INFLUENCE OF SELECTED INSTITUTIONAL FACTORS ON PERFORMANCE OF MATHEMATICS IN PRIMARY SCHOOLS, A CASE OF MIGORI SUB- COUNTY, MIGORI COUNTY, KENYA

BY

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DECLARATION

Declaration by the candidate

This thesis is my original work and to the best of my knowledge has not been presented at any other university for the award of a degree or a diploma. No part of it may be reproduced without prior permission of the author and/or Moi University.

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This thesis is dedicated to my wives Anna and Loice, sons Job, Ibi, Reagan, Tony Arthur, Justus and daughters, Emelda and Akinyi for their love, patience and encouragement during the study.

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ABSTRACT

The contribution that mathematical knowledge and skills make to the economic, industrial and technological growth of the modern world are quite obvious to almost everyone as it enters into all areas of human activities. However as important as the subject is, the tremendous and persistent failure of standard eight pupils in Kenya has remained a major threat to its learning. The subject is viewed in Kenya and even in the developed world as difficult to learn, thus most pupils complete primary school without grasping the fundamental arithmetical skills required. This study therefore sought to establish the influence of selected institutional factors on pupils' performance in selected schools in Migori Sub-County. The study will focus to determine the influence of teacher/ pupil ratio, teaching methodology, adequacy of instructional materials and teacher characteristics on performance in Mathematics in primary schools in Migori County. The study used descriptive survey research design, mixed methods approach. The target population was120 head teachers, 960 teachers and 24,000 pupils. A sample of 552 respondents was drawn consisting of 24 head teachers, 288 teachers and 240 pupils. Stratified proportionate random sampling technique was used to select head teachers while random sampling was used to select teachers and pupils from the schools whose head teachers had been selected. Three five point likert type of questionnaires were used to collect data from head teachers, teachers and pupils. The questionnaires were validated by a team of experts from the department of Educational Psychology. Reliability was tested by subjecting the instruments to a pilot study among six schools from Rongo district that did not take part in the study. Cronbach's alpha was used for analysis of reliability in which a value of 0.86 and above was found. Data collected was analyzed using descriptive statistics. Statistical Package for Social Sciences (SPSS) was used to process the data collected. Results of data analysis were presented using frequency distribution tables, bar graphs and pie charts. The findings indicated that the student teacher ratio was too many in relation to the expected ratio. The teaching methodology used by the schools being studied was rated as effective by majority of the respondents, however others still perceive that the methodology they use is not effective. The study also found out that most of the instructional materials were available but inadequate, for example blackwalls, manila papers and main class text books were rated below 50% which was below average. It was concluded that school administrators and policy makers need to seek and develop policies to ensure that ideal performance management is implemented for sustained short and long-term positive enduring effects on pupil's performance. There is need for government to employ more mathematics primary school teachers. This will enable attainment of recommended pupil teacher ratio in schools which currently is far above the required standards. It will also help to offset the problem of teacher shortage as a result of over-enrolments caused by introduction of Free Primary Education.

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LIST OFABREVIATIONS

CDF - Constituency Development Fund

GOK - Government of Kenya

HOD - Head of Department

KCPE - Kenya Certificate of Primary Education

KNEC - Kenya National Examinations Council

MOE - Ministry of Education

MOEST - Ministry of Education Science and Technology

PISA - Program for International Students Association

SMASSE - Strengthening Mathematics and Science Education

SPSS - Statistical Package for Social Sciences

SRS - Simple Random Sampling

TSC - Teachers Service Commission

UNESCO - United Nations Educational Scientific and Cultural Organization

CHAPTER ONE:

INTRODUCTION

1.0 Overview

This chapter examines the background information to the problem, statement of the problem, purpose and objectives of the study. The chapter also presents the study hypothesis, research questions, significance, scope and limitations of the study, theoretical framework, conceptual framework and operational definition of terms.

1.1 Background of the Study

Education in mathematics is critical to the development of Kenya's economy, as well as many other countries around the world, according to literature and policies. An important part of the curriculum, it is also a fundamental part of civilization in both a practical sense as well as an aesthetic sense. Mathematics, according to Crockroft (1982) edited in Dangol, (2016), is one of the few subjects in the school curriculum that is as critical to the country's future as it is to an individual's day-to-day existence. Math has always been an important subject in education, but in today's society, it has taken on a greater significance (NCTM, 2010). Mathematical knowledge and skills have had a significant impact on the modern world's economic, industrial, and technological development, as almost everyone can attest to this fact.

Globally, performance in mathematics in international countries has shown tremendous progress over time (Papanastasiou, 2020). In grade 4 math, for example, since 2015,

Portugal gained 83 points. This is almost two years' worth of learning progress. The experience of Portugal's reform is well documented by Nuno Crato. Following dismal first results in TIMSS and PISA, the education system was reformed to pay increased attention to results, with a clear curriculum, increased school autonomy, regular assessment, vocational paths, and flexibility. Large increases since 2015 are also reported for England and Cyprus. Other large increases occurred for Armenia, Azerbaijan, the Czech Republic, Georgia and the Russian Federation (Shin, Lee & Kim, 2016).

According to the 2019 Trends in International Mathematics and Science Study (TIMSS), the United States scored in the top quarter of participating education systems in both mathematics and science at both the 4th and 8th grades. While some participating education systems had a higher TIMSS 2019 score than the United States, none of these education systems had a wider score gap between their high and low performers than the United States (Ma & Ma, 2019).

Regionally, there is a deterioration of mathematics performance in Sub-Saharan Africa (Howie, 2016). Both primary and secondary level mathematics education are weak in most African countries, reducing the potential population of talented students who choose mathematics majors at the university level. This condition has been attributed at least in part to inadequate teacher recruitment and laws requiring universal elementary education, which has increased crowding in the primary schools and brought a drop in quality (Mutodi & Ngirande, 2017). Large class size prevents teachers from interacting

with students, attending to those who need special attention, or practicing learner centered techniques. One result is that few students reach the secondary level. In some sub-Saharan countries, less than 10% of the secondary age population is enrolled in school; in the rest for which figures are available, only South Africa and Swaziland have gross enrolment ratios greater than 50 (Visser, Juan & Feza, 2015).

There are a lot of misconceptions out there about what math is like for students, and this is especially true in Kenya and even the developed world. Students in the United States tend to score in the middle of the pack when it comes to reading comprehension, but they often fall far short of those in other developed countries when it comes to math and science (Ornstein, 2016). Mathematics in the United States is more focused on drill and practice than high-scoring countries, according to (Robert &Joanne, 2017). International competitiveness has been put at risk because of poor performance, which is attributed to a lack of quality teaching.

Students in Kenya place an emphasis on performance tests because the immediate goal of learning is to pass these tests, which lead to higher education. Exam passing rates are a key indicator of academic success in the classroom (Akrofti et al 2017). As a result, more than a third of all candidates who took the primary mathematics exam in that year failed to demonstrate the level of mastery required by the subject teacher, effectively excluding them from careers in which mastery of mathematics is a pre-requisite. The world conference of education for all (EFA) in Jomtien, Thailand, adopted learning achievement as a key indicator of education (UNESCO, 2010). Because math scores at

the KCPE in Kenya have remained consistently low over the years, this suggests that the subject is being taught at a low standard. It is clear that many students who leave primary and secondary school in Kenya do not meet the basic mastery level of primary and secondary mathematics courses, based on their KCPE performance in mathematics. The chances of achieving Kenya vision 2030's goal may be bleak unless this trend is reversed.

1.2 Statement of the Problem

The government, parents, and educators in the country are all concerned about the low math scores that have been reported (Tata, 2013). When students perform poorly on exams, it is a sign that they are not learning as they should because of the poor quality of the instruction they are receiving. The poor performance and negative attitude toward the subject are attributed to the traditional (conventional) teaching methods. Teachers have been the primary facilitators of the learning process. Students are the focus of instruction, not the other way around (Njoroge, 2016).

Migori County in particular has indicated a low performance in mathematics for the past five years. Despite all the efforts (Mkumbo, 2019) the rate of pupils' performance was 16.09% in the year 2019, 14.55% in the year 2018, 12.14% in the year 2017 and 18% in the year 2016. Performance in the year 2015 was a bit exceptional but still performance was low.

The most common method of transmission is one that results in an instrumental understanding without a rationale, rather than one that results in a relational understanding that has a rationale (Ball, 2013). Students are taught what works, but not why it works, because students, especially those in grades three and four, struggle to grasp basic mathematical concepts when they are not exposed to effective teaching methods and a stimulating learning environment. Regardless of how basic the topics are, students in lower socioeconomic classes often struggle with mathematics because of the shift in communication methods (mother tongue to English) (Watson, 2013). For students in Kenya, a solution to their math difficulties has been put in place through professional development and the establishment of a proper institution to support the teaching of mathematics. Therefore, this study sought to investigate the influence of institutional factors on the teaching and learning of basic mathematics concepts in primary schools.

1.3 Purpose of the Study

The purpose of the study was to investigate the influence of selected institutional factors on the teaching and learning of basic mathematics concepts in primary schools.

1.4 Objectives of the Study

These objectives included;

i. To determine the influence of teacher/ pupil ratio on performance in Mathematics in primary schools in Migori Sub-county

ii. To establish the influence of teaching methodology on performance in mathematics in primary schools in Migori Sub-county

iii. To find out the influence of the adequacy of instructional materials on performance in mathematics in primary schools in Migori Sub-county

iv. To identify the influence of teacher characteristics on performance in mathematics in primary schools.

1.4 Research Questions of the Study

These research questions guided the included;

i. What is the influence of teacher/ pupil ratio on performance in Mathematics in primary schools in Migori Sub-county?

ii. What is the influence of teaching methodology on performance in mathematics in primary schools in Migori Sub-county?

iii. What is the influence of the adequacy of instructional materials on performance in mathematics in primary schools in Migori Sub-county?

iv. What is the influence of teacher characteristics on performance in mathematics in primary schools in Migori Sub-county?

1.5 Hypothesis

H_{01}: there is no statistical significant relationship between pupil teacher ratio on the performance of mathematics

H_{02}: there is no statistical significant relationship between teaching methodology and the performance of mathematics

H_{03}: there is no statistical significant relationship between instructional materials and the performance of mathematics

H_{04}: there is no statistical significant relationship between teacher characteristics and the performance of mathematics

1.6 Significance of the Study

The study sought to get solutions to the perennial poor performance in mathematics, which makes pupils not to join good Secondary schools. The study may also shed some light on the quality of teaching and learning in school, information which may be useful to teachers, parents, and government as most Kenyans place utmost value on academic performance. The research may also inspire other scholars to conduct research in this field so as to fill in the gaps which might be exposed by its study.

1.7 Scope of the Study

The study involved an investigation into the influence of institutional factors on the performance in mathematics. The variables of the study are institutional factors (pupil teacher ratio, teaching methodology, instructional materials and teacher characteristics) and the performance in Maths as dependent variable. Brunner's theory will be used. The study was carried out in public primary schools in Migori Sub-County, Migori County. Head teachers, standard four, five, six, seven and eight mathematics teachers and

standard four, five, six, seven and eight pupils in both rural and urban schools were involved in the study.

1.8 Limitations of the Study

There are many primary schools in Kenya. The study was carried out in Migori Sub-County which is one of the many Sub-Counties found in Kenya. The researcher was not able to involve every member of the population but the sample of study was randomly selected from both teachers and pupils. These were the representative sample for which findings was found from and generalized. Therefore the findings cannot be generalized in the whole country but only a reasonable generalization can be made from the results of the study. The researcher made sure that the sample size selected was achieved to exhaust all the information for the study.

1.9Assumptions of the Study

The study assumed that all respondents were honest and accurate in providing required information. It was also assumed that all pupils selected for the study (standard four to eight) have gone through the same level of curriculum in terms of years spent in primary school and that the Kenya National Examinations Council (KNEC) examination results are adequate and accurate instrument in evaluating student performance in KCPE Mathematics.

1.10 Theoretical Frame Work

Brunner's theory of learning, known as "constructivism," was used to guide this research (1966). Knowledge and meaning are created by a person's interactions with

their own experiences and their own ideas, according to constructivism. According to Constructivism, students learn best when they build or construct their own knowledge through practical activities. Giambattista, cited by Airasianet al. (2018), argued that humans can only understand what they have created for themselves as a learning philosophy, constructivism has roots dating back to the eighteenth century. However, Jean Piaget and John Dewey are generally credited with formalizing constructivism theory. In John Dewey's view, education was a process that required students to engage in meaningful activity. Knowledge and ideas emerged from a situation where learners had to draw them from experiences that made sense, according to him Jean Piaget, on the other hand, outlined the mechanisms by which students internalize knowledge. Education reform movements often draw inspiration from Piaget's theory of constructivist learning, which has influenced a wide range of educational theories and practices (Airasianet al, 2018).

Instructors in this model must play the role of facilitators rather than teachers. A facilitator, on the other hand, encourages the learner to discover their own understanding of the subject matter. In this way, the focus shifts from instructor and material to learner (Gamoran, et al, 1998). As a result of this drastic shift in responsibilities, a facilitator now requires a completely different set of abilities than a teacher did (Burstain, 1992). Instead of lecturing students, facilitators engage them in conversation and help them come to their own conclusions. While teachers typically deliver monologues, facilitators maintain an open line of communication with students throughout the course of the lesson. Smith,(1980). The active role of the teacher and the

value of expert knowledge are not dismissed by constructivism as some (conservative/traditional) educators claim. Constructivism alters this role to one in which teachers assist students in creating their own knowledge rather than simply regurgitating it. Learners are just as interested in their progress as they are in their finished product in a constructivist classroom In order to give students feedback, teachers must monitor their students' progress and behavior on a regular basis. Students benefit from these methods because they allow for real-time intervention and enrichment to improve learning (Airasian and Russel, 2018).

However, it still assumes that the learner's primary role is to absorb what the teacher has to say. When it comes to "social" forms of constructivist teachings, the learner is a much more active participant in creating new meanings with the teacher. The learner should take on more and more of the burden of knowledge acquisition, according to this view. Constructivist teaching methods have received a mixed bag of scientific support, with some studies praising them and others criticizing them. Comparisons were made between traditional teacher-centered science classrooms and those where students were in charge of their own learning. They found no significant differences in student performance between traditional and constructivist methods in their initial assessment of student performance immediately following the lessons. Students who learned using constructivist methods retained more of their new information than those who learned using traditional methods 15 days later, according to a second assessment.

This approach to instructional design has also been questioned by several educators, particularly when it comes to the creation of materials to help beginners (Mayer, 2014). Scholars and educators have struggled with the tensions between teacher-directed instruction and student-centered constructivist approaches, each offering evidence for its effectiveness in achieving some mathematical outcome, for example, improvement in teacher facilitation of classroom discussion, development of classroom mathematical norms, and student learning of particular topics. The three student learning models cited by Black (2017) are: (1) inquiry and problem-based learning, where students are in control of their own learning; (2) authentic curriculum, where learning is connected to students' interests and needs through rich and authentic tasks; and (3) constructivism, where teachers tailor their instruction to meet the specific learning needs of their students. A constructivist approach to student learning is common in studies aimed at improving math teaching and learning.

1.11 Conceptual Framework

The conceptual framework provided below shows the relationship between the institutional factors and teaching and learning of mathematics. The schematic diagram below gives the presentation of the research topic.

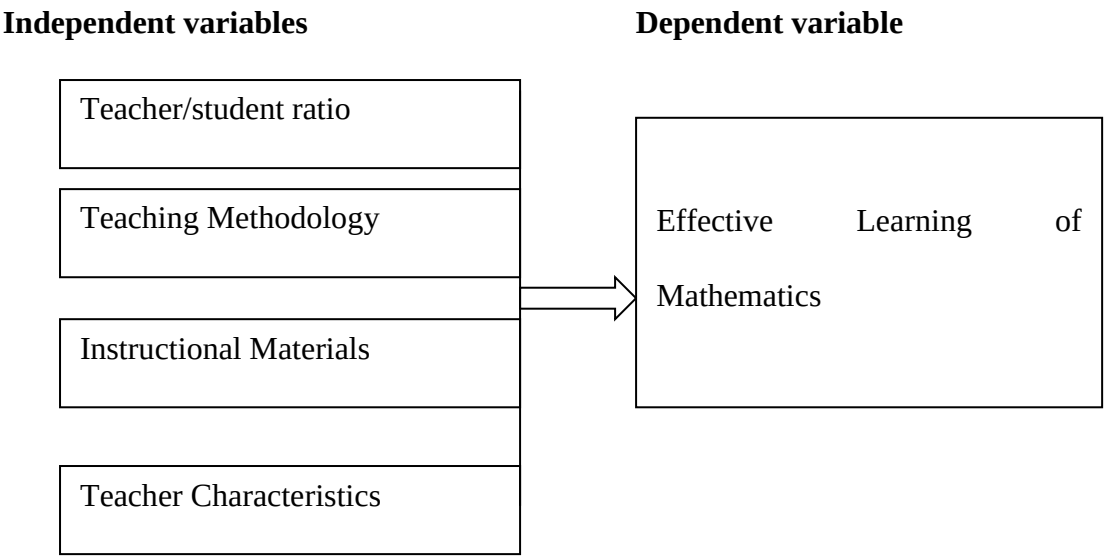

Fig 1.1: Conceptual framework

In this study, the teacher/student ratio, teaching methods, instructional materials, and teacher characteristics were all independent variables. Teachers/student ratios are critical in any educational setting, and this study sought to determine whether the ratio of teachers to students has an effect on students' performance in the mathematics subject. It is also possible that a student's performance in mathematics may be influenced by how they are taught. A further study examined the impact of instructional materials on math performance, as instructional materials assist students in obtaining the information they need in a particular subject, and thus, more relevant instructional materials are more likely to assist students. Teachers' attitudes toward a subject or a student were also examined, and the results were found to be strongly influenced by these attitudes.

1.12 Operational Definition of Terms

Institutional factors: In this study Social factors that conjointly generate a regularity of behavior. In this study institutional factors are school facilities, instructional materials, teacher staffing and head teachers' administrative skills.

Instructional materials: In this study, they are materials like books, films and field trips that support or enhance the process of learning.

Performance in mathematics: in this study performance in mathematics is the level of achievement of a student in terminal or in the KCPE examination with respect to attained skills or knowledge of compared to set standards.

Teacher characteristics: in this study, teacher characteristics are the skills of communication, adaptability and patience during teaching and learning.

Teacher pupil ratio: this is the number of pupils attending classes divided by the number of mathematics teachers.

Teaching methodology: these are the classroom instruction methods used to teach pupils in class

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The main aim of this chapter is to examine the past studies and current trends raised by various scholars concerning factors that determine performance in K.C.P.E Mathematics. The chapter reviewed aspects under various sub-headings: Student performance in Mathematics, class size and teacher pupil ratio, teaching methodology, instructional materials factor and teacher characteristics.

2.2 Class Size and Teacher- pupil Ratio

The class size controversy in the Philippines was defined by Brewer et al. (2011) as the actual number of students taught by a single teacher at a given time. Their definition also included teachers who are administrators, librarians, special-education support staff members, or teachers who perform other roles outside the classroom. They found that the ratio of teachers to students is a global indicator of the amount of human capital invested in children's education, both directly and indirectly. A lower teacher-student ratio means a smaller class size. Teachers' roles and the amount of time they spend in the classroom during the school day can affect the disparity.

According to World Bank (1999) reports, the relationship between students and teachers in primary schools is wildly unequal. In Kenya, for example, 7,224,201

primary school students were enrolled in 1996, and 184,393 teachers were assigned to them. This equates to a student-to-teacher ratio of one to thirty-seven. In 1993, the ratio was 1:31, and in 1997, it was 1:29.

Human interaction can be overlooked when teaching a large class, according to a study by Fonseca and Conboy (2016). The study observed that professors lectured too quickly, which made learning and teaching impersonal and, as a result, stressful for the students. The most efficient way to utilize class time in a large classroom, according to him, was to have students type up lecture notes ahead of time. The motivations, definitions, and theorems presented in the lecture are listed in these notes. Classwork examples and applications would be included in the notes. He noted that students frequently make human errors as a result of this, such as making calculation errors, getting stuck in an explanation, losing their train of thought, and forgetting a formula (Ghimire, 2017).

In the period from 1970 to 1976, the number of untrained teachers more than tripled, as noted by Eshiwani (2014). More than half the teachers were ethnic minorities at that time. Untrained teachers may have contributed to the poor quality of education because they lack a thorough understanding of the fundamental theories of learning and teaching methodology. Additionally, the Ominde commission was concerned about the large number of teachers without training and the low morale of teachers due to poor working conditions and low wages in Kenya (1964). UPE has also been influenced by teachers' professional qualifications. According to Thais (1994), a lack of qualified teachers

results in a lack of adequate instruction that does not adequately prepare students for college. Most primary schools in the city were already overcrowded, according to a meeting of more than 300 city primary school principals and PTA leaders.

Teachers have also been known to mistreat students on a regular basis. According to Raju (1973), some teachers compel students to perform menial tasks such as fetching water, cooking, or digging, and even abuse female students. Many children drop out of school as a result of being bullied, mistreated, or subjected to corporal punishment. There are two types of children with special educational needs: physically challenged children and those who have been gifted in some way. Many teachers lack basic training aids, such as Braille machines, white cases, hearing aids, ear molds, and play materials, according to a 1992 EFA report on special education needs in regular schools. As a result, it's obvious that education is rife with inequality. Bogonko (1992), claims that the general public has a negative attitude toward the education of children with disabilities. Teachers' training has been shown to have a significant impact on students' academic performance (Idiaghe, 2014).

The teacher-to-pupil ratio in Delta State's primary schools is currently 1:22, according to the most recent data available on teacher-to-pupil ratios. Even though this is below the recommended 1:35 teacher-student ratio, it is still adequate (Ministry of Education Report, 2017). Primary school boards may face the following issues in their efforts to run the schools effectively. Female teachers outnumber male ones by a factor of 12,654 to 4875 in schools; more working mothers and fathers. Low moral standards, a lack of

motivation, and a difficult economic situation are just some of the personal values that teachers may have changed over time. According to (Okoth, 1998), low academic achievement can be traced back to a failure to recognize and reward students' achievements and efforts. Regardless, teachers are expected to carry out their duties as if they were being paid to do so, even if they aren't feeling particularly inspired.

Pupils and teachers in successful schools form collegial relationships that foster social skills, according to UNICEF (2019). Accurate teaching and learning methods, appropriate methodological approaches, and competent teachers are all associated with quality schools (UNESCO, 2012). According to Chingos (2012), a decrease in the student-to-teacher ratio in Swedish fourth- to sixth-grade classes of students aged 13 to 16 results in an increase in math test scores with a standard deviation of 0.023 to 0.033. A correlation between low teacher-to-student ratios and student performance has been found in France at both elementary and secondary school levels, according to some studies (Gary-Bobo, & Mahjoub, 2013). However, in the United States, a study on the teacher: pupil ratio from kindergarten to third grade level found that a small teacher: pupil ratio resulted in a minimal relation performance.

A study by O'Sullivan (2016) in Ugandan primary schools on the effectiveness of classroom equipment, the size of classrooms, the teacher-pupil ratio, and the appropriateness site for playground and latrines in relation to the school's readiness for the child's admission was conducted. O'Sullivan (2016) found that, despite the importance of these factors, most primary schools in Uganda lack them. The vast

majority of Uganda's primary schools, as a result, do not provide an environment conducive to a smooth start to school in first grade. Math concepts learned by third-grade students are a focus of the current study, which examines classroom effectiveness.

A study by Wekesa (2010) found that schools with a low student-teacher ratio produced better academic results in Kenya's KCSE math exam. It was also discovered, however, that students' math performance was not necessarily affected by the high student-to-teacher ratio, as some schools performed exceptionally well in national math tests (Wekesa, 2010). According to Okwach and Odipo (2017), teachers who have a high or low teacher-pupil ratio may be less effective. Teachers and other school resources may suffer as a result of low enrollment, which is common in Kenyan primary schools. In comparison to the sheer number of educators, the quality of those educators is a major source of concern. Schools, according to Kinyanjui (2019), have a significant impact on student outcomes because of the character of their teachers.

A study by Kiptum (2018) found that the introduction of FPE in Kenya's primary schools posed a number of challenges to improving KCPE achievement. These included teacher development, overcrowded infrastructure, lack of students' sitting and wringing facilities, and high enrollment. The number of students enrolled in Kenyan primary schools increased from 5.8 million in 2012 to 7.2 million in 2013 to 10.1 million in 2019 as a result of the introduction of free primary school education in the country. But despite these efforts, the number of educators is still insufficient to meet the rising

demand for classroom space (MOEST, 2019). Students in urban slums and rural schools in Africa were less likely to interact with their teachers because of the larger class sizes, which Bold, Kimenyi, Mwabu, and Sandefur (2010) say can reach up to 100 students in rural schools and 120 students in urban slums.

For example, teachers' insufficient preparation, overcrowding, poor classroom and teacher facilities, and a lack of instructional oversight have all been identified as management issues in primary schools by researchers. Other issues include curriculum shifts, school location and the supervision climate teachers and students encounter (Oghuvbu, 1999). There were an increase in the number of primary schools in Nigeria from 48,552 to 59,174 between 1999 and 2013, with a total enrolment of 25, 765,969 students. Teacher-pupil ratio is 1:44, which is too much for the teachers in the 591,041 primary schools (Universal Basic Education commission, 2014). The situation in Kenya has worsened since primary school enrollment has increased and teachers have been understaffed. This could have an effect on the students involved.

2.3 Teaching Methodology

The teaching of mathematics is a highly intricate process that involves interactions between math teachers, students, and the actual mathematics that is taught in classrooms around the world (Cohen, Raudenbush, and Ball, **201**3). Students of different backgrounds and interests and motivations must be grouped and interacted with in a variety of ways in order to get the most out of the experience. Some of today's most pressing and contentious issues in mathematics education fall under this umbrella.

The teacher-to-student ratio is a key factor in classroom management. High school teacher/student ratios as low as 1:50 do not allow for much one-on-one attention, and low ratios are no better. Up to a certain point, however, decreased teacher-to-student ratios improve teaching effectiveness. Smaller classes necessitate a different approach to teaching. The classroom methodology relies heavily on the teacher. Learning environments, activities and resources must all be defined and selected by him/her in order for him/her to be successful in his/her role. Problems with teacher methodology include: insufficient presentation, pace of work, inappropriate resources, topic sequencing and language levels according to Nyongesa (2014)

It is recommended by the Cockcraft committee (2012) that mathematics instruction at all levels should incorporate a variety of teaching methods, including: teacher-led demonstrations, student-to-student and student-to-teacher dialogue, hands-on activities, practice of foundational skills and routines, and investigative problem solving. A list of possibilities does not guarantee good methodology, according to the report. These activities are determined by the context in which they are performed, the importance they are given, and the relationship between them. The inclusion of appropriate learning resources is critical when using activity-based teaching methods. Resource utilization is essential in ensuring that students learn to appreciate and enjoy mathematics through a variety of appropriate practical activities. Students' understanding of mathematical concepts is improved through the use of resources and the activities that result from them. It's critical that teachers plan ahead and identify the materials they'll need for each

lesson, as well as the role they'll play in teaching and learning. The use of textbooks, teacher's manuals, and curricula is critical in the mathematics classroom.

Teacher's guidebooks and syllabuses recommend that teachers use inquiry-based or activity-based methods that are focused on learning tasks that encourage inquiry, creativity, manipulative and manual skill development. The transcribed activities in the teacher's guidebooks were analyzed to see if there was a common pattern in the distribution of instructions. This is a common pattern in which the teacher initiates a response from the students. Feedback was sometimes given in response to these. Teachers' manuals suggest, if not explicitly, that teachers should engage students in active learning rather than relying on them to passively absorb information, and they should place an emphasis on conceptual understanding rather than memorization. Guidebooks, on the other hand, emphasize teaching methods that rely heavily on the exposition teaching method **(**Mereku, 2013).

Teachers' methods are influenced by the overburdened Mathematics curriculum. Mathematics is taught theoretically to make up for the lack of time given to students to discover things for themselves. Teachers may be frustrated by a lack of resources and a lack of support from head teachers. There have been a number of studies on the best ways to teach mathematics. Studying the role, implementation, and effectiveness of learner's post practical activities was the focus of a Forrester (2010) study. Regardless of the learner's age, the study found that practical activities can help students better understands mathematics.

Curriculum content (what is taught) and instructional practices are directly impacted by a body of mathematical education research that has been done (how it is taught). All knowledge, including mathematical knowledge, is built on the foundation of the senses. The immature mind must constantly return to concrete experience in order to aid in abstract thought. Abstract thought must be based on concrete experience. Rowntee, (2014) argues that students should be exposed to real-world experiences as part of their education. To improve their perception, the experiences should provide stimuli for the sense organs of sight, touch, and hearing.

There have been significant forays into some of the most controversial and pressing questions about the effectiveness and impact of various instructional practices by the educational research community in the last two decades and in particular some studies that examine the effects of various interpretations and implementations of practices that have been advocated in the "reform" documents for mathematics education (McLeish, 2018).

Mathematical achievement among students in the United States is still alarmingly low compared to other countries (Slavin, Lake, and Groff, **201**9). (Mullis, Gonzalez, and Chrostowski, **201**3; National Assessment of Educational Progress [NAEP], **201**7; Thomson, Cresswell, and De Bortoli, **201**4). The quality of mathematics instruction is an essential part of raising student achievement in the subject. Student achievement gains are greater and more long-lasting for those who receive high-quality instruction

compared to those who receive lower-quality instruction (Rivkin, Hanushek, and Kain, **201**5; Wright, Horn, and Sanders, 1997).

It was recommended by the Cockroft Report (1982) that the learner be given opportunities to discuss Mathematical ideas and to practice fundamental Mathematical skills. The Cockroft study found that students who participated in discussion activities with their teachers performed better than those who did not. Table (1962) found that a good way to teach students is to help them achieve their goals. Hands-on lessons and higher-order thinking tasks were found to result in high student achievement in a study of mathematics and science education (Wenglinsky, **201**0). Since teaching and learning processes, attitude formation, and performance in mathematics are all influenced by how students perceive teachers, their pedagogical practices are critical. In order to encourage students to put forth more effort and engagement in mathematics, friendly pedagogical practices are essential (Too, **201**4).

Teaching methods are hotly debated, with arguments ranging from "direct instruction" to "inquiry," from "teacher-centered" to "student center (ASEI)" to "traditional" to "reform" It is common for these labels to make rhetorical distinctions that miss the point about the quality of instruction. Teachers' knowledge and use of Mathematical content, teachers' attention to and handling of students, and students' engagement in and use of Mathematical tasks" determine the quality of instruction.

Resources are used in the learning process when more than one human sense is used, according to Wachiye (1996). As part of its investigation into education, the World Bank Development Report (1993) recommended that educational systems strive for maximum efficiency in the use of available resources. When it comes to human learning, Wachiye (1996) estimates that sight (83 percent), smell (3.5 percent), touch (1 percent), and taste (one percent) all play an important role. Approximately 50% of what is seen and 20% of what is heard are believed to be retained. As a result, pre-schoolers require visual aids and active participation in lessons.

Educators, researchers, and scholars have long questioned the way Kenyan schools teach math. Educators like Eshiwani (1984) chastised them for employing antiquated teaching methods. He advocated for the use of effective teaching techniques rather than rote memorization (repeating words but not understanding the meaning). Learning activities and student participation should not be ignored in any way. It was a challenge put forth by the Education Commission (1964) for teachers of academic subjects including mathematics to use practical activities to help students better understand their lessons, such as making models.

According to Michael (1987), new teaching methods should move from old expository teaching methods to the new child-centered method in a continuous manner. To accomplish this, math teachers should use techniques such as lecture, discussion of mathematical concepts, group work (to aid in the understanding of manipulating numbers), text book reading, games involving numbers, and slides to help students

grasp the concepts. Numeracy is the goal (the ability to use numbers in arithmetical calculations). Children's understanding and interest in mathematics can be boosted through the use of mathematical modeling (practical representation of mathematics), the use of resource people (experts who can help to make mathematics concepts understandable), and experiments with numbers. Instructional methods are determined by a strategy, which is determined by the lesson's intended content and goals (Mutunga and Breakell, 1992).

Pre-school children in the Makuyu zone face difficulties and problems that prevent them from performing well in mathematics. These difficulties and problems appear to stem from parents' unwillingness or inability to send their children to pre-school. They waited until their children were old enough to go to school before enrolling them in primary school. Thus, valuable groundwork for future mathematical achievement was lost, and the issue was thoroughly investigated in this project. According to Farant (2017), the methods used to teach a subject, including mathematics, have an impact on how well students perform on standardized tests. Bruner (1965) argued that discovery methods are known to keep students engaged and engrossed, which aids in their comprehension and retention of the information they are learning. A learner can apply these methods to a wide range of subjects by employing them. By connecting new information to what they already know, students in discovery methods take an active role in the process of gathering and making sense of the information they're being taught. Activity methods play a large role in discovery learning.

According to Edger (1994), however, teachers often forget or are unaware of the importance of psychomotor (motivation and effectiveness) skills for students. He argued that teachers, including those in pre-school, tend to overlook the importance of motor learning. It's possible that many teachers in Kenya's current educational system have never received adequate training on how to teach and, as a result, have no idea how to motivate students. Developing these skills requires the use of a variety of teaching techniques. Also, transition in education is the movement from one stage of learning to another, according to him. At this point in a child's life, the transition from pre-schooler to primary schooler is marked by the emergence of new responsibilities and roles. In order for students to grow in their self-awareness, schools should provide them with a steady stream of fresh perspectives.

2.3.1 Conventional Methods

Conventional teaching methods place more emphasis on the material being taught than on the individual students being taught, resulting in an education that is viewed more as a means of completing the curriculum than as an effort to assist each student reach his full potential. Rather of focusing on learning, the focus is on teaching. Formal teaching methods, such as those used in traditional classrooms, rely on instructing the entire class at once. As a result, students have a tendency to absorb information like a sponge. Students are muted, and real debate and inquiry are hindered when working in such a setting. The teacher's primary responsibility is to impart knowledge to students (Browell et al 1991).

To ensure that all students are focused on the same task at any given time, they normally sit in straight rows. As a result, children are encouraged to take part in a wide range of informal classroom activities that allow them to have a great deal of control over what they do. Ant-quality education has its roots in teacher-centered education. Preparation for adulthood is a major focus for the Greeks and Romans. Prior to this period, education was based only on the needs and abilities of the students themselves, which was a radical shift in thinking. (Farrant 2019). Traditional teaching relies heavily on imagery of the mind as an empty vessel from which the teacher pours fresh information that enriches the pupils' understanding.

In spite of the fact that traditional methods have been shown to contribute to subpar learning and, as a result, a poor attitude and poor performance, many schools continue to use them because they believe that a student-centered approach leads to a student with terrible behavior. They argue that education oriented on children is ineffective because it lacks a true commitment to learning and because of the turmoil it causes in the classroom. They believe that a teacher-centered approach to education ensures that high educational standards are upheld (Aaronson, Barrow and Sander, 2017).

A study conducted by Thompson and Sheckley (2017) indicated that BSN students liked classrooms where they were able to participate in critical thinking, questioning, detecting assumptions, and predicting outcomes. When it comes to teaching, traditional lecturing is one of the most used ways. Lecturing is a waste of time as a teaching

strategy, according to Ebert-May, Brewer and Allerd (1997). They also claim that lecturing produces an information-receiving role that is passive and non-thinking.

These academics have shown that there has been a paradigm change from lecture-based education to one that incorporates a range of ways to teach effectively and stimulate students to think critically.

Students in a 3-credit medical surgical nursing course were used as both an experimental and a control group, and their test scores were compared. To the experimental group's advantage, researchers observed statistically significant variations between the means of both groups. In addition, Levitt and Adelman (2010) investigated the use of role play in an online Baccalaureate program to teach nursing theory. To participate, students dressed up as various nursing theorists and conversed with other students who portrayed the roles of those theorists. This content and manner has received overwhelmingly favorable feedback from students, who have expressed their excitement and interest in the course. After the course was over, students were still interested in nursing theory. In the teaching and learning process, effective instruction is essential.

It was found that Iranian nurse educators and students had differing views on the efficiency of university-based programs in education. The researcher identified particular teacher behaviors that contribute to student accomplishment, and advised better and more complete measures of teaching effectiveness to be developed by the researchers.

2.3.2 Using a Student-Centered Approach to Teaching

There has been an increase in the need to encourage a more student-centered approach to education all around the world. To say that a lesson is "student-centered" means that students' techniques are valued and effective solutions are taught based on their understanding, with an emphasis on making connections between what students have learned. Students in mathematics are given the opportunity to actively participate in their own education. To get pupils to actively participate in their education, we must rethink our teaching methods. A stronger emphasis on student-centered education and more rigorous testing of educational materials are two of the goals of this initiative (Owo & Ikwut, 2015). When students engage in higher order thinking and active learning, pedagogical changes follow suit. Students discuss more than listen and develop their own talents rather than simply receiving knowledge (World Bank, 1999). As a result, pupils learn to take ownership of their own education.

Some instructors, according to Bruffee (2019), are favoring instructional techniques that encourage students to take an active role in their own learning and knowledge generation. For the past fifteen years, renowned Swiss psychologist Jean Piaget has studied how toddlers learn. Child-centered education has been firmly established in schools thanks to his views of learning. He showed how a newborn picks a play block to demonstrate an underlying pattern in all learning. Even in adult education, this process is evident.

According to a poll conducted in the pilot district, only three out of the four components of the ASEI lesson had been implemented: the student-centered one was absent. According to a number of studies, student-centered education in the classroom is a problem and far from ideal. The domineering teacher, hushed students, and chalk and talk are still used to depict classroom reality. Attempts to integrate learner-centered education in the classroom in Sub-Saharan Africa were far far from the ideal in the classroom. As a teacher, you are seen by society and culture as a source of knowledge and authority, which has a negative impact on your pupils' perceptions and attitudes toward you. It will take time for the public's opinion of classroom behavior to shift, according to (World Bank session paper, 2018).

There appears to be a discrepancy between the curriculum's meaning and instructors' understanding of the term "leaner centered" in South Africa. Both South Africa and Namibia misunderstood the significance of group work as a symbol of the learner-centered educational revolution. However, teacher-centered education has not changed as a result of placing students in groups for group projects. Rather than focusing on the spirit and content of concepts, teachers in SSA tried to implement a learner-centered approach. Students' involvement and participation in the teaching and learning process was viewed more in terms of procedure than as a means of enhancing learning. What was originally meant to be a student-centered activity is actually a series of muscle-based exercises (World Bank Working paper, 2018).

The vast majority of students do not participate in class in a way that is consistent with the educational ideal. Numerous comments and observations about students' experiences with curriculum reforms and the few studies that have been conducted indicate that students have difficulty adjusting to their new roles. It was not until 1940 that student-centered instruction was introduced into the classroom in the United States, and only 25 percent of schools in New York were able to successfully implement it after eight years of effort. Teacher knowledge and practice gaps, general misunderstandings of what it means to be learner-centered, resulting in implementations without the intended learning, limited instructional time, insufficient physical facilities, an overcrowded curriculum, inadequate staffing and insufficient curriculum support materials were cited as reasons for why this gap continues to exist (Struyven & De Meyst, 2010).

2.4 The instructional materials

One of the ways to accomplish specific educational goals is through the use of instructional materials. After the materials are chosen, thorough preparation is required before any further preparation can begin. A teacher has access to a wide range of resources that go beyond the textbook. Textbook supplements and other suggested textbooks from other publishers can also serve as useful resources to students. There are options for the school to add more charts, software, and videos. Subject-specific, grade-specific course goals and a very complete curriculum plan are included in government-approved curriculum guides. Instructive software and videotapes are examples of recommended educational resources.

Mental models, theoretical models, and other types of models are all employed in educational materials, according to Onasanya (2014). Due to the nature of knowledge and the process by which knowledge is acquired in many fields, these models have a specific pedagogic value in science and technology education. Models of natural or man-made structures or systems are built of material things that are meant to highlight and explain or depict the structures, functional processes, and linkages in the original. In order to gain a better understanding of how the physical world works and the factors that contribute to it, concrete models are built (Onasanya and Adegbija, 2017).

According to Huang and Chang (2012), students' mathematical comprehension should not only be judged on the basis of their written work, but also on the basis of their demonstrations and oral interpretations. According to Hunt Nipper and Nash (2011), concrete manipulatives have various benefits. A few advantages of this approach were: trial and error, visual and kinesthetic breakdown of mathematical concepts, and active participation in the mathematics session (Hunt et al, 2011). Formal and informal mathematics can both benefit from the use of manipulatives (Boggan et al., 2010).

Learning through exploration with real-world objects can have a positive impact on students' development if teachers know how and when they can use manipulatives effectively. When teaching math, students who use manipulatives outperform those who don't (Driscoll, 2018). Mathematics manipulative can both be commercial and teacher-made. An important aspect in teaching youngsters about abstract concepts and symbols is the use of manipulatives. According to Heddens (2016), as all mathematics is

grounded in reality, the real world must be represented mathematically in order to be calculated. Concrete teaching resources such as geometric rods and geo board, among others, should be used to aid pupils in constructing geometric ideas. Students' personal mathematical knowledge is aided by the teacher's ability to assess and address their requirements as they build their own personal mathematical knowledge.

To achieve their academic goals, students require suitable learning and teaching resources. Students' academic performance is considerably aided by the use of teaching and learning materials such as textbooks, stationery, practice books, and teaching aids (Muindi, 2011). Academic success is largely dependent on the effective application of the resources students have at their disposal, such as textbooks, exercise books, and classrooms (Otieno, 2010). Math achievement in Puntland province, Somalia, was investigated by Salad (2015). According to him, teaching and learning aids such as books, charts and calculators have an impact on students' success on arithmetic tests. It was discovered that these services were lacking in the schools tested, a factor that had a substantial impact on the low math outcomes. Students use workbooks to complete follow-up exercises. When it comes time for the teacher to check homework, students can choose from a variety of tasks and workbooks (Achoka, 2013).

It is possible to use slides and overhead transparencies as well as computer-generated presentations to create graphics that may be projected onto a whiteboard or a wall. Non-projected products like graphic materials, still photos, maps, DVDs, and videocassettes can sometimes feature visual presentations in addition to audio ones; this is especially

true for items like these. Visual aids that are not projected include: chalkboards, multipurpose boards like white boards, bulletin or display boards, graphic materials (graphics, charts, graphs), posters, and cartoons; still photographs, postcards, illustrations from periodicals and books; flip charts commercially prepared or blank; maps and globes, models, and regalia; and other non-projected visual aids (Achoka, 2013).

Both teaching and studying require specialized equipment, which includes everything from calculators to sophisticated machinery. Chalkboard; most students find it difficult to think when they are copying material. Students need time to reproduce what is on the chalkboard. It is recommended to use the chalkboard for important textual content. It is possible to improve training with the help of instructional technology. Using them can be a bridge between the abstract world of the textbook and the real world. They can be paused to debate significant events as they happen. Recording students' classroom presentations gives them the opportunity to observe themselves in action and learn from their mistakes (Adewoye, 2017).

According to Buba (2013), a survey of social studies teaching resources in schools found that either written nor audio-visual materials were available in sufficient quantity or quality in the majority of instructional settings. Only a few institutions listed these resources as available, and they were in terrible shape. These resources must be increased at a rate commensurate with the growth of kids if students are to study mathematics effectively. The safety of pupils might also be jeopardized by

overcrowding in classrooms and laboratories. Students may become discouraged and opt to leave school if they are too crowded or do not have access to the fundamental resources they need to succeed academically. There is a huge deal of expected learning in biology that does not occur in our schools because of the absence of instructional tools and the ineffective use of proper teaching materials (Adeyeabe, 1993, and Nwagbo, 2018).

In underdeveloped countries, school facilities have proven to be a significant factor in academic success. Hyneman and Jamson, (1980) found that the availability and effective use of the laboratory and the library are critical to student success in the KCSE. According to Eshiwani et al, (1985), schools with these resources outperform those without them on standardized tests. GOK (1988) also recommends ways to make best use of current facilities and staff in educational and training institutions in its report on the next decade and beyond on education and manpower training. Based on psychological principles of learning, Rao and Ravi (1992) say that instructional materials are crucial because they can help students learn if used correctly. This encourages students to participate actively in the learning process and provides a wider range of options for disseminating ideas and knowledge. School administrators have found that children are more likely to succeed if they are in an environment that encourages them to learn. Architects have the ability to create buildings that are more secure and safe. Schools that are either newly constructed or recently remodeled can benefit from more energy-efficient HVAC and ventilation systems, for example.

Schools that are well-designed deliver a powerful message to children about the importance of education in their community.

2.5 Teacher Characteristics

2.5.1 Teacher Effectiveness

Teachers can have a huge impact on a student's academic success, yet their effectiveness varies widely (Rokoft, 2014). The majority of teachers in schools are undeniably capable, caring professionals who are dedicated to meeting the needs of their pupils every day. There is a lot of evidence that great instructors can lead all pupils to learn, regardless of their socioeconomic status or lack of parental involvement (Stronge, 2010). If most teachers are effective, does it make a difference whether or not a few of them are ineffective? "One ineffective instructor has an enormous impact on many pupils over time, so yes, it does matter a great deal. Teachers are accountable for ranging from 20 to 201 pupils each year depending on the school size, class size and school level. It's reasonable to assume, based on these estimations, that an incompetent teacher will lower student achievement and hinder their learning for the duration of their career (Chart, 2010).

Numerous issues arise when students are forced to deal with inadequate teachers in a hostile learning environment, and some of the most vivid and lasting memories children have are the results of such experiences (Wally et al, **201**2). This can be done by a lack of interest for the subject, a harsh or improper behavior towards the students, a failure to maintain order in class and/or unfairly preferring some pupils to others. At this point,

it is critical to accurately describe the characteristics of ineffective educators so that they can be identified and either improved upon or reprimanded for their poor performance in the classroom. In many countries, like Kenya, low academic achievement among primary school students makes identifying ineffective instructors a valuable endeavor.

As an example, take the low quality passes in Migori County, where almost a third of the candidates had them. Ineffective instruction is one of the primary causes of this poor academic performance in mathematics, according to research. Educators are certain of one thing: nothing can increase student achievement as much as having qualified professors on the faculty. Scholars have studied the qualities of effective teachers and found that they include, for example (Tucher and Hindana, **201**4), that effective teachers are well-versed in their subjects, concerned about their students, fair and respectful to students, have positive attitudes toward teaching as a profession, are sociable in class, and motivate their students.

Effective instructors, according to Okpalaand Ellis (**201**5), are kind, encouraging, approachable, eager, courteous, knowledgeable, empathic, passionate, and have a sense of humor. Studying the characteristics of effective and ineffective instructors was the focus of (Walls et al, **201**2) qualitative research. Okpala and Ellis and Stronge et alresults .'s on the characteristics of effective teachers are in line with their own. Their research revealed five characteristics of unsuccessful teachers: partial treatment of

students, a lack of organization and resourcefulness, the inability to encourage student inquiry, and an authoritarian approach in class.

According to a 2017 study by Haydon primary school students were polled about what they thought made a good teacher. According to him, the following eight attributes are present in a teacher: they are open and friendly with their students, knowledgeable about the subject, able to explain things clearly, interested in the subject, and able to prevent other students from disrupting the session. Hesborn et al, (2010) in Moi University examined the 20 characteristics of ineffective teachers identified in their study and found that some of these characteristics can be eliminated administratively in schools, such as wasting students' time and injuring students by wearing inappropriate clothing in the classroom.

2.5.2 Motivation

Motivation, according to John (1983), is the amount of effort that individual puts forth in pursuit of a specific objective. According to Chaille and Britain (1997), most youngsters arrive at school eager to learn. A teacher's greatest challenge is therefore to cultivate and strengthen this inclination, so that students leave school with the drive and capacity to continue their education in the sciences. Learners will not be able to gain the scientific information and abilities essential for meaningful conversations on issues with a mathematical emphasis without developing favorable attitudes toward mathematics. When it comes to acquiring information and abilities, we must shift from absorbing

facts to using what we've learned to solve new issues. Motivation, cognitive engagement, and conceptual change are all linked, according to Nelson (**201**0). Motivation is an essential part of learning, and it has a significant impact on student success.

There are numerous benefits to incorporating multimedia (MM) into classroom instruction, including decreased learning time, decreased instructional costs, increased instructional consistency, improved student mastery learning, improved retention, improved safety, increased motivation, and increased student accessibility, since instruction is not restricted to specific classroom times. Lessons are more memorable and lasting when they involve students in an active learning process that encourages communication, appeals to the sense of sight while also providing a concrete basis for grasping abstract concepts like deficiency and deficit concerns (Staylor ,**201**2 , Kellerman,**201**4).

Line film, video-conferencing, 16 MM projector film, video disk, and satellite have been offered as a result of the urgent need for new educational technology in recent years (Akaninwor,1999) The equipment and program for MM are always evolving, and the range employed will vary depending on the workplace, according to Samaras, Gouvanakis, Bonsiour, and Tarabanns (**201**6). Among the possible components are desktop and laptop computers, software developers and power point, televisions and video cameras, microphones/amplifiers, CDs/DVD-ROM burners, CD scanners and digital cameras. Various teaching approaches, tactics, and media are demanded from the

teacher in the classroom. According to Effabo, education becomes more appropriate when lectures are supplemented with examples, demonstrations, and visual presentations (1996). Cognitive-perceptual philosophy is prevalent among the majority of MM practitioners. Students are encouraged to use their multiple senses in order to counteract "Verbalism" in the classroom by using synchronized M. In a study examining the impact of synchronized multimedia on biology students' motivation and performance, Nkwekeet found that students' motivation to learn and their academic performance were both improved.

Students' interest in learning is believed to be piqued when MM is used in the classroom. When it comes to schooling, motivation is a crucial factor. Okoroma (**201**0) agrees that motivation is a key variable in stimulating learner interest and reinforcing the process of learning. Students are more engaged in the learning process when using visual, auditory, and synchronized MM, according to Morris (**201**4) and Aggrawell (**201**7). Motivated students are eager to learn and eager to put in their best effort. Staylor (**201**2) agrees with the sentiments expressed above, but he adds that MM products must be produced or purchased in accordance with MM design principles in order to pique and maintain students' attention.

As a result of this study, the experimental group in biology performed better academically than the control group when they employed MM materials such as VCDs and televisions to synchronize a lesson presentation. It is congruent with Ijhedo's findings in this regard (1995). The use of MM in teaching and learning provides both

auditory and visual signals or information that appeals simultaneously to the senses of sight and hearing. What they learn gives students a sense of realism. Among other realistic efforts, (Onyegegbu, **201**6) and Hoska (**201**9) conclude that the equipment, when used in the instructional delivery process, motivates students' interest in learning and has positive effects on their academic performance. This can save our children from many frustrating situations.

People that are motivated are better able to deal with failure and keep their actions focused on accomplishing a certain objective (Geory and Hamson, **201**7). Those who show an early interest in arithmetic and a favorable attitude toward it are more likely to pursue a career in science. Teachers of science must know how to use motivational strategies in their classroom interactions in order to keep students interested in classroom activities. Mathematicians must also know how to use motivational strategies in their classroom interactions. Goods and Brophy (1980) highlighted that some psychologists believe that certain persons are more motivated to succeed than others, resulting in a disparity in accomplishment. As achievement becomes increasingly important to them, they reevaluate how they spend their time and energy. Three elements were proposed by Atkninson (1964) to explain the inclination to pursue an achievement goal: the need for achievement or the motivation for success, the likelihood of success, and the value-added incentive to succeed in the endeavor.

Fear of failure can also be sparked in an achievement-related setting. According to Atkninson's idea, the strength of a person's tendency to approach and avoid a task

determines their drive for achievement. When it comes to Atkinison's idea of accomplishment motivation, success or failure leads to task selection. Achievement goals and "I wish to attain" are both included in the statement. In the words of Weainer (1972), Individuals who have a high level of resultant achievement motivation are more likely to be motivated by failure, whereas those who have a low level of resultant achievement motivation are less likely to be motivated by success.

There is a strong correlation between eight-grade accomplishment and motivational variables and instructional time (Sighet al, **201**2) according to the research findings of Fraser, Walbera, Welch and W. Students' motivation and academic achievement have been shown to be moderated by school type in several studies. Study findings and comments on findings tend to indicate that more students choose single secondary schools in terms of students' accomplishment than mixed schools, according to research findings and comments on findings.

Aiaia, Patrick, Emperor K.Pangban, and Onweuabu Okechukwu Chibueze conducted research for the Delta State University Department of Science Education. According to Abraha (**201**7), in Nigeria motivated students outperform uninterested pupils on a post-assessment test. The large accomplishment gap between highly motivated and lowly motivated pupils in mathematics suggests that the former has a major impact on the latter. The findings show that motivation has a significant impact on text sore. Students are inspired by the words they hear. The material reviewed in this section has

underlined the importance of increasing one's motivation in order to achieve greater academic success.

2.5.3 Attitude

In the words of Atzie and Fish (1995), "attitude" refers to a person's general impression of a stimulant. Our attitude toward a task or the people with whom we work has an impact on our output when we are engaged in that endeavor. Having a good attitude will allow you to keep going even in the face of a variety of obstacles. One of the factors that contributed to the low competence of secondary schools in science was the unfavorable attitude toward teachers and students that instructors and students had toward each other (Smasse Project, 2018). It turns out that, according to the findings of the Smasse study, science is perceived to be particularly challenging by some teachers, students, and other critical stakeholders. Many factors contribute to this sentiment, including a lack of success in national examinations and students' belief that focusing on courses they won't pass is a waste of time. Two psychologists' research, Birch and Veroff, back up this claim. Anxieties about a favorable outcome urge people toward action, while worries about a bad consequence stall or even stop them.

Depending on how the instructor views the material, the way they deliver it or show it can have a significant impact on how students learn. In Bashora's (2014) study, many teachers struggle with the topic of whether material or teaching methods are more effective for students' learning and education. As a result, teachers developed attitudes about the material and their perspectives on it changed. In their 2010 report, the

National Council of Teachers of Mathematics found that teachers who were well-versed in their subject matter were able to provide students with in-depth explanations, make connections between prior courses and new material, and inspire students to do well in math class.

If a math instructor has a good grasp of the subject matter, he or she will be able to break down the syllabus into manageable chunks, making it easier for students to comprehend and follow the teacher's instructions. Motivation has a significant impact on text scores, according to the findings. Students are inspired by something unique. In order to achieve higher levels of performance, the authors in this area have underlined the importance of being motivated. People's inclination to respond in a certain way to a stimuli is a good indicator of their attitude toward something or someone. Attitudes are formed by our experiences in the world around us, just like habits. Students' attitudes influence what they learn and how eager they are to study. We can't learn anything if we have a negative attitude, and curiosity is a major inhibitor of our ability to learn (Kimeron, 2010)

Students were more eager to learn when they thought the material they were studying was fascinating, engaging, significant, and relevant, therefore they were more likely to engage in the learning process. Having a good attitude about a subject is linked to better performance, according to Wills (2010). Secondary school students and instructors in Kenya have consistently struggled with math and science, according to research conducted by certain important stakeholders (Nui & Wahome, 2016). According to the

findings of this study, one of the most important factors influencing performance is one's attitude. Students' attitudes were found to play a significant effect on their performance by Indoshi and Othuon (2011), in agreement with Manoah. Students with positive attitude tended to score well in a test which was a sign that it was a highly essential aspect in the Mathematics curriculum. The literature on the importance of attitude in education revealed that it was a critical determinant of how well a curriculum, particularly in mathematics, is applied in educational institutions.

Learners' attitudes and degrees of science anxiety might be influenced by their professors' expectations, according to Mwiria (2012). At the first meeting between the teacher and the students, biology altitude is established. Biology students' academic success is largely determined by their ability to develop relationships with their peers. Students' attitudes toward learning biology may be negatively influenced by teacher authoritarianism and impersonality; on the other hand, democratic and personal interactions between teachers and students in the classroom can excite a positive attitude toward learning biology. The teaching methodology and the teacher's professional skills and practice may be dependent on the level of science an individual student is familiar with.

Teachers that are dissatisfied with their jobs are more likely to have a negative impact on student performance in biology because they are less efficient and more anxious. A student's unfavorable feelings toward mathematics may be exacerbated by a teacher's lack of enthusiasm for the topic, which could lead to the development of a fear of

mathematics in the student's heart. Instructors' perspectives, instructional methods, classroom relationships, expectations for students' performance, and teachers' anxiety levels were all factors in the performance of Kenyan primary school pupils in mathematics. The literature review part emphasizes the importance of changing one's attitude toward mathematics in order to achieve academic success.

2.6 Student Performance in Mathematics

All aspects of human life are affected by mathematics in some way. In today's society, mathematics is regarded as the bedrock of scientific and technological knowledge, and as such is critical to a country's social and economic progress. Eraikhuemen (2013) posits that a disciplined and ordered pattern of life can only be achieved through a culture of mathematics because of the wide range of applications of mathematics.

From country to country, there are differences in the quality of math education. In the United States, Singapore, and Chinese Taipei, student achievement has improved over time, but the results are still different (2013). Anxiety, motivation, social attitudes, and cognitive ability all play a role in students' ability to do well on math tests. This ability can be seen in their ability to answer questions orally. Students' poor mathematics performance can be attributed to a variety of factors, including a negative attitude toward school and learning, discrimination at home, and issues specific to the school itself (Banerjee, 2016).

Students' math abilities have varied widely across countries and continents. Despite its importance to students' education, this subject's performance has been consistently

poor, as evidenced by the subject's low global mean score. In Puntland, Somalia, for example, students in form four were found to be underachieving in math between 2017 and 2010. Education Minister and Africa Educational Trust convened an investigation in 2011 in order to determine what was behind poor math performance. Students' attitudes, inadequate textbooks, and a lack of teaching resources are just a few of the causes of poor math performance, according to the findings. When compared to the number of students who scored above average, the majority failed to meet the passing standard.

To make it easy to compare students' test scores from different countries, the TIMSS reports have been developed. International Studies, for example Mathematical achievement in Britain is significantly lower than in many other countries, according to Mullis, Gonzalez, Conner, Chrostowiski, Gregory, and Smith (2011). International studies consistently rank Pacific nations higher than the United Kingdom, Hungary, the Netherlands, and the United States, according to a new report (Mullis, Gonzalez,Conner, Chrostowiski, Gregory, and Smith, 2011).

Among the possible causes of a student's lack of success, the answer is that the organization of mathematics in the United Kingdom differs from that in other nations. The fact that students in Kenya continue to perform poorly in math has prompted the establishment of a committee to look into how the subject is taught in classrooms, according to (2017). The committee found that teacher talks and student consolidation of work were the two most common features of lessons observed in most mathematics

classrooms; other critical aspects of teaching were missing. Fourth-graders in the United States performed exceptionally well on the TIMSS tests in 1995, according to reports.

After eighth grade, in 1999, they had sunk to the average level of achievement. US students, according to the findings of Robert and Joanne, (2017), do not hold onto the advantages they gain in elementary school. Teachers in the United States emphasize drill and practice, and students said they completed worksheets and exercises from their textbooks. To deal with numbers and quantitative concepts, Math has been taught this way for most of US history. Mathematical educational reforms instituted by the NCTM in more recent times have produced principles and standards for the subject in educational institutions nationwide (NCTM). A number of initiatives have been proposed to improve the performance of US students in mathematics, citing evidence from national and international assessments.

Students in Japan consistently score exceptionally well in subjects like mathematics and science, according to an international achievement study. The second international study of mathematics achievement found that eighth graders in Japan answered 62% of test items correctly on average, compared to 45% in the United States. Unemployment and social issues in Japan are becoming more prevalent, but the Japanese government continues to place a high priority on education and training for its citizens. Japan's national policies encourage a far greater number of people to participate in science and mathematics education than would be expected.

Students' performance is influenced by the amount of time they have to learn and the amount of opportunity they have. Opportunities to learn' in mathematics include scope of material, method of teaching, and match between new material and students' prior knowledge. Numerous studies have shown a direct link between a student's ability to learn mathematics and the amount of time they have to do so. It is also found in subsequent international studies, such as the Second International Mathematics Study (SIMS) and the Third International Mathematics and Science Study (TIMSS) (Mullis et al, 2011). In international studies and in NAEP assessments, important Mathematical outcomes have been measured and a wide range of Mathematical topics have been covered. Researchers can use this data to examine the importance of learning opportunities as a factor in student Math achievement (World Bank, 2015).

Total time and achievement have a positive relationship, as one might expect. This study found a strong correlation between the amount of time spent teaching mathematics and students' math achievement across all of Australia's states. Students are still spending only a small amount of time in the Math class, despite the findings of this research. Twenty percent of eighth-grade students received less than 30 minutes a day of mathematics instruction in 1996, according to Grouws and Smith's analysis of data from the National Assessment of Educational Progress (NAEP) Math study.

After adjusting for students' home backgrounds, the NAEP in Math found that a student's ability to perform in mathematics was best predicted by the number of advanced mathematics courses they had taken. SMASSE, a joint effort between Kenya's

Ministry of Education and the Japanese government's JICA, may have been conceived as a means of improving classroom practices and ensuring that students receive a quality education.

2.7 Summary of Literature Reviewed

Many researches have been done on pupils' performance in line with institutional factors, in search of failures of pupils in their final examination despite the presence of the resources. Like Darling-Hammond, 1999; Darling Hammond, Berry, & Thorenson, 2001) and others (Goldhaber & Brewer, 2000) clearly argue that pupils of teachers who hold full certification achieve similarly to those who study under teachers with temporary, "emergency" credentials. Therefore this study argued the same after analyzing information given in Migori County where the percentage of the failures in mathematics is high.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter entails the research design and methods that were used in the study to address the research objectives. It gives the description of the research design, study location and target population, sampling techniques, research instruments, scoring, piloting, validity and reliability of research variables, data collection and data analysis procedures.

3.1 Research Design

The study adopted mixed methods, descriptive research design. Calderon (2016), defined descriptive research as a purposive process of gathering, analyzing, classifying, and tabulating data about prevailing conditions, practices, processes, trends, and cause-effect relationships and then making adequate and accurate interpretation about such data with or without or sometimes minimal aid of statistical methods. Also, this method ascertains prevailing conditions of facts in a group under study that gives either qualitative or quantitative, or both, descriptions of the general characteristics of the group as results.

3.2 The Study Location

The study was conducted in public primary schools in Migori Sub-County, Migori County. Migori County is a county in the former Nyanza Province of southwestern Kenya. It is located in Western Kenya and borders Homa Bay to the North, Kisii to the North East, Narok to the East and South East, Tanzania to the South and South West and Lake Victoria to the West. The capital is Migori town which is also its largest town. Migori, the capital of the Migori County, has latitude of 1°4'14.51"S and a longitude of 34°28'30.98"E or -1.070698 and 34.475272 respectively. The county has a population of 917,170. Migori County is perhaps the most diverse in Nyanza after Kisumu. The inhabitants include Suba-Luos, Luos, Kuria, Kisiis, Luhya, Somalis, small pockets of Indians, Arabs, and Nubians. Migori town serves as an important link between Kenya and Tanzania and the second most viable commercial center in Luo-Nyanza after Kisumu. Other major towns in MigoriCounty include Kehanncha and Isebania in Kuria District. The main economic activities include agriculture, fishing, manufacturing and mining. There is some small scale gold mining carried out in the country. The county also sees some limited commercial activity, mainly small and micro-enterprises in the Jua Kali sector. These include auto mechanics, furniture works, tailoring, welding, trade and agriculture. Agricultural activity is carried out in areas such as Ngege, Oyani and Anjego. There is a National cereals board depot in Migori Town the area consists of both rural and urban areas where majority of the public primary schools are in rural area. The Sub-County has120 public primary Schools. The area is appropriate for this study because despite the general availability of learning and teaching resources in

teaching of mathematics, the region still performs poorly. There was also no similar study which has been carried out in the county.

3.3 Target Population

The target population is the group of individuals that the intervention intends to conduct research in and draw conclusions from (Draugalis & Plaza, 2019). The target population comprised of head teachers, mathematics teachers and pupils between standard four to eight from all registered public primary schools in the district totaling to 120 head teachers of the 120 primary schools in the Sub-County. The target population included 960 teachers and 24000 pupils (Migori Sub- County Education office, 2014). The target population was selected as they are the main factors that manipulate pupils' performance.

3.4 Sampling Procedure and Sample Size

According to Kothari (2000), edited by Bodnar, Namieśnik, and Konieczka (2013) selection of a representative sample from a population using any random sampling design is done using the criteria; for a population of less than10 sample size is 100%, more than 10 but less than 100 respondents to employ a sample size of 30%, a population of over 100 to employ a sample size of 20% and less than 500, 30% for a population more than 500 but less than 1000 and for a population of over 10,000 to employ a sample size of 1%.The study therefore selected 24 head teachers, 288 teachers and 240 pupils.

Simple random sampling was used in this study to select a representative sample of schools since this sampling gives the same chance to each unit of the population of being selected. The respondents were categorized into head teachers, teachers and pupils. From each group, the respondents were also sampled randomly. Simple random sampling was used because it ensures that each member of the target population has an equal and independent chance of being included in the sample as it produces a random sample.

Table 3.1: Sampling Frame

Variable	**Target Population**	**Procedure**	**Sample size**	**Sampling**
Head teachers	120	120x20%	24	Simple random
Teachers	960	960x30%	288	Simple random
Pupils	24000	24000x1%	240	Simple random
Total	25080		552	

Source: Migori Sub- County Education office.

Sample size =552

3.5 Research Instruments

Qualitative and quantitative data collection techniques were used in this study. The two methodologies are complementary, each contributing to a better understanding and interpretation of the data generated and to the ultimate findings. Furthermore Warwick and Linger (1995) observe that researchers prefer using methods that provide high accuracy, generalizability and explanatory power, with low costs, rapid speed and

maximum management demands and administrative convenience. Based on these, a combination of the following research instruments was used in the study.

3.5.1 Questionnaire

Questionnaires were administered by the researcher to all the sampled respondents(see appendix B and C). They included both open ended and closed ended questions. The open ended questions were used to collect qualitative data while quantitative data was collected using closed ended questions. The first part section A of the questionnaires sought the demographic information of the respondents while sections B, C and D sought information with regard to the study variables. They were preferred because they can be used to gather data quickly from geographically dispersed sample population. They were also deemed appropriate as many respondents can be reached (Borg and Gall, 1983). They are economical in terms of time, effort and cost. The main disadvantage of questionnaires is that they are characterized by low rate of return of the dully filled in questionnaires when mailed (Kerlinger, 1986).

Further the study collected data on the influence of teacher pupil ratio on performance through classroom observation forms which was assessed in three years to analyse the trend of performance in relation to the teacher ratio.

3.5.2 Scoring

The research adopted a five-Likert scale questionnaire which was rated in a scale of 1 to 5 which made it easy to measure the influence of institutional factors on performance of

mathematics. **E**ach of the items were measured in a likert scale of 1 to 5. Strongly Agree represented by 5, Agree-4, Undecided-3, Disagree- 2 and strongly disagree-1. Means was rated between 1 as minimum scores to 5 as maximum scores. The researcher made sure that the statements are within the stated scores in all the objectives.

3.5.2 The Interview Schedule

An interview schedule was used to collect qualitative data from the head teachers (Appendix D). The schedules provided the researcher with greater opportunity to explain the purpose of the study (Kothari, 2009) and the items in the interview schedule sought information on the influence of selected institutional factors on performance of mathematics in Migori Sub-County. Open ended items were used in development of the interview schedule to avoid limiting respondents' response and to facilitate guidance and probing for further clarification. This method was used because it offers the possibility of modifying one's line of inquiry; allowing in-depth analysis and can be adapted to the ability and educational level of the respondent thus avoiding misinterpretation. The presence of the interviewer on the spot may over stimulate the respondent sometimes giving imaginary information just to make the interview interesting (Kothari, 2009).

3.6 Piloting

Gay (2003) observes that it is highly desirable to run a pilot test on questionnaires and to revise it based on the result of the test. Before the actual study, piloting was carried out in six schools from Rongo Sub-County that were not involved in the study. The area

was chosen because it was neighbouring Migori Sub-County and had similar characteristics. Piloting was meant to establish whether the instruments are relevant for data collection, identify any problems likely to occur during the actual data collection and check if the instructions in the questionnaire were clear to the respondents.

Pilot testing was conducted in order to detect any deficiencies and difficulties that respondents are likely to face when responding to the items. The purpose is to establish if any questions are likely to make respondents feel uncomfortable and to make sure that all the participants in the sample understand the questions in the same way. Moreover, the researcher was able to find out how long it would take to complete the survey hence regulate it. The findings of the pilot study were used to determine the validity of the research instruments.

3.7 Validity and Reliability

3.7.1 Validity

Validity refers to the correctness and soundness of results of conclusions reached in the study (Kothari, 2009). The content selected and included in the research tools must be relevant to the variables being investigated for it to pass the validity test. Content validity of the instruments was determined by giving the questionnaire to my supervisors, colleagues in class and scholars in the Department of Educational Psychology, Moi University to carefully and critically examine and assess the relevance of the items to objectives of the study.

3.7.2 Reliability

Reliability of the instruments refers to the level of internal consistency or stability of the measuring instruments over time (Mugenda and Mugenda, 1999). Reliability of the instruments was determined after they have been pilot-tested among six schools from Rongo sub-county that did not take part in the study. Numbers were used to represent the responses choices, analysis for internal consistency was accomplished using Cronbach's alpha (Gay, 2003). Numbers were used to represent the response choices then Cronbach's alpha was used for analysis of internal consistency. A threshold of above 0.7 was achieved (see table 3.2) and therefore was acceptable for this study as recommended by Fraenkel & Wallen (2000).

Table 3.2: Reliability tests

Teacher/student ratio

Reliability Statistics	
Cronbach's Alpha	N of Items
.863	6

Teaching methodology

Reliability Statistics	
Cronbach's Alpha	N of Items
.747	6

Instruction materials

Reliability Statistics	
Cronbach's Alpha	N of Items
.867	15

Teacher characteristics

Reliability Statistics	
Cronbach's Alpha	N of Items
.866	5

3.8 Data Collection Procedures

The researcher sought for a research permit from the permanent secretary, ministry of education through the department of Education Psychology, School of Education, Moi University and thereby got clearance from the District education office. The head-teachers of schools sampled for the study were notified in writing.

3.9 Data Analysis

Data analysis was done using both descriptive and inferential statistics. Descriptive statistics involving frequencies, percentages and means and Standard Deviations (S.D) were used to analyze data. The descriptions of frequencies and percentages were used to find the quality of teaching methods employed by teachers. Inferential methods such as Chi-square tests were used to show the relationship between institutional factors and academic performance. The tests provided the difference between observed data and the findings. The analysis was done using the Statistical Package for Social Sciences (SPSS). The resulting data analysis from questionnaires was summarized and depicted in the form of frequency tables and bar graphs. The resulting data analysis from questionnaires and interview schedules was summarized and depicted in the form of frequency tables, bar graphs and pie charts.

Data collected from the interviews were converted into themes, then presented in narrative analysis. This method involves the reformulation of stories presented by respondents taking into account context of each case and different experiences of each respondent.

3.10 Ethical Considerations.

Ethical measures are principles which the researcher bonded himself or herself with in conducting his/her research. In this study, the researcher followed the following research ethics:

Permission to conduct the research*:* In this study, the researcher sought permission from the school of education and was issued with an introduction letter that was taken to the National council for science and technology. The researcher was then issued with a research permit from the ministry of higher education. The researcher presented the permit to the institutions where the research was carried out.

Informed consent***:*** Participants were given enough information pertaining the study before data collection on the aims of the study, the procedures that were followed, the possible advantages for the participants, the credibility of the research and the way in which the results were used. Those who agreed to sign the information consent went ahead to fill the questionnaires. Some disagreed and withdrew from the study.

Confidentiality and Anonymity**:** A researcher has to be responsible at all times and be vigilant, mindful and sensitive to human dignity. In this study participants' confidentialities were not compromised, as their names were not used in the collection of data. No private or secret information was divulged as the right to confidentiality of the participants was respected (Huysamen, 1994).

Anti-plagiarism was done to ensure that the work submitted is the original work of the researcher and has not been submitted to any other University for the purposes of research.

CHAPTER FOUR

DATA PRESENTATION AND INTERPRETATION OF FINDINGS

4.0 Introduction

This chapter presents an analysis of the data that was gathered using the research tools discussed in chapter three. First it presents and discusses the background information of the respondents and then the results of the study as per the study objectives such as To determine the influence of teacher/ pupil ratio, teaching methodology, adequacy of instructional materials teacher characteristics on performance in mathematics in primary schools.

4.1 Response Rate for subjects

A total of 288 questionnaires were distributed to the teachers. 254 out of 288 of them were positively responded to and returned, giving a response rate of 88.2% for the teachers, which are excellent for generalizations of findings (Peil, 2005). The pupil respondents had a response rate of 83.3%, 240 questionnaires were distributed to the pupil respondents, 200 of them were returned. According to Peil, (2005), a response rate of 70% and above is good for making generalizations for a study. The researcher managed to interview the 24 head-teachers

Table 4.1 Response rate for subjects

Target population	Sample size	Response rate	Percentage rate
Teachers	288	254	88.2%
Pupils	240	200	83.3%
Head teachers	24	24	100%
Total	552	478	

The study was therefore able to target 478 respondents in which 254 were teachers 200 were pupils and 24 were head teachers.

4.2 Demographic characteristics of the teacher respondents

The demographic information would assist in establishing if the information given by the respondents would be in any way related to the characteristics of the respondents. The respondents' demographics are presented in terms of gender, working experience, academic qualification and the teaching experience in the education profession.

4.2.1 Gender of the teachers

The researcher found it necessary to determine the gender of the respondents. The findings are presented in table 4.2 below:

Table 4.2 Gender of the respondents

Gender	**Frequency**	**Percent**
Male	114	44.9
Female	140	55.3
Total	254	100.0

As per the findings indicated in table 4.1 most (55.3%) of the teachers were female while the remaining 114 (44.9%) were male. The respondents were mainly female

implying that female teachers comprise a bigger percentage of the schools being studied in Migori Sub-County.

4.2.2 Working experience

Determining the working experience of the teachers was necessary to establish if it had any influence on the response of the study variables. The findings on the teaching experience of the teachers are presented in table 4.3 below;

Table 4.3Teacher Working Experience

Work experience	Frequency	Percent
1-2 years	26	10.2
3-4 years	8	3.1
5 years and above	220	86.6
Total	254	100.0

As indicated in table 4.2 the findings showed that majority of the teachers 220 (86.6%) had worked for 5 years and above, 26 (10.2%) agreed that they had worked for 1-2 years and 8(3.1%) had worked for 3-4 years, indicating that the respondents have worked long enough to influence the institutional factors on learning of mathematics in the areas of study.

4.2.3 Professional Qualification

The study sought to investigate the professional qualification of the teachers. The findings are presented in table 4.4 below;

Table 4.4Professional qualification

Professional qualification	Frequency	Percent
University	36	14.2
Diploma	36	14.1
P1	128	50.4
Others	54	21.2
Total	254	100.0

The findings indicated that majority 128 (50.4%) were P1 teachers, 36 (14.2%) were University and diploma teachers respectively and 54 (21.2%) had other levels of education in which most of them having KCSE, KACE and KCE academic qualification. Hence majority were qualified teachers indicating that the performance of the mathematics of the various schools were mainly influenced by educated staff and thus have the capacity to implement, monitor and manage the institutional factors influencing mathematics in the schools.

4.3General information for the pupils

The study sought to investigate the type of school in which the students are learning and the findings are presented below;

4.3.1 Type of school

A total of two hundred pupils responded. The findings indicated that majority of the pupils 60% (n=120) were in a mixed type of school (both boys and girls), 30% (n=60) were from a boys school and 10% (n=20) were from a girls school.

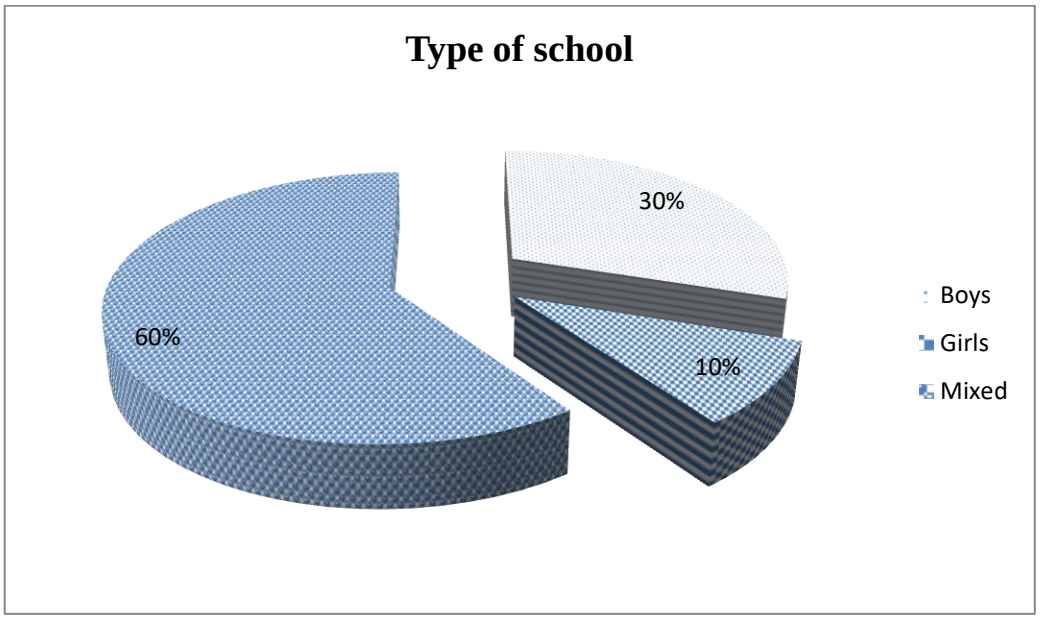

Figure 4.1 Type of school

4.3.2 Gender of the pupils

The study further sought to investigate the gender of the pupils and the findings are presented in table 4.5;

Table 4.5 Gender of the pupils

Gender	Frequency	Percentage
Male	120	60
Female	80	40
Total	200	100

The findings indicated that 60% of the pupils were boys and the remaining 40% were girls.

4.4 Data analysis and presentation (based on research objectives)

This part was divided into four sections for example Section A: Teacher pupil ratio, Section B: Teaching Methodology, Section C: Instructional Materials and section D: pupil attitude towards mathematics.

SECTION A: TEACHER PUPIL RATIO

4.4.1 The influence of teacher pupil ratio on performance in Mathematics in primary schools.

The first objective was to investigate on the relationship between pupil teacher ratio and pupils' academic performance of mathematics in primary schools. In order to understand the relationship between them the researcher collected data through pupil's achievement analysis sheets and classroom observation forms.

Table 4.6 teacher Pupil ratio

	Pupil teacher ratio	
Year	Pupil teacher ratio	Number of pupils who passed
2014	1:53	35
2013	1:66	22
2012	1:72	18

From the findings it is clearly indicated that there is a relationship between pupil teacher ratio and academic performance. For example the study showed a higher number of students who performed well in mathematics when the pupil teacher ratio was low and vice versa (table 4.6)

4.4.1.1 Number of pupils in class

The study assessed the number of pupils in class as adequate, many and too many. 50 Pupils and below were indicated as adequate, those between 50-100 were indicated many and those above 100 were too many.

Table 4.7 Number of pupils in class

Number of pupils in class		
	Frequency	Percent
Adequate	26	10.3
Many	140	55.1
Too many	88	34.6
Total	254	100.0

The study revealed that majority 140 (55.1) of the teachers noted that the number of children in their classes are many 88 (34.6%) noted that they are too many and only 26 (10.3%) of the noted that the children are adequate. From the findings it can be noted that from the schools studied majority of pupils in class were many that is between 50 and 100. From the pupil teacher ratio studied the probability of such class size to pass in mathematics is low therefore interfere with school mathematics performance.

4.4.1.2 Student Concentration in Class

The study further sought to investigate the rate of student concentration in class and the findings were presented in figure 4.2 below

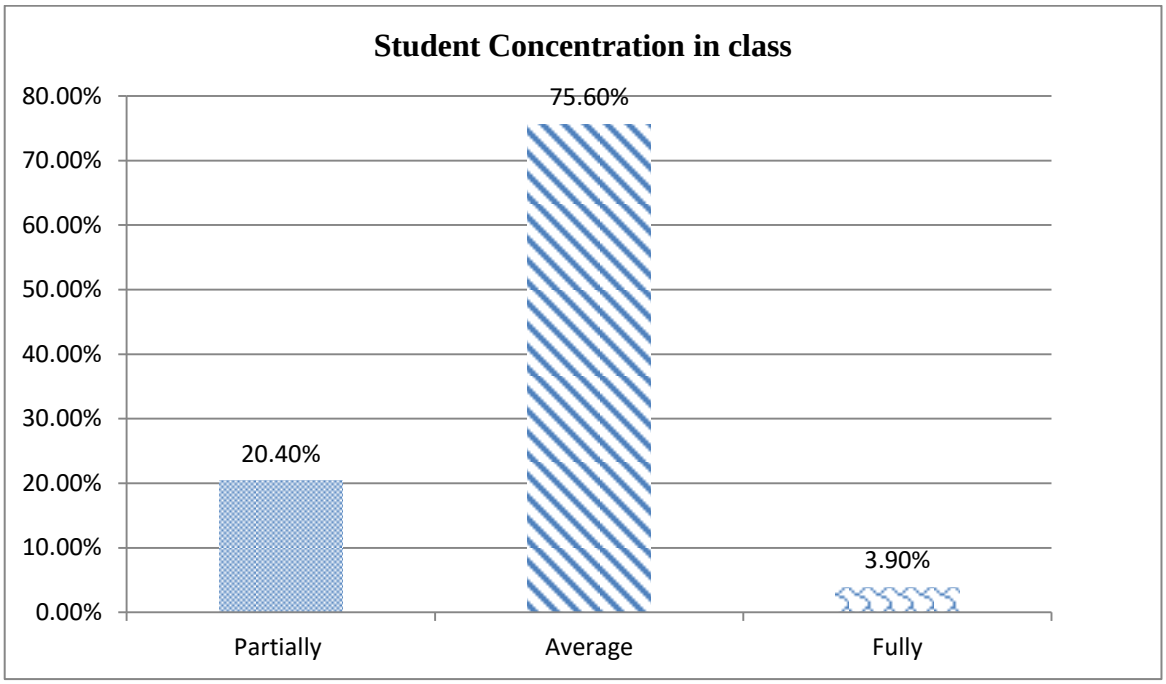

Figure 4.2 Student Concentration in class

The student concentration in class was highlighted by 192 (75.6%) of the teachers, 52 (20.4%) noted that student concentration was partial and only 10 (3.9%) agreed that students were concentrating fully in class.

4.4.1.3Frequency of students given homework

Teachers were asked how often they give their learners mathematics homework. Table 4.8 presents the findings.

Table 4.8 Frequency of students given homework

Homework	**Frequency**	**Percent**
Daily	104	40.9
Twice weekly	78	30.7
Once weekly	46	18.1
Once in two weeks	16	6.1
Once in a month	10	3.9
Total	254	100.0

The study revealed that majority 104 (40.9%) of the teachers give their learners mathematics homework daily, 78 (30.7%) noted that they give them homework twice in a week, 46 (18.1%) agreed that they give them once in a week 16 (6.1%) said that they give their students mathematics homework once in two weeks and 10 (3.9%) agreed that they give them once in a month.

4.4.1.4Rate of work Completion for marking

Teachers were also asked the percentage of work they complete marking their work. Table 4.9 presents the findings;

Table 4.9 Rate of work completion for marking

Complete work for marking	**Frequency**	**Percent**
0-25%	14	5.5
26-30%	34	13.4
51-75%	120	47.2
76-100%	86	33.9
Total	**254**	**100.0**

As depicted from table 4.9 majority 120 (47.2%) complete marking 51-75% of their work 86 (33.9%) noted that they complete 76-100% of their work, 34 (13.4%) complete 26-30% of their work while 14(5.5%) of the teachers agreed that they complete 0-25% marking their students work.

4.4.1.5 Descriptive statistics on teacher pupil ratio and academic performance

The study further sought to assess the respondents' jurisdiction on the effect of teacher pupil ratio on their academic performance. The findings are presented in table 4.10

Table 4.10 Effects of teacher pupil ratio on academic performance

Descriptive statistics				
Statements	N Statistic	Mean Statistic	Percentage mean	Std. Deviation Statistic
Smaller class sizes perform better academically	249	3.5382	70%	.91115
Pupils academic achievement depend on their hard work irrespective of class size	249	2.6707	52%	1.29670
Pupils in smaller class sizes have high concentration than many pupils in class	245	4.8122	96%	1.06618
Academic achievement largely depend on the teachers input to the pupils	249	2.0361	40%	.96444
Teachers find too many pupils in class difficult to manage hence lower academic achievement	249	4.7189	94%	.91211
Many pupils in class perform poorly due to limited resources e.g. text books	249	3.9639	78%	1.15820
Valid N (listwise)	245			

The study observed from the respondents that majority 96% (mean=4.81) agreed that pupils in smaller class sizes have high concentration than many pupils in class, 94% (mean=4.71) noted that teachers find too many pupils in class difficult to manage hence lower academic achievement, 78% (mean=3.96) agreed that many pupils in class

perform poorly due to limited resources e.g. text books, 70% (mean=3.53) of the teachers noted that smaller class sizes perform better academically, 52% (mean=2.67) agreed that pupils academic achievement depend on their hard work irrespective of class size and 40% (mean=2.0) noted that academic achievement largely depend on the teachers input to the pupils.

SECTION B: TEACHING METHODOLOGY AND ACADEMIC PERFORMANCE

4.4.2 Teaching methodology and academic performance

The study also sought to investigate the relationship between teaching methodology and the performance of mathematics subjects in their schools. Table 4.11 presents the findings

Table 4.11Effectiveness of teaching methodology used to teach mathematics

	Effectiveness of teaching methodologies			Total
	Teaching centered methods	Student centered method	Teacher student interactive method	
Not effective	0	16	30	46
Effective	12	42	115	169
Very effective	0	6	6	12
Total	12	64	151	227

The findings indicated that the teacher student interactive method was the most effective method as supported by majority of the teachers.

The teachers were further asked of the best teaching methodology for teaching mathematics in their respective schools. The findings are presented in figure 4.4;

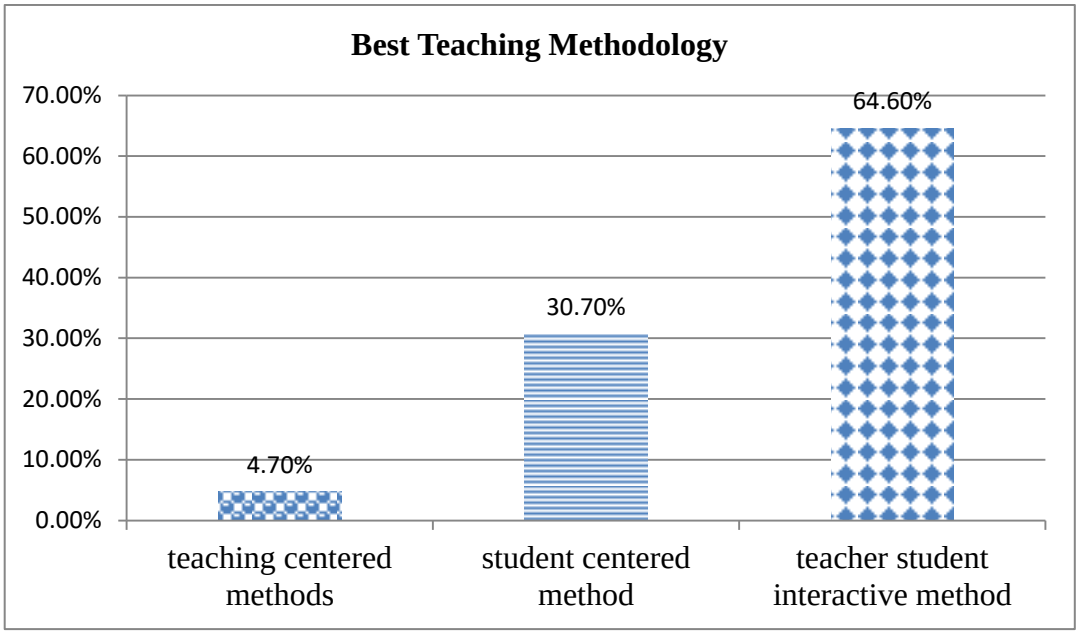

Figure 4.3 Teaching methodology

4.4.2.1 Pupil assessment test scores

The test results were categorically scaled as: [75-100%] = high; [50-74%] = moderate and [0-49%] = low.

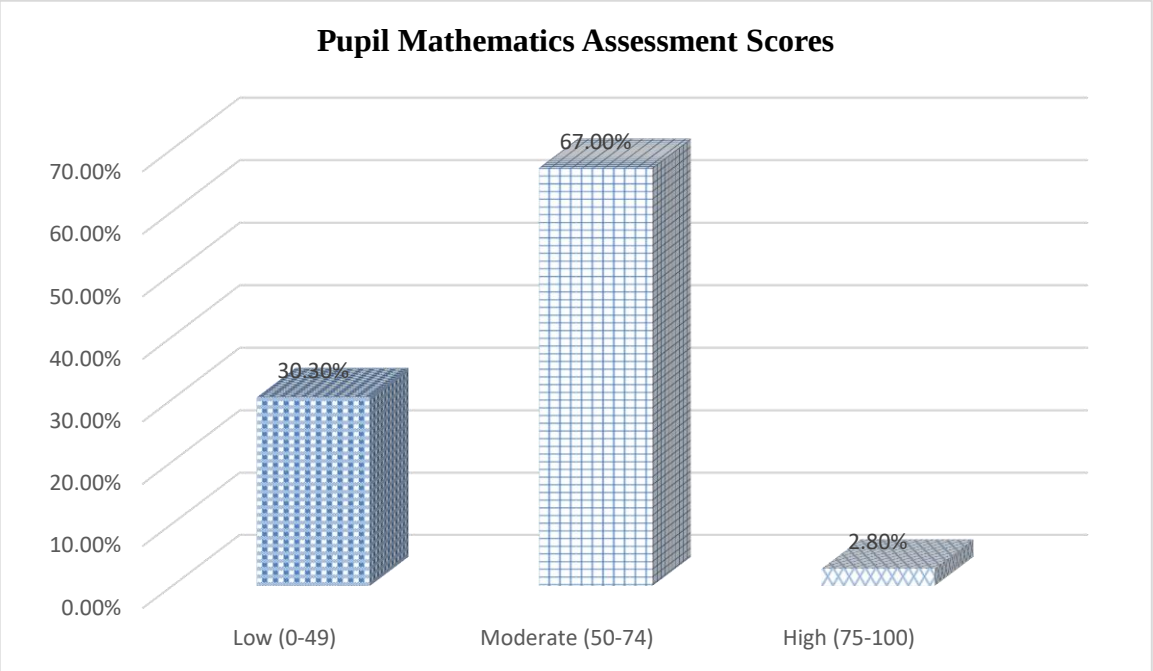

Figure 4.4 Pupil assessment test scores

4.4.2.2 Performance assessment test scores according to teaching method

On the best teaching methodology for teaching mathematics, the study compared the teaching methodologies with different levels of mathematics. The findings are presented in table 4.12 below;

Table 4.12 Teaching Methodology

	Estimated mean	Standard deviation	Standard error	95% interval	Confidence level
Teacher-student centered	1.87	0.499	0.074	1.733	2.009
Teacher centered	1.36	0.490	0.098	1.174	1.546
Student centered	1.79	0.413	0.067	1.639	1.940

Based on the teaching method applied, the estimated marginal mean estimates reveal that teacher-student interactive approach produced the high mean score (mean=1.87), followed by the student-centered approach (mean=1.79) and the lowest mean score (mean=1.36) was recorded for the teacher-centered approach.

The mean estimates for all the three teaching methods fall within the 95% confidence interval bands. The results reveal that combining both teacher-centered and student-centered teaching methods in teaching learners is the most effective approach that produces best student results. This result is consistent with the finding by Wiggins (1987) who reported that interaction between the teacher and students during the teaching and learning process encourages the students to search for knowledge rather than the lecturer monopolizing the transmission of information to the learners. The

estimated mean score (mean=1.79) recorded for the student-centered approach is marginally lower than that of the teacher-student interactive approach.

This indicates that student-centered methods are also an effective teaching approach, which is consistent with the finding by Lindquist (1995) who indicated that student-centered methods promote greater mastery of the subject than centralizing the flow of knowledge as a one way channel from the lecturer to the student. Application of teacher-centered methods produced results that were significantly lower (mean=1.36) comparative to those derived when using teacher-student interactive and student-centered approaches. This confirms with the finding by Hake (1998) who reported that students' little or no active involvement in the learning process could lead them score poor academic achievement results

SECTION C: INSTRUCTIONAL MATERIALS AND MATHEMATICS PERFORMANCE

4.4.3 Instructional materials

The study sought to rate the adequacy of the teaching and learning resource materials in the various schools. Table 4.13 presents the findings;

Table 4.13 Instructional Materials

			Mathematics performance			
			High	Average	Below	Total
	Adequate	Count	40	10	10	60
		%	66.7	16.7	16.7	100
Instructional	Moderate	Count	10	20	10	40
materials		%	25	50	25	100
	Scarce	Count	0	5	15	20
		%	0	25	75	100
Total		Count	50	35	35	120
		%	41.7	29.2	29.2	100

The results on the contingency revealed that as the instructional materials become adequate, the level of performance also increases. The results imply that instructional materials influence the pupils' performance in mathematics.

4.4.3.2 Relationship between instructional materials and performance in mathematics

Chi-square tests were used to assess the relationship between instructional materials and performance of mathematics. Table 4.14 depicts the findings

Table 4.14 Relationship between instructional materials and performance in mathematics

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.921[a]	24	.010
Likelihood Ratio	40.691	24	.018
Linear-by-Linear Association	7.867	1	.005
N of Valid Cases	254		

a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .10.

From the results, the P-value for the Pearson Chi-Square test for relationship between instructional materials and the performance of mathematics among pupils in Migori Sub-County is 0.01 at 5% level of significance. Since the p-value (p=0.01) is less than 0.05, therefore, statistically it shows significant relationship between the two variables. This implies instructional materials can influence the performance of pupils in mathematics subject. When teachers have adequate instructional materials they will be in a position to teach well to achieve utmost performance in mathematics subject.

4.4.3.3Pupil Responses on the adequacy of learning materials

The study sought to investigate the responses of the pupils on the adequacy of learning materials (See Table 4.15).

Table 4.15Adequacy of learning materials and mathematics performance

			Pupil mathematics performance			
			High	Average	Below	Total
Learning materials	Adequately stocked	Count	80	20	20	120
		%	66.7	16.7	16.7	100
	Averagely stocked	Count	20	40	20	80
		%	25	50	25	100
	Poorly stocked	Count	0	10	30	40
		%	0	25	75	100
Total		Count	100	70	70	240
		%	41.7	29.2	29.2	100

Like the teacher responses, the results from the pupils also revealed that when the learning materials become adequately stocked, the level of performance also increases. The results imply that learning materials influence the pupils' mathematics performance.

4.4.3.4 Relationship between Adequacy of learning materials and mathematics performance

Using Chi-square tests with significance level of P>0.05, the study assessed the relationship between pupils learning materials and the performance of mathematics subject. Table 4.16 depicts the findings;

Table 4.16: Chi-square test for relationship between learning materials and performance of mathematics subject

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	123.282[a]	48	.000
Likelihood Ratio	49.459	48	.415
Linear-by-Linear Association	11.384	1	.001
N of Valid Cases	200		

a. 59 cells (93.7%) have expected count less than 5. The minimum expected count is .01.

From the results in Table 4.16, the P-value for the Pearson Chi-Square test for relationship between adequacy of learning materials and the performance of mathematics subject is 0.000 at 5% level of significance, showing a significant relationship between the two variables. This implied that adequate learning materials for pupils are necessary in order to perform better in mathematics subject.

4.4.4 Teacher characteristics

Teacher characteristics in this study was measured with five items which included how teachers care for their pupils, fairness and respect to pupils, flexibility when approached by pupils and the frequency of use of cooperative mapping in class. The study sought to investigate the influence of teacher characteristics on the performance of mathematics subject in their schools. Table 4.17 presents the findings; Key: A-Always, F-Frequently, O-Occasionally, R-rarely, N-Never

Table 4.17 Teacher characteristics and performance of mathematics subject

Statements	Descriptive	A	F	O	R	N	Total
As a teacher how do you care for your students	Frequency	165	78	4	7	0	254
	Percentage	65	31	2	3	0	100
How fair and respectful are you to your students	Frequency	190	42	21	1	0	254
	Percentage	75	17	8	1	0	100
How often do students approach you with their academic problems	Frequency	22	141	41	29	24	254
	Percentage	9	56	16	11	8	100
Do you engage your students for light moments in class	Frequency	58	116	44	12	24	254
	Percentage	23	46	17	5	9	100
How often do you use cooperative mapping in your class	Frequency	34	56	101	40	23	254
	Percentage	13	22	40	16	9	100

The findings indicated 165 (65%) of the teachers noted that they always take care of their students, 78 (31%) agreed that they frequently take care of them 4 (2%) noted that they occasionally do so, 7 (3%) agreed that they rarely take care of their learners and none of them noted that they never take care of them. When they were asked how fair and respectful they are to their learners, 190 (75%) noted that they do so always, 42 (17%) do so frequently, 21 (8%) noted that they do so occasionally and 1 (0.4%) rarely respect their learners fairly.

The findings also indicated that 22 (9%) are always approached by students with their academic problems, 141 (56%) are frequently approached, 41 (16%) are approached occasionally, 29 (11%) are rarely approached and 24 (8) are never approached by students for academic advises. When they were asked if they engage their students for light moments in class, 58 (23%) noted that they do so always, 116 (46%) frequently engage students, 44 (17%) occasionally engage students, 12 (5%) do so rarely and 24 (9%) never engage students for light moments in class. The findings also indicated that 34 (13%) always use cooperative mapping in their class, 56 (22%) use it frequently, 101 (40%) used them occasionally, 40 (16%) rarely use then and 23 (9%) never use cooperative mapping in their class.

4.4.4.1 Relationship between Teacher characteristics and Pupil performance in Mathematics

Using chi-square tests, the study further sought to investigate teacher characteristics in terms of their academic qualification and pupil performance in mathematics (Table 4.18).

Table 4.18 Teacher Characteristics and Performance

	Value	df	Asymp.Sig. (2-sided)
Pearson chi-square	5.074a	4	.281
Likelihood ratio	5.676	4	.224
N of valid cases	254		

a. 8 cells (88.9%) have expected count less than 5. The minimum expected count is .50.

The results suggest that; at $\chi 2$ (4, N=254) = 5.07, p= 0.28) teacher characteristics and mathematics achievement is not statistically significant. We therefore accept the null hypothesis. The results illustrate that teacher qualification does not influence pupil's mathematics performance.

4.4.4.2 Relationship between teaching experience and pupil's performance in mathematics

Chi-square tests were done to determine the relationship of teacher characteristics in terms of teaching experience and mathematics performance was also tested. The chi-square results were indicated in Table 4.19;

Table 4.19Teaching experience and mathematics performance

	Value	df	Asymp.Sig. (2-sided)
Pearson chi-square	15.963a	8	0.043
Likelihood ratio	17.364	8	0.027
N of valid cases	254		

a. 15 cells (100.0%) have expected count less than 5. The minimum expected count is .75.

The results report that; at ($\chi 2$ (8, N=254) = 15.963, p= 0.043), the null hypothesis is rejected and it is concluded that there is statistically significant relationship between the number of years teachers have been teaching the subject and pupil performance in the same subject.

4.4.4.3Pupils' opinion on the influence of Teacher characteristics on mathematics performance

The pupils were also asked on the influence of teacher characteristics with regard to mathematics performance. The findings are presented in figure 4.5below

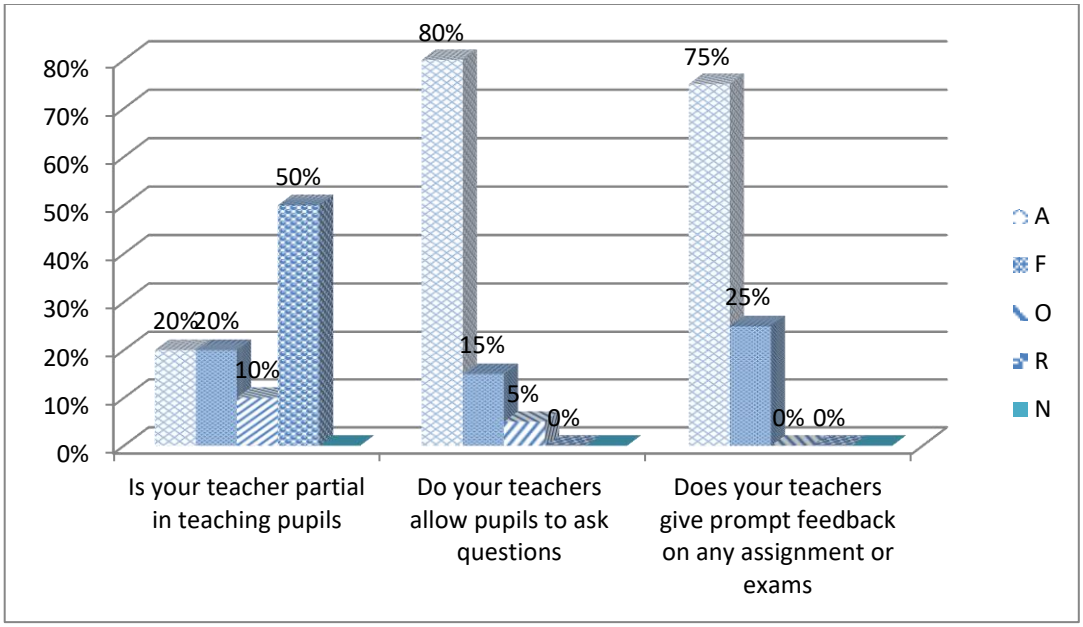

Figure 4.5 Pupils' opinion on influence of teacher characteristics and mathematics performance

When the pupils were asked if their teachers are partial in teaching pupils 20% of the pupils noted that they do so occasionally, another 20% said that they do so frequently, 10% agreed that their teachers do so occasionally and 50% said that it is rare.On the opinion if their teachers allow pupils to answer questions, majority 80% agreed that it is always like that, 15% agreed that it is frequent and 5% noted that it is occasional. The findings from the pupils also indicated that majority 75% of the pupils agreed that their

teachers always give prompt feedback on any assignment or exam, 25% noted that it is done on frequent basis.

SECTION D: PUPIL ATTITUDE TOWARDS MATHEMATICS

4.4.5 Pupils' Attitude towards mathematics

The study sought to investigate the pupil attitude towards mathematics. The findings are presented in table 4.20;

Key : SD- Strongly Disagree, D-Disagree, N-Undecided, A- Agree, SA- Strongly Agree

Table 4.20: Pupil Attitudes on Mathematics

STATEMENT		SA	A	N	D	SD	MEAN
Our mathematics teacher starts a lesson by reviewing the previous lesson	F	35	53	17	70	35	2.9190 (58.3%)
	%	16.7	25.2	8.1	33.3	16.7	
Our mathematics teacher guides us during practices	F	18	37	17	86	52	2.4429 (48.9%)
	%	8.6	17.6	8.1	41.0	24.8	
Pupils like and enjoy learning mathematics	F	17	17	17	106	53	2.233 (44.7%)
	%	8.1	8.1	8.1	50.5	25.2	
Our mathematics teacher allows us to present the activities in class	F	71	88	17	17	17	3.852 (77.02%)
	%	33.8	41.9	8.1	8.1	8.1	

The findings indicated that 58.3% (mean=2.910) of the pupils agreed that their mathematics teacher starts a lesson by reviewing the previous lesson, 48.9% (mean=2.44) noted that their mathematics teacher guides them during practices, 44.7%

(mean=2.233) said that they like and enjoy learning mathematics and 77% (mean=3.85) agreed that their mathematics teacher allows us to present the activities in class.

From the scores on the pupils' attitudes, it was found that the three items measured on attitude were below average. For example it was found that mathematics teachers do not start their lessons by reviewing the previous lessons, limited guides on practices and that pupils did not fully enjoy learning mathematics. This could have attributed to the poor performance in primary schools in the County as pupils need a lot of follow ups including reminding them of what was learnt previously to enhance understanding. The teachers however allowed them present activities in class which was rated 3.8 out of 5.

4.5 Qualitative Analysis

This section presents findings from the head teachers' information concerning performance of mathematics in general. Interviews were done and found that majority of the head teachers were male with majority being between 45-49 years of age. On their academic qualifications, the study found out that majority of the head teachers had a BA (BSC) with 15 to 19 years administrative experience.

On appraisal of mathematics teachers, the study revealed that most head-teachers, conducted appraisals with different purposes such as completion of a probationary period, teacher registration, performance management, regular feedback for improvement, career advancement, individual inspection or identification of

developmental needs. The overarching objectives of these different teacher appraisal processes typically include professional development and/or accountability. However the study noted problems encountered by head teachers in providing adequate materials to teachers in which majority of them noted lack of funds to procure the materials, those which were provided by the government were not enough to cater the number of pupils in the school hence negatively influencing the performance of mathematics subject in the county.

On the extent of motivation for teacher motivation to effectively play their roles in the school, the study revealed that the head teachers a proper working environment for the teachers to achieve their goals. Other head teachers also made sure that monetary incentives were given to the best performing teachers as well those who worked overtime, were paid overtime pay. Leave for rest was allotted for the teachers so as to regain back their energy of teaching more.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The findings presented in chapter four were further summarized in this chapter so that specific findings can be clearly shown in relation to the research objectives. The findings were presented, interpreted and conclusions drawn based on the findings as a reflection of the research objectives. The recommendations were made on what should be done to improve the performance of mathematics in schools.

5.2 Summary of findings

From the findings, the researcher was able to collect data from the sampled schools and their respondents. The respondents demographic information was reviewed in analyze if it can in one way or another influence the responses. The study found out that majority of the teachers who participated in the study were female, the respondents also had worked long enough to influence the factors affecting the performance of mathematics. The respondents were also qualified enough to influence the performance of mathematics.

5.2.1 Teacher pupil ratio and mathematics subject performance

The findings indicated that the pupil teacher ratio was too much in relation to the expected ratio, from the findings it is noted that most of the teachers noted that the pupils in their classes were many and others even agreed that they were too many thus may be a contributing factor to the poor performance of mathematics in Migori County.

The findings further indicated that the teachers were never satisfied with the student population in their classes, which may further contribute to low student concentration as highlighted by majority of the teachers in the study.

It was found that most teachers put a lot of effort in making sure that they give out homework to students in order to enhance performance. This therefore could not be a factor contributing to poor performance of mathematics in Migori Sub-County as teachers are seen doing their best in their work. The study also indicated that majority of the teachers finish marking most of the work which was rated in the study as 51-75%.

To justify the findings, the study observed from the respondents that majority 96% (mean=4.81) agreed that pupils in smaller class sizes have high concentration than many pupils in class and that 94% (mean=4.71) noted that teachers find too many pupils in class difficult to manage hence lower academic achievement.

These findings are inline with a study done by Glass and Smith, (1979), this analysis found that not only did small classes improve the chances for academic achievement, but that small classes could also be used as a predictor of student's success. Glass and Smith (1978) showed that ''as class size increases, achievement decreases''. The results of their investigation suggested that a class size of 15 or fewer would be needed to make a noticeable improvement in classroom performance. Repeated studies provided evidence of important relationships between the number of students in the classrooms

and students achievement. This research demonstrated that an appropriate class size was fewer than 20 students, and that the greatest benefits of small classes are obtained in the early grades. Similar to my study, it was noted that small class sizes perform better academically, the teacher can easily manage a small class and identify the areas to be improved, however schools in Migori County had many pupils in class with fewer ratio of teachers hence the reason of poor performance of mathematics subject in the County.

The findings of the Meta-analysis study pointed out evidence between reduced class size and pupil achievement. More specifically, the results showed that as class size decreased, student achievement increased. The achievement of pupils in instructional groups of 15and fewer scored several percentile ranks above that of pupils in classes of 20 and 30 (Glass and Smith, 1979). The strength of the relationship varied according to the level of the reduction. Reductions in class size below 20 students resulted in larger improvements in student achievement than for reductions in the 20 to 30 range. Based on their findings, Glass and Smith (1978) concluded that ‘there is little doubt that, other things equal, more is reamed in smaller classes.

5.2.2 Teaching methodology and the performance of mathematics subject

The teaching methodology used by the schools being studied was rated as effective by majority of the respondents; however others still perceive that the methodology they use is not effective. They further highlighted the best methodology which enhances the performance of mathematics as a subject, majority of the teachers noted that teacher student interactive method is the best method for teaching mathematics. On the

influence of teaching methodologies the findings indicated that majority 90% (mean=4.57) were of the opinion that teaching methodologies adequately develops competencies pertaining mathematics, others noted that it promotes active participation by students in the teaching learning process and that teaching methodologies provides them with effective instructions in teaching.

According to Knowlees (1980), teaching style or methodology is a very influential factor in students' learning experiences (Knowles, 1980) and is a critical component in determining the extent of students' learning since teachers provide the "vital human connection between the content and the environment and the learners" (Heimlich &Norland, 1994, p. 109) and because it stems from an educational philosophy that lends direction and purpose to a teacher's teaching (Galbraith, 1999). This claim about the effectiveness of teaching style is supported by a comprehensive body of research, especially in mainstream education, which links it also to student achievement outcomes (for example, Black, 1993; Conti, 1985; Cupkie, 1990; Miglietti& Strange, 1998; Welborn, 1996). The existence of this rich body of research about teaching style is based on the premise that teachers do not all teach alike and that classroom teaching styles are not all equally effective (Baily, 1984).

The results from my study indicated an effective teaching methodology which improves performance of mathematics however others still perceive that the methodology they use is was not effective leading to the poor performance of mathematics. This meant that different methodologies work differently with different teachers.

5.2.3 Influence of Instructional materials on the performance of mathematics subject

This objective deemed to explore the adequacy of the teaching and learning resource materials in the respondents' various schools. The study found out that most of the instructional materials were available but inadequate, for example blackwalls, manila papers and main class text books were rated below 50% which was below average, therefore may be a contributing factor to the poor performance of mathematics subject in Migori County. Other instructional materials like class text books, curriculum guides and rulers were slightly above average which was also not rated good in the study.

In support of this claim Udomior (1999) states the instructional materials have an effect on learning, with good understanding in less time as well as means of communication between teachers and learners. Akinson (1999), says that it gives rise to a more effective learning than lecturing. In line with this, Bonka and Gollonary (1991) opined that it is generally assumed that students or learners will understand the things they see very easily than listen to abstract ideas presented in words. Bello (1999) opined that instructional materials influence both the learners and educator during the teaching and learning process in any given environment.

In my study the fact that teachers agreed that instructional materials enhances performance of mathematics, some of the important instructional materials were

inadequately stocked in their various institutions hence affecting delivery which is a contributing factor to poor performance of mathematics in the County.

5.2.4 Influence of Teacher characteristics on the performance of mathematics subject

This objective was measured with various approaches in which teachers have on handling of students with regard to performance of mathematics subject. The findings found out that majority of the teachers always take care of their students, majority also noted that they are always fair and respectful are you to their students. Majority of the teachers also noted that students approach them frequently with their academic problems. They also noted that they frequently engage their students for light moments in class. Cooperative mapping was occasionally used as highlighted by majority of the teachers.

From the findings, it is viewed that teacher characteristics is effective in the performance of mathematics subject and therefore might not be a factor in the poor performance of mathematics subject in Migori County.

These findings are have a strong link between this important construct of teacher characteristics and student achievement and has been demonstrated through many studies, mostly in mainstream education for example; Anderson, Greene, & Loewen, 2018; Ashton & Webb, 2016; Good & Brophy, 2013; Midgley et al., 1989; Pajares, 1996; Schunk, 1991; Zimmerman, 1995.

These studies have shown that teachers with a strong sense of efficacy take more risks, set higher standards for themselves and their students, and provide the potential for higher academic gains among learners (Wood & Bandura, 1989). Teacher efficacy also has been shown to be related to many other behaviors that have the potential to impact student achievement. For instance, teacher efficacy has been shown to be strongly related to teachers' adoption of innovations (Gusky, 1988; Smylie, 1988) and classroom management strategies (Gibson & Dembo, 1984) which preserve student motivation and self-esteem, both with the possibility of being translated into more success for individual students.

It is also argued that teacher efficacy may influence student achievement through teacher persistence (Good & Brophy, 2003). Teachers with high efficacy take responsibility for student learning and may view student failure as a push for greater effort to improve achievement. These teachers spend more time monitoring and working with their students (through whole-group instruction, for example), providing the means for higher levels of student engagement. Efficacious teachers are more likely to implement instructional strategies to enhance student learning, rather than just covering the curriculum. They also take more risks and have confidence in overcoming classroom challenges, which contributes to higher student achievement (Good &Brophy, 2003).

5.3 Conclusion

The following conclusions were reached from the analysis of the data from the previous chapter.

The study found out that teacher student ratio is a contributing factor to poor performance of mathematics in Migori Sub-County. The high number of students in classes reduces their concentration in class and gives the teachers a difficult time in managing them. Though teachers try their level best to achieve excellent performance in mathematics subject large class sizes still becomes hard to manage.

The study also revealed that the teaching methodologies used was rated effective in the study, however other teachers still have problems in their teaching methodologies. Teachers therefore need the best teaching methodology in order to achieve their objective of excellent academic achievement in mathematics.

Instructional materials, was another areas highlighted in the study, the found out that other instructional materials are inadequate and therefore may contribute to poor performance of mathematics subject. It was concluded that instructional materials are very important for teacher instruction and lack of it may affect academic performance of students.

Teacher characteristics according to the study were observed to favour the welfare the performance of the students with regard to mathematics subject. Participation of

teachers in managing student performance is perceived to motivate students in working hard to achieve their objectives. It was therefore concluded that teacher characteristics largely contributes to the performance of mathematics subject in Migori Sub-County.

5.4 Recommendations

School administrators and policy makers need to seek and develop policies to ensure that ideal performance management is implemented for sustained short and long-term positive enduring effects on pupil's performance. Toward this end and based on the above conclusions the following recommendations are necessary for better performance of pupils and attainment of ideal performance of subjects in the primary schools;

i. There is need for the Ministry of Education to employ more primary school teachers. This will enable attainment of recommended pupil teacher ratio in schools which currently is far above the required standards. It will also help to offset the problem of teacher shortage as a result of over-enrolments caused by introduction of Free Primary Education.

ii. There is need for the government through the MOE and the TSC to undertake provision of enough instructional materials throughout the country to ensure equity in learning for all pupils.

iii. There is need for the government to fund schools adequately to enable school management to provide on-job training for teachers on the best approaches and methodologies to handle pupil performance.

iv. There is need to establish systems to monitor performance management initiatives continually and closely through community participation,

providing feedback to administrators, policy makers, and parents about the success of the programmes for the welfare of their children.

5.5 Recommendation for further research

The study recommends that a similar study be conducted in other counties countrywide. This will assist in making a nationwide conclusions and generalizations for the study.

A similar study can also be carried out in secondary schools to create a comparative study for both primary and secondary schools.

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APPENDIX I: LETTER OF INTRODUCTION

Dear Sir/ Madam.

I am a post graduate student at Moi University pursuing a Master of Education in Educational psychology. I am carrying out a study on influence of institutional factors on learning of mathematics in primary schools in Migori Sub-County, Migori County. You are among the respondents, who have been selected to take part in this study. Kindly help in filling this questionnaires/interview schedule for me to collect in appropriate time. I will highly appreciate your cooperation. All information filled in will be treated with strict confidentiality since the purpose of this study is purely academic. You are therefore requested not to write your name or name of your institution.

Yours sincerely,

Kokelo Babugun

APPENDIX II: QUESTIONNARE FOR TEACHERS

Section A: Demographic Information

1. a) Your Gender: Male ( ) Female ( )

b) Working experience:

1-2 years [ ]

3-4 years [ ]

5 years and above [ ]

2 a) What is your academic qualification?

University () Diploma ( ) P1 ( ) KCSE ( ) others ( )

Section B

Teacher pupil ratio

Indicate the teacher pupil ratio in the following years in your class

2012 ……..

2013 ……..

2014 ……..

Indicate the number of students who passed each year in your class

……

Rate the ratio of the pupils in your class with regard to recommended class size

Adequate [ ]

Many [ ]

Too many [ ]

Are you satisfied with the pupil population in your class?

Yes [ ]

No [ ]

Which class size can your pupils concentrate more?

Fully [ ]

Average [ ]

Partially [ ]

5. a) How often do you give your learners mathematics' homework?

Daily ( ) twice weekly ( ) Once weekly ( ) Once in two weeks ( ) Once in a month ( )

Please state why.....

……

……

b) What percentage of pupils completes their homework?

0-25% ( ) 26-50% ( ) 51-75% ( ) 76-100% ( )

c) Do you know the reason why?.....

……

…..……

d) How soon do you give back books after marking?

After each mathematics session ( ) After a day ( ) After some days ( )

Kindly rate the following statements according to your jurisdiction on teacher pupil ratio and mathematics performance

Strongly agree (SA) Agree (A) Undecided (UD) Disagree (D) strongly disagree (SD)

Statement	**SA**	**A**	**UD**	**D**	**SD**
Smaller class sizes perform better academically					
Pupils academic achievement depend on their hard work irrespective of class size					
Pupils in smaller class sizes have high concentration than many pupils in class					
Academic achievement largely depend on the teachers input to the pupils					
Teachers find too many pupils in class difficult to manage hence lower academic achievement					
Many pupils in class perform poorly due to limited resources e.g. text books					

SECTION B: Teaching methodology

8.a) What methods do you apply in your mathematics teaching

Teacher centered [ ]

Student centered [ ]

Student teacher centered [ ]

b) Do you consider your teaching method effective?

Effective [ ]

Very effective [ ]

Not effective [ ]

Kindly rate the following statements according to your jurisdiction on teaching methodologies and mathematics performance

Strongly agree (SA) Agree (A) Undecided (UD) Disagree (D) strongly disagree (SD)

Statement	SA	A	UD	D	SD
Teaching methodologies provides us with effective instructions in teaching					
Provides prompt pupil feedback					
Enables us to set reasonable academic expectations					
Teaching methodologies adequately develops competencies pertaining mathematics					
Promote active participation by students in the teaching learning process					
Reinforce the autonomous component in learning					

SECTION C: Instructional Materials

Kindly rate the adequacy of the following Teaching and Learning Resource Materials in your school

Instructional Materials

Variable	**Adequate**	**Moderate**	**Scarce**
Class text books			
Teaching materials			
Main Class text book			
Other recommended books			
Geometrical sets			
Models			
Somacubes			
Manila papers			
Black wall			
Black wall ruler			
Computer software			
Rulers			
Curriculum guides			
Bulletin/display boards			
Supplementary materials			

SECTION D: Teacher Characteristics

Statement below is about teacher characteristics.

Please tick (□) in the box that closely represent your response.

A=Stands for always (5)

F= Stands for frequently (4)

O= Stands for occasionally (3)

R= Stands for rarely (2)

N= Stands for never (1)

A) As a teacher how do you care for your students?

A( ) F( ) O ( ) R( ) N( )

b) As a teacher how fair and respectful are you to your students

A( ) F( ) O ( ) R( ) N ( )

c) How often do students approach you with their academic problems?

A( ) F( ) O ( ) R( ) N ( )

d) Do you engage your students for light moments in class?

A( ) F( ) O ( ) R( ) N ( )

e) How often do you use cooperative mapping in your teaching?

A( ) F( ) O( ) R( ) N( )

APPENDIX III: QUESTIONNAIRE FOR PUPILS

These questionnaires collecting data purely for academic purposes performance of Mathematics in Migori Sub-County. Do not write your name on the questionnaire. Kindly answer all questions by ticking the option that applies.

SECTION A: General Information of the Respondent

Type of school

Boys ( ) Girls ( ) Mixed ( )

Gender

Male ( ) Female ( )

SECTION B: Instructional Materials

Kindly rate the adequacy of the followingTeaching and Learning Resource Materials in your school

Instructional Materials

Variable	Adequately stocked	Averagely stocked	Poorly stocked
Class text books			
Teaching materials			
Main Class text book			
Other recommended books			
Geometrical sets			
Models			
Somacubes			
Manila papers			
Black wall			
Black wall ruler			
Computer software			
Rulers			
Curriculum guides			
Bulletin/display boards			
Supplementary materials			

SECTION C: Teacher Characteristics

Statements below represents teacher characteristics, please tick in the box the one that closely represents your response

A=Stands for always (5)

F= Stands for frequently (4)

O= Stands for occasionally (3)

R= Stands for rarely (2)

N= Stands for never (1)

Is your teacher partial in teaching pupils

A( ) F( ) O ( ) R( ) N ( )

Do your teachers allow pupils to ask questions?

A( ) F( ) O ( ) R( ) N ( )

Does your teacher give prompt feedback on any assignment or exams?

A( ) F( ) O ( ) R( ) N ( )

Statement below is about student's attitude towards mathematics in your school. Please tick in the box that most closely represents your responses

SA-Strongly Agree, A-Agree, NS-Not Sure, D-Disagree, SD- Strongly Agree

SN	STATEMENT	SA	A	NS	D	SD
1	Ourmathematics teacher starts a lesson by reviewing the previous lesson					
2	Our mathematics teacher uses locally available materials to teach us mathematics					
3	Our Mathematics teacher guides us during practices					
4	Pupils like and enjoy learning mathematics					
5	Our mathematics teacher allows us to present the activities in class					

APPENDIX IV: HEADTEACHERS' INTERVIEW SCHEDULE

SECTION A: GENERAL INFORMATION

1) **a) Gender**

Male ( ) Female ( )

b) Age bracket below

25 ( ) 25-29 ()

30-34 ( ) 35-39 () 40-45( )

45-49 () over 50 ()

2) **What is your qualification?**

P1/Diploma( ) BA (BSC) ( ) BED( )

BA/BSC with PDGE( ) MA/MSC ( ) MED/MPhill( )

Others specify……

3) **Administrative experiences**

Less than 5 years ( ) 5-9years ( ) 10-14 years ( )

15-19years( ) 20 and above ( )

SECTION B

4) As a professional teacher and supervisor of your teachers how do you appraise your mathematics teachers?

……

……

5) As administrator what problems do you face in the attempt to provide adequate instructional materials to the teachers?

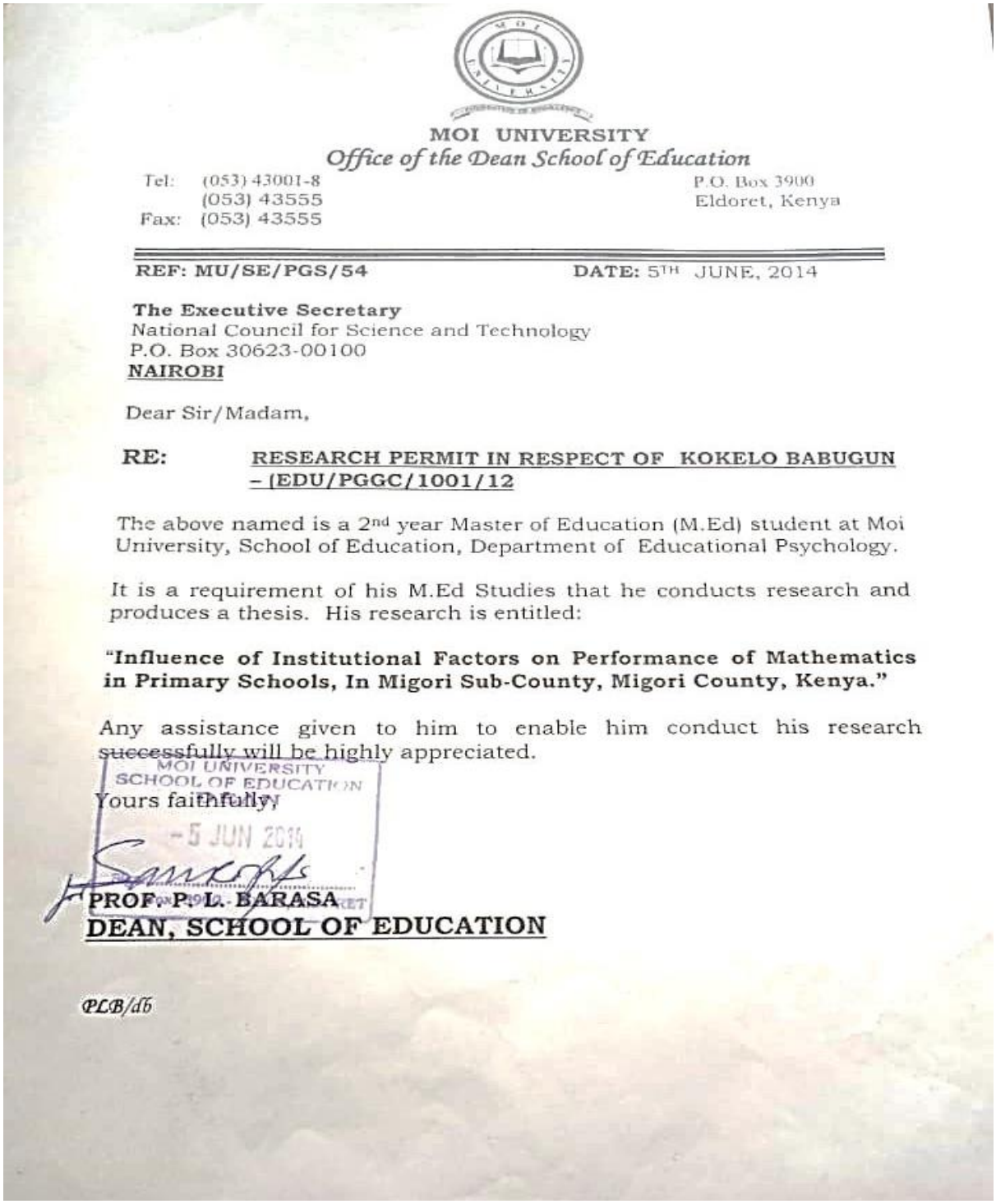
……

……

6) To what extend are your teachers motivated to effectively play their roles in providing academic passes?

……

APPENDIX V: RESEARCH PERMIT FROM INSTITUTION



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P.O. Box 3900
Eldoret, Kenya

REF: MU/SE/PGS/54 **DATE:** 5TH JUNE, 2014

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

Dear Sir/Madam,

RE: RESEARCH PERMIT IN RESPECT OF KOKELO BABUGUN – (EDU/PGGC/1001/12

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

It is a requirement of his M.Ed Studies that he conducts research and produces a thesis. His research is entitled:

"Influence of Institutional Factors on Performance of Mathematics in Primary Schools, In Migori Sub-County, Migori County, Kenya."

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

MOI UNIVERSITY
SCHOOL OF EDUCATION
-5 JUN 2014

Yours faithfully,

PROF. P. L. BARASA
DEAN, SCHOOL OF EDUCATION

PLB/db

APPENDIX VI: RESEARCH PERMIT FROM NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 592730

Date of Issue: 03/March/2020

RESEARCH LICENSE

This is to Certify that Mr.. BABUGUN KOKELO KOKELO of Moi University, has been licensed to conduct research in Migori on the topic: INFLUENCE OF INSTITUTIONAL FACTORS ON PERFORMANCE OF MATHEMATICS IN PRIMARY SCHOOLS, IN MIGORI SUB- COUNTY, MIGORI COUNTY, KENYA. for the period ending : 03/March/2021.

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APPENDIX VII: MAP OF KENYA SHOWING MIGORI COUNTY