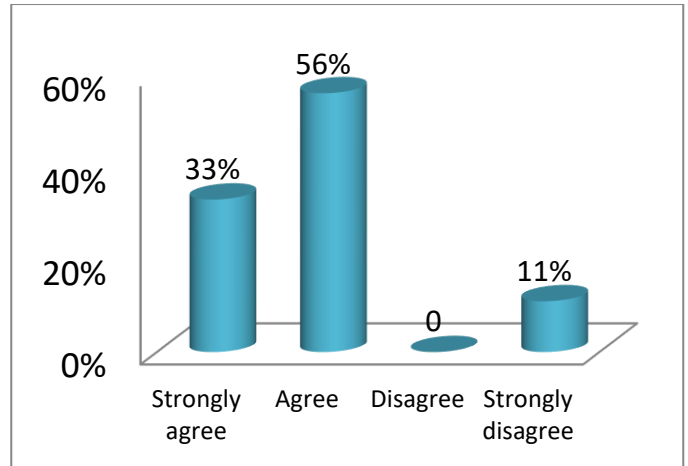


Figure 4.17: Teachers views on the effect of teachers’ professional experience on pupils’ performance: Source: Field data (2019)

The figure above shows that majority of the respondents agreed that experience of a teacher influences pupils’ achievement. 11% of the respondents however strongly disagreed to that statement.

4.6.2.5 Teachers Class Attendance

The researcher asked the pupils’ if their respective teachers of Mathematics attended class regularly and they responded as highlighted below:

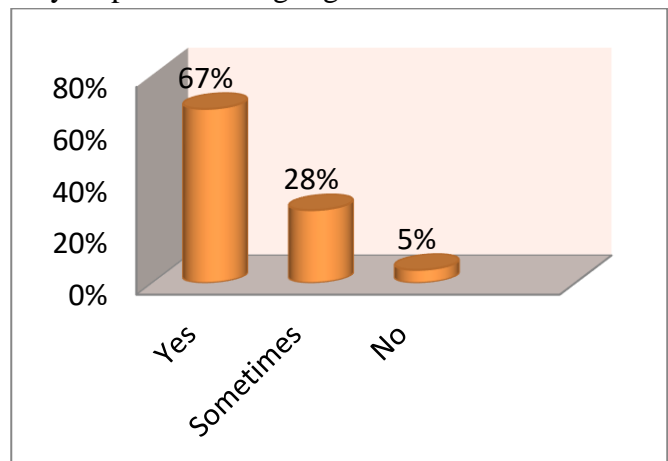


Figure 4.18: pupils’ responses on teachers’ class attendance

Source: Field data (2019)

As shown in the figure above, 67% of the said that teachers attended class while 28% of the pupils' said that teachers only attended classes sometimes. On the other hand, 5% of the respondents said that teachers did not attend class.

4.6.2.6 Individual attention given to pupils'

The researcher further asked the pupils' if teachers attended to their individual needs in the learning of Mathematics. It is evident from the figure below that majority of the pupils' said that teachers of Mathematics attended to their individual needs with regard to the learning of Mathematics in secondary schools in Kitwe district.

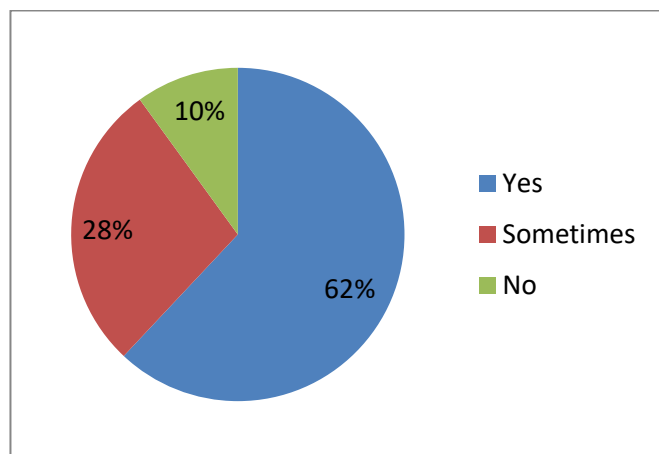


Figure 4.19: Individual attention given to pupils'
Source: Field data (2019)

4.7 Other factors

The researcher further asked the respondents (school administrators and teachers) to give other factors that affect grade 12 pupils' performance in Mathematics. Below are some of the common responses:

Absenteeism- majority of the school administrators said that absenteeism is one of the factors contributing to poor performance in Mathematics by grade 12 pupils.

Lack of teaching materials- lack of teaching materials was another challenge cited by the school administrators.

Students' reliance of leakages- Exam malpractice was cited as another factor contributing to pupils' academic performances. Pupils' spend time searching for exam leakages instead of studying for the final Examination.

Lack of confidence among the learners- some teachers said that lack of confidence among the learners contributes to the pupils' academic performance.

Bulky syllabus- Majority of the teachers said that the syllabus for senior Mathematics is bulky and this tends to frustrate the learners because they have a lot of work to study within a limited period. The teachers further stated that the time allocated to the pupils' during the exam is not enough for the pupils to answer all the given questions.

Lack of preparation- the respondents said that some pupils' do not prepare adequately for the exam due to their reliance in exam leakages. This without a doubt affects pupils' academic performance.

Over-enrolment- the respondents indicated that the teacher pupil ratio in schools affected the performance of pupils. The big numbers of pupils' make it difficult for teachers to attend to pupils' individual needs.

4.8 Objective number 4: To establish strategies that can be adopted to improve students' performance in mathematics in secondary schools

The study sought information on strategies of improving Mathematics performance at secondary school level. The respondents were asked to suggest wants needs to be done in order to improve the performance of grade twelve pupils' in Mathematics.

4.8.1 Government (MoGE)

Majority (90%) of the respondents said that the government should employ more teachers of Mathematics to reduce the pupil to teacher ratio. The respondents said that government should provide all the necessary teaching and learning materials and 50% of the school administrators suggested that government give incentives to teachers of Mathematics as a way of motivating them. Teachers suggested that the MoGE should reduce the number of topics in the syllabus by removing some topics rendered irrelevant and they further suggested that the ministry reduce the amount of paper work done by teachers in order to give them enough time to study the material they intend to present in class.

4.8.2 Examination council of Zambia

Teachers suggested that ECZ should increase examination duration by 30 minutes and that ECZ should allow schools to be repeating pupils' who are not performing well without the fear of examination numbers expiring. The teachers further suggested that ECZ should only prepare one paper for the examination having two sections instead of pupils' writing two papers in two separate days.

4.8.3 Schools and Teachers of Mathematics

Below were the responses from the school administrators, teachers and pupils':

Schools should ensure that Mathematics club is compulsory and all pupils must attend. Some teachers suggested that administrators should minimize changing of teachers. The same teacher should teach pupils from grade 10-12. Teachers should complete the syllabus in time so that they have enough time for revision and they should help the learners develop interests in Mathematics. Teachers should enhance remedial work for slow learners and Schools should ensure that student teachers are monitored closely. Schools

administrators should ensure that all the teachers are attending to their respective classes and that all teachers attend CPD meetings. Teachers should use a variety of teaching methods according to the concept being taught in order for learners to fully understand the concept.

4.7.4 Pupils'

It was suggested that pupils should avoid being absent from lessons and that they develop positive interest in Mathematics. Pupils' should spend a lot of time practicing how to answer exam questions and stop relying on exam leakage and spend time preparing for the exams.

V. DISCUSSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter discusses the main findings of the research, the conclusions and recommendations.

A. DISCUSSION OF FINDINGS

5.0.1 Research Objective 1: To Assess the Impact of Pupils' Attitudes Towards Mathematics on The Academic Performance

The findings of the research indicate that students themselves contribute to the poor performance in Mathematics. Some of the pupils' said they had no interest in learning Mathematics because it is too difficult. Some of the teachers said that learners develop negative attitudes towards Mathematics because of the wrong belief that Mathematics is a difficult subject. The negative attitudes of the pupils towards Mathematics and their lack of interests in Mathematics have a negative impact on their academic performance in the subject. This confirms the views by Githua (2002) who mentioned that students' negative attitude towards Mathematics

contributes to the dismal performance of pupils. The results also agree with Adino (2015) who said that the attitude a person is likely to influence the way one will perceive the objectives, content, methods and even evaluation strategies used in Mathematics

Nicolaido and Philippou (2003) showed that negative attitudes and lack of interest were the result of frequent failure or problems when dealing with Mathematics tasks and these negative attitudes and lack of interest may become relatively permanent. According to these authors, when children first go to school usually, they have interest and positive attitudes towards Mathematics. However, as they progress, their interest and attitudes become less and eventually become negative at Secondary School. When student develop negative attitude, they absent themselves from work and students absenting themselves from lessons also negatively affect the performance as noted by majority of the school administrators.

5.0.2 Research objective 2: To investigate the effects of Motivation on pupils' performance in Mathematics

The research findings show that motivation has an impact on the performance of pupils' in Mathematics. Majority (90%) of the teachers said that motivation has an effect on pupils' achievements. Only 10% of the teachers said that motivation has no effect on pupils' achievement. This indicates that pupils' need to be motivated for them to achieve more with regard to the learning of Mathematics in secondary schools. This agrees with Abdurrahman & Garba (2014) who concluded that motivation has a significant impact on academic achievement of students and that highly motivated students perform better academically than the lowly

motivated students. The results also agree with Etsey (2005) who states that lack of motivation and professional commitment produce poor attendance and unprofessional attributes towards students, which in turn affect the performance of the students academically.

5.0.3 Research objective 3: To examine the influence of teachers' attitudes on pupils' academic performance

The findings of the research show that teachers' attitudes towards pupils had an impact on performance. Majority of the administrators said that if there is no good relationship between teachers and pupils' then pupils will grow negative attitudes towards the subject these teachers teach and this will make it difficult for them to learn. This is in line with Wekesa (2013) who said that teachers' attitude towards Mathematics influence students' attitude towards Mathematics as well as their achievement. In the same vein, Yara (2009) confirmed that teachers' attitudes towards the teaching of Mathematics plays a crucial role in shaping the attitudes of students towards the learning of Mathematics. Adino (2015) who argues that a teacher's beliefs will influence his choice of Mathematics content, which he perceives comfortable or easy to teach, supports this. This finding is supported by the assertion that students care more about how much a teacher relates to them than how much the teacher knows. If they have a negative attitude towards you, they look for more negative things in you, but if they are positive, they look for more positive things in you (Nafungo, 2004). The findings also agree with Ngeche (2017) who states that the attitude of a teacher resonates in the attitude of her students towards the study of the subject. If teachers have positive attitudes towards

Mathematics, students will also have positive attitudes towards the subject. Teachers' attitude towards Mathematics, therefore, matters as it has a powerful influence on student attitude formation

Other Factors affecting pupils' performance

The respondents highlighted a good number of factors that affect the academic performance of pupils' in Mathematics.

Socio-economic factors-the findings of the research indicate that socio-economic factors of the parents affect the performance of the children. 70% of the pupils' said that they were from middle-income families while 20 % were from low-income homes and 10% were from high-income homes. Majority of the teachers said that family income has an impact on pupils' academic performance. This agrees with Conger et al (1992, 1993 & 1999) who said that low parental socio-economic status is associated with diminished resources hence contributing to lower academic achievement.

From the research findings, 40% of the parents/guardians did not have education beyond secondary school education, 30% had tertiary education, 20% had no education beyond primary school education and the remaining 10% of the parents/guardians have never been to school. This affects pupils' academic performance because parents may not be actively involved in the children's school activities due to their limited knowledge. This agrees with Desarrollo (2007) who indicated that the extent to which parents or family members are actively engaged in a student's education has positive influence on the student's achievement. It is believed that low socio-economic status negatively influenced pupils' attitude, in part, because it prevents students from accessing various educational

materials and resources, and creates a distressing atmosphere at home (Majoribank, 1996).

School based factors-the findings of the research further shows that there are school based factors that contribute to pupils' performance in Mathematics. As indicated in the findings, majority of the respondents strongly agreed that a teacher's knowledge of subject matter affects pupils' academic performance in Mathematics and pupils' whose teachers have a high knowledge of subject matter tend to perform better than those whose teachers have less knowledge on the content. Branford et al. (2000) said that teachers not only need knowledge of a particular subject matter but also need to have pedagogical knowledge and knowledge of their students. Teachers' competency in these areas is closely linked to students' thinking, understanding and learning in Mathematics education.

The research further shows that teachers experience has an impact on the pupils' academic performance. This agrees with Mondoh (2005) who said that teachers with many years of experience in teaching understood the subject matter as well as the teaching methodologies that may positively influence students' attitudes towards learning and performance in Mathematics. Bulkiness of the syllabus is one factor pointed out by teachers that contribute to the performance of the pupils. The study also shows that the big numbers of pupils' in schools negatively affected the performance of pupils' because it reduces the one to one interaction between the teachers and the pupils.

Majority (70%) of the school administrators said that there is a relationship between the level of qualification of the teachers and the performance of

the pupils' in secondary schools. However, majority of the teachers disagreed to that, but when asked if a highly trained teacher is required to teach Mathematics in secondary schools, 100% of the teachers agreed. This shows that indeed qualification influences academic performance. This agrees with Aliyu et al (2013) who concluded that the level of educational attainment of teachers' qualification is positively related with the students' outcome. The finding also agrees with Goldhaber & Brewer (2002) who stated that students do better in Mathematics if taught by a teacher with bachelors or master's degree in Mathematics.

5.1.3 Research Question 4: What are some strategies that can be employed in order to improve performance in mathematics in secondary schools?

The researcher also sought to establish some strategies that can be employed in order to improve performance in mathematics in secondary schools. It was suggested that government employ more teachers of Mathematics to handle the increasing number of pupils' in schools. The respondents further said that government should provide all the necessary teaching and learning materials and give incentives to teachers of Mathematics as a way of motivating them so that they can effectively teach the subject. It was further suggested that Ministry of General Education through CDC reduce the number of topics in the syllabus so that teachers can have enough time to revise the material with their pupils'.

The respondent further suggested that the ministry reduce on the amount of paper work done by the teachers so that they can spend that time studying the material to teach to their pupils' and become well acquainted. School administrators suggested that

teachers use a variety of teaching methods to suit the topic being delivered and help learners to fully understand the concepts.

The respondents suggested that schools ensure that Mathematics club is compulsory in all the schools and schools ensure that teachers finish the syllabi. Teachers should motivate the learners, stimulate interests in them so that they can enjoy the learning of Mathematics and develop positive attitudes towards Mathematics in order to perform better. The immediate supervisors should monitor the student teachers closely and teachers should enhance remedial work for slow learners. The school administrators and teachers suggested that pupils' increase their study time and develop positive interests in Mathematics. it was also suggested that ECZ should increase the number of hours in which the exam is conducted and that they should allow schools to repeat the learners who are not performing better without the fear of the examination numbers expiring.

B. Conclusions

Based on the findings of the research, it can be concluded that Lack of interests and negative attitudes towards Mathematics affect the pupils'' performance in Mathematics. The study further established that motivation has an impact on pupils'' performance in Mathematics. Teachers' attitudes towards pupils' and towards Mathematics as a subject have an impact on pupils'' performance. If teachers have positive attitudes towards pupils', they will create a good learning environment that will make it easier for pupils to approach them.

Socio-economic factors of the pupils'' parents have an impact on the pupils'' academic performances and school-based factors; like teacher experience and

knowledge of subject affects the pupils' performance. The study further established that the qualification of the teachers equally has an effect on the academic performance of the pupils' and the big numbers of pupils' in classes make it difficult for teachers to attend to all the pupils' individual needs.

Remedies to improve performance of students in mathematics as mentioned in the findings of the study include; Proper guidance to change the students' negative attitude towards mathematics, Motivating the pupils' and employing more qualified teachers of Mathematics to reduce the teacher pupil ratio in schools. Reducing the amount of paper work for the teachers to give them time to prepare and to increase the number of hours for the final examination will also help to improve the performance of the pupils. Use of variety of teaching methods and the formation of mathematics clubs in the schools would be a great booster to the achievement of students in the subject.

C. Recommendations

Students indicated negative attitude towards mathematics and that learning Mathematics was not interesting and fun to them. The researcher recommended the following:

- I. There is need for teachers to develop and maintain positive attitude towards Mathematics by ensuring students adapt to modern Mathematics learning by use of ICT.
- II. Teachers should encourage students to do extra work apart from the work given in class and slow learners be given extra assignments in order to improve.
- III. More assessments should be enhanced to keep students acquainted on the expectations of the mathematics department.
- IV. Stakeholders should be encouraged to prioritize provision of resources required in the teaching of Mathematics.

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