TEACHER RELATED FACTORS INFLUENCING PUPILS’ PERFORMANCE OF MATHEMATICS AT KENYA CERTIFICATE OF PRIMARY EDUCATION IN PUBLIC SCHOOLS IN LIKONI SUB-COUNTY, KENYA

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A Research Project Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Education in Curriculum Studies

UNIVERSITY OF NAIROBI

2016
DECLARATION

This project is my original work and has not been presented in any other university

_____________________________

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DEDICATION

This work is dedicated to my beloved niece, Gladys.
ACKNOWLEDGEMENTS

I would like to thank God for granting me the wisdom to successfully complete this work. I wish to acknowledge the effort and support of my supervisors, Dr. Caroline W. Ndirangu and Dr. Lucy W. Njagi for their professional assistance and motivation they gave during the research period. My gratitude also goes to the lecturers of the Department of Educational Administration and Planning who gave moral support that enabled this project to be successful.

I also thank my family for supporting my idea to pursue this course. I wish to finally express my gratitude to all those who in one way or another contributed directly or indirectly towards the completion of this project.
ABSTRACT

Mathematics is essential for daily life and plays a crucial role in school curricula; yet pupils’ performance in mathematics remains low worldwide and Kenya is no exception. Mathematics performance in Likoni is not satisfactory. The purpose of this study was to investigate the teacher related factors influencing pupils’ mathematics performance at Kenya certificate of Primary Education in public schools in Likoni sub-county, Kenya. This study was guided by following objectives; teacher preparedness, instructional methods, in-service training and teacher motivation. This study was guided by social constructivism theory. Descriptive survey design was used and data collected using questionnaires, interview guide and observation guide. The targeted population comprised of 24 head teachers, 380 mathematics teachers, and 5700 pupils. Stratified random sampling was used to select the required number of pupils. Purposive sampling was used to select mathematics teachers. A sample of 20 head teachers, 20 mathematics teachers and 300 pupils was obtained for the study. The validity and reliability of the instruments were enhanced by a pilot study. A reliability coefficient of 0.82 was obtained from this study. Statistical package for social sciences was used to get descriptive statistic such as percentages, frequencies and tabulation. The study findings established that teacher preparation was lacking in the delivery of mathematics content. Teachers capitalized on teacher-centered instructional methods. In-service training was inadequate while there was very little motivation to both teachers and learners. In view of these findings the study concluded that there was need to address the mathematics curriculum implementation in regards to teacher preparation, teacher instructional methods and in-service training. The study recommended the following: Ministry of Education and umbrella groups should harmonize the policy of teaching mathematics by organizing in-service training for mathematics teachers with regards to instructional methods and teacher preparation in teaching of mathematics. The study was confined to few of the factors that can influence mathematics performance at Kenya Certificate of Primary Education. Further and related studies on other factors are recommended to be conducted.
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# ABBREVIATION AND ACROYNMS

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<th>Full Form</th>
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<tr>
<td>AIR</td>
<td>American Institute of Research</td>
</tr>
<tr>
<td>CEMASTEA</td>
<td>Centre for Mathematics, Science and Technology Education in Africa</td>
</tr>
<tr>
<td>EFA</td>
<td>Education For All</td>
</tr>
<tr>
<td>KCPE</td>
<td>Kenya Certificate of Primary Education</td>
</tr>
<tr>
<td>KICD</td>
<td>Kenya Institute of curriculum Development</td>
</tr>
<tr>
<td>KNEC</td>
<td>Kenya National Examination Council</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science Technology and Innovation</td>
</tr>
<tr>
<td>NAEP</td>
<td>National Assessment of Education Progress</td>
</tr>
<tr>
<td>PTE</td>
<td>Primary Teacher Education</td>
</tr>
<tr>
<td>SbTD</td>
<td>School based Teacher Development</td>
</tr>
<tr>
<td>SMASE</td>
<td>Strengthening of Mathematics and Science in Education</td>
</tr>
<tr>
<td>SPRED</td>
<td>Strengthening Primary Education</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nation Educational Scientific and Cultural organization</td>
</tr>
<tr>
<td>WEF</td>
<td>World Education Forum</td>
</tr>
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</table>
CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The global community’s commitment over quality in education at basic level of education has been emphasized in many international forums including the World Conference on Education for All (1990) in Jomtien, Thailand. World Education Forum (WEF) in Dakar - Senegal (2000) on Education For All (EFA) affirmed the principles that every child has a right for education. World Education Forum has adopted the right of access to education as one of the six goals to promote Education for All (EFA), improving all aspects of quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in numeracy.

Mathematics education is a global challenge that needs urgent local solutions (UNESCO, 2009). Smith (2004) describes mathematics as of central importance to modern society, because it provides the vital underpinning of the knowledge economy. Smith further noted that mathematics form the basis of most scientific and industrial research and development. Increasingly, many complex systems and structures in modern world can only be understood using mathematics and much of the design and control of high -technology systems depend on mathematics inputs (Smith, 2004).

Under achievement in mathematics has remained a global concern even in the developed countries. Studies conducted by American Institute for Research (AIR) to investigate mathematics performance on USA students-4th and
8th grades as compared with peers around the world and by National Assessment of Education Progress (NAEP) that assessed the progress in mathematics of students in grades 4,8 and 12, found that grade 4 pupils performed below average mark consistently from 1996-2007. The study also revealed that teachers were the major cause of poor mathematics performance in the US (AIR, 2007). This characteristic of under achievement in mathematics is also observed in the middle – income and developing countries.

Internationally, a plethora of research on motivation (Agezo, 2010; Cogneau, 2003; Dolton & Marcenaro-Gutierrez, 2011; Lambert, 2004; Ololube, 2006; Rebore, 2001; Sargent & Hannum, 2005) have found that teacher motivation is associated with student learning outcomes. In a cross-country analysis there is a relationship between teacher motivation and pupils performance, Dolton and Marcenaro-Gutierrez (2011) observe that countries with poor records of teacher motivation have low teacher performance leading to poor educational outcomes.

Research has shown that successful professional development experiences have a noticeable impact on teachers’ work in and out the classroom. (Villegas-Reimers, 2003; Borko and Putnam, 1995). In India, policy documents and official commentaries recognize the need to enhance the relevance and the quality of pre and in-service teacher education as a way to make education more child-centered and relevant to students’ and teachers’ local contexts. However, messages mediated through the prevailing training approaches are
not having the expected impact on classroom processes (Dyer, 2004; NCTE, 1998).

Armstrong, Henson and Savage (2009) indicates that in order to provide quality experience for all students, lessons must be planned and prepared properly for effective teaching and learning. Indimuli, J., Mushira, N., Kuria, P., Ndung'u, R., & Waichanguru, S., (2009) concur to Armstrong’s view to that teacher preparation is vital for effective teaching and learning process.

Much of research into mathematics education in recent years has been driven by concerns about students’ achievement in mathematics. In response to these concerns, there has been a refocusing of the attention on the teacher (Ilorin 2003). Teacher effectiveness has come under the microscope; reforms in teaching standards have been formulated and teacher professional development especially in-service training have been re-thought (National Council of Teachers of Mathematics, 2000, Zaslavsky, Chapman & Leikin, 2003)

A UNESCO (2009) review of studies in Africa revealed that poor implementation of mathematics curriculum was due to the lack of well-trained teachers and good use of better teaching methods, inadequate supply of relevant equipments and lack of development of mathematics culture. In Uganda, poor mathematics performance has remained a matter of public outcry in national examinations. Studies done at Makerere University to investigate factors that hinder pupils opportunities to learning of mathematics in primary schools revealed that 83 percent of the factors that hinder mathematics learning are teacher related. The factors included: poor teaching methods, lack of
continuous professional development, poor preparation caused by weak academic background, lack of teacher motivation and literacy in mathematics. (Opolot-Okurut, 2008)

According to University of Nairobi (2008), in Kenya mathematics is a prerequisite subject to many advanced careers like medicine, pharmacy, and other business courses such as accounting, finance and banking. One has to score high in mathematics for him or her to be allowed to pursue any of the mentioned careers. Mathematics is one of the core and compulsory subjects for learners in Kenya’s 8-4-4 system of education. The nature and the proportion of time (seven lessons a week in primary school upper classes) allocated to mathematics emphasize the major importance given to mathematics.

The government of Kenya in collaboration with donor agencies has consistently implemented teacher-based educational interventions aimed at improving pupils’ achievement in mathematics and science in primary schools. These interventions include; Strengthening Primary Education (SPRED) program, school-based Teacher Development (SbTD) program and Strengthening of Mathematics and Science Education (SMASE) program. (Republic of Kenya 2008, CEMASTEA, 2010, SMASE-WECSA, 2010).

Despite these interventions, pupils’ performance in mathematics in primary schools in Kenya National examinations have remained below expectations (KNEC, 2010).

Kenya National Examination Council’s (KNEC) assessment of standard 3 learners in numeracy and literacy reported poor learning achievement. The
report indicated that achievement in both reading (297.58) and numeracy (295.6) was below the standardized mean of 300 (KNEC, 2010). A study of Uwezo programme on Literacy and Numeracy in Kenya, indicates that the national literacy and numeracy abilities among children still remain low. The study also indicates that three out of 10 Standard 3 children cannot solve a Standard Two division problem while in the same class, one out of 10 children cannot recognize numbers between 11 and 99. By the time children reach Standard Eight; one out of 10 cannot solve Standard Two division problems. This reflects the magnitude of challenge in performance of mathematics. It is in this view the researcher is set to investigate the teacher related factors influencing pupils performance of mathematics at Kenya Certificate of Primary Education in Likoni sub-county.

Likoni Sub-County has mostly been in the last position in mathematics performance out of the four sub-counties in Mombasa County indicating a deficiency with mathematics curriculum implementation in the Sub-County.

The table below shows Mombasa – County performance for the past five years out of 100 percent
Table 1.1:

Mombasa County KCPE Mathematics Performance (2010-2014)

<table>
<thead>
<tr>
<th>Sub_county / Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>MSS</th>
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<tbody>
<tr>
<td>Changamwe</td>
<td>42.12</td>
<td>42.22</td>
<td>40.74</td>
<td>44.61</td>
<td>43.69</td>
<td>42.67</td>
</tr>
<tr>
<td>Kisauni</td>
<td>40.48</td>
<td>40.32</td>
<td>40.04</td>
<td>40.22</td>
<td>43.73</td>
<td>40.66</td>
</tr>
<tr>
<td>Mvita</td>
<td>42.93</td>
<td>42.61</td>
<td>47.68</td>
<td>44.17</td>
<td>43.70</td>
<td>44.21</td>
</tr>
<tr>
<td>Likoni</td>
<td>37.33</td>
<td>38.25</td>
<td>38.90</td>
<td>39.01</td>
<td>32.69</td>
<td>38.13</td>
</tr>
</tbody>
</table>

Source, County Education Office 2010-2014

Table 1.1 indicates results for the last five years for the four Sub-Counties in Mombasa County. Mathematics in Likoni Sub-County has registered poor performances of many years and this call for immediate action hence this inquiry.

1.2 Statement of the problem

Mathematics is one of the compulsory, examinable subjects for all candidates at Kenya Certificate of primary Education level in Kenya. Its’ crucial role in the realization of Kenya vision 2030 cannot be underestimated (Government of Kenya, 2007). Inline with this, the Kenya government in collaboration with donor agencies has consistently implemented Teacher –based educational interventions aimed at improving pupils’ achievement in mathematics and science in primary schools. These interventions include SPRED, SbTD and recently SMASE program (Republic of Kenya, 2008, CEMASTEA, 2010 SMASE-WESCA, 2010).

Despite implementation of these teacher- based interventions, pupils achievement in mathematics in Likoni sub-county has remained below
educational stakeholders expectations. Table 1.1 presents mean scores posted by four sub- counties in Mombasa County for the last 5 years. Performance of mathematics in national examinations is used to select students progressing to the next level of education and training. Performance of mathematics across regions has however varied significantly with certain regions posting very good performance while others perform poorly. Despite the persistent dismal performance of mathematics in public primary schools in Likoni sub-county, no systematic studies have been done to explain circumstances contributing to the situation.

1.3 Purpose of the study
The purpose of the study was to investigate teacher related factors influencing performance of mathematics in Kenya Certificate of Primary Education in public schools in Likoni Sub-County.

1.4 Research objectives
The study was guided by the following objectives:

i. To determine how teacher preparedness influences performance of mathematics at Kenya Certificate of Primary Education in Likoni Sub-County.

ii. To determine how teachers’ instructional methods influences performance of mathematics at Kenya Certificate of Primary Education in Likoni Sub-County.
iii. To determine how teacher in-service training influences performance of mathematics at Kenya Certificate of Primary Education in Likoni Sub-County.

iv. To determine how teacher motivation influences performance of mathematics at Kenya Certificate of Primary Education in Likoni Sub-County.

1.5 Research questions

The study was guided by the following questions:

i. How does teacher preparation influence the performance of mathematics in Kenya Certificate of Primary Education in Likoni sub-county?

ii. How does teacher instructional method influence performance of mathematics in Kenya Certificate of Primary Education in Likoni sub-county?

iii. How does teacher in-service training influence the performance of mathematics in Kenya Certificate of Primary Education in Likoni sub-county?

iv. How does teacher motivation influence the performance of mathematics in Kenya Certificate of Primary Education in Likoni sub-county?
1.6 Significance of the study

The findings of this study may be useful to researchers, teachers of mathematics, CEMASTEA and the Ministry of Education (MOE). It may help MOE to find ways of intervening in the teacher related factors influencing curriculum implementation of primary school mathematics. It will also help the primary headteachers in manning and managing the mathematics curriculum implementation at school in order to improve the performance. Curriculum developers may identify the training needs for mathematics teachers in order to narrow the gap between curriculum design and the actual curriculum implementation. Kenya Institute of Curriculum Developers (KICD) may get to know the teacher related factors that influence implementation of mathematics curriculum, re-examine teaching methodologies in teaching mathematics and take measures to improve on implementation by re-in-servicing teachers of mathematics through CEMASTEA.

1.7 Limitations of the study

The researcher would have been faced with the problem of absent headteacher due to their busy schedule. In case of such a situation the researcher could make appointment prior to the visit. In a situation where there was shortage of teachers, a single teacher was forced or asked to handle class 7 and 8. In case such situation arose, the researcher worked with a mathematics teacher in the direct immediate class. In a possibility that other factors other than teacher related ones could be the cause of poor performance in mathematics, the researcher analyzed such factors and indicated them in the summary of the study.
1.8 Delimitation of the study
Since primary schools in Likoni Sub-County had similar characteristics, the scope of the study was delimited to public primary schools, headteachers, mathematics teachers and pupils in Likoni Sub-County because they were reliable. The variables captured were: teacher preparedness, instructional methods, teacher motivation and teacher in-service training because they could influence performance of mathematics at Kenya Certificate of Primary Education.

1.9 Basic Assumption of the study
The assumptions underlying this study were that;

i. All the respondents gave accurate and honest response to items in the research instruments.

ii. Kenya Certificate of Primary Education results were a true reflection and acceptable measure of teachers’ effective implementation.

iii. Teachers were conversant with mathematics syllabus requirements.

1.10 Definition of significant terms
The following are significant terms that were used in the course of this study;

**Performance** refers to pupil achievement in mathematics as indicated by his/her scores in important school or national examination.

**Teacher in-service training** refers to short courses and programmes that take place while one is employed in order to keep in trends with mathematics teaching such as Strengthening Mathematics and Science and School based Teacher Development
Teacher instructional methods refers to all the approaches that a teacher may take to actively engage pupils learning; teacher –centered or learner –centered approaches.

Teacher motivation refers to the driving force that generates and sustains teaching and learning process.

Teacher preparedness refers to the readiness of the teacher as pertains the teaching learning process. The preparation entails preparation of schemes of work, lesson plan, instructional materials and records of work.

Teacher related factors refers to issues within the teacher that affects learning process either positively or negatively such as teacher preparedness, instructional methods, in-service training and teacher motivation.

1.11 Organization of the study

The study is organized into five chapters. Chapter one is the introduction which covers the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, limitations and delimitation of the study, assumption of the study, definitions of significant terms and organization of the study also forms part of chapter one. Chapter two includes literature review highlighting factors such as meaning, rationale and outlining teacher related factors influencing mathematics performance at KCPE in relation to teacher preparedness, instructional methods, teacher in-service training and motivation. It also provides a theoretical and conceptual framework of the study. Chapter three covers research methodologies which comprises of research design, target
population, the sample size and sampling techniques, the description of research instruments, research instrument validity and reliability, data collection procedures and data analysis techniques. Chapter four consists of data analysis, interpretation and discussion of the findings. Finally, chapter five consists of summary of the study, conclusions, recommendation and suggestion on areas for further research.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction
This chapter reviewed teacher related factors influencing performance of mathematics in Kenya Certificate of Primary Education in public schools. It examined the influence of teacher preparation, instructional methods, in-service training and teacher motivation. It also provides a theoretical and conceptual framework for the study.

2.2 The concept of mathematics performance
Mathematics is a way of viewing and making sense of the real world. From the point of view of mathematics, a concept is an idea or an image of something that forms in the mind of children after going through certain learning experiences. Performance of mathematics depends on how well or badly a learner does. A learner can attain high, average or low scores in mathematics. It is a crucial subject and important in our everyday life. It is an area of under performance in quite a number of our schools and this is largely due to lack of confidence and expertise of teachers who teach it. Children learn mathematics if their abilities and needs and interests are taken into account when planning, teaching and evaluating mathematics lesson so that necessary mathematical skills imparted to learners is applicable in real life situations.

The main goal of mathematics education in schools is the mathematisation of the child’s thinking, clarity of thought and pursuing assumptions to logical conclusions which is central to mathematical enterprise. A learner who
performs well in mathematics is likely to have high scores in overall outcomes of other subjects.

2.3 Teacher preparedness and mathematics performance.

Armstrong, Henson and Savage (2009), indicate that in order to provide quality learning experience for all students, lessons must be well planned and prepared effectively. Responsibilities and characteristics of the 21st century teacher is matching instructions and programmes to learner’s characteristics, conducting task analysis to identify an appropriate beginning point, form a logical sequence for instruction and specifying learning intentions. Lessons should be well prepared to suit learners’ capabilities and interests. Lessons must stimulate learners to want to learn the new information. Armstrong et al. (2009) further confirm that as one plans for a group of learners he/she needs to engage in what is called “task-analysis activities.” Task analysis requires that one takes the content that is to be taught and first identify the desired results from learning of the content; secondly break the content into smaller components or sub-tasks that logically build towards the desired results; and finally define appropriate teaching approaches for each component and specify objectives.

A teacher needs to prepare for the learning teaching process. Preparation includes having the following documents: scheme of work, lesson plan, lesson notes and records of work covered. These documents if used appropriately make curriculum implementation effective hence good performance in examinations (Thungu, Wandera, Gachie & Alumande, 2008). Indimuli, Mushira, Kuria, Ndung’u and Waichanguru (2009) claim that teacher
preparation is vital for effective teaching and learning. Effective teaching includes preparation, implementation and evaluation.

The use of appropriate instructional materials is equally important just as the use of effective teaching methods when presenting mathematics lessons. To gain optimal results, the use of these materials should not be limited to teacher's demonstration but rather students must use them in meaningful ways (Ernest, 2000).

Effective instruction depends on both the quality of the resource and the skill of the teacher (Gauther & Lawson, 2004). According to Etsy (2005), instructional materials motivate pupils, and encourages them to study lesson by providing them with opportunity to have an access to information and evaluate it. Etsy (ibid) indicated that the use of concrete materials can produce meaningful use of notational systems and increase student concept development.

According to Douglass and Kristin (2000), in a comprehensive review of activity based learning in mathematics in kindergarten through grade eight, concluded that using manipulative materials produces greater achievement gains than not using them. They also noted that the long-term use of concrete instructional materials by teachers knowledgeable in their use improved student achievement and attitudes. Eshiwani (1983) points out that the availability of text-books and achievement have positive correlation.

Balkie (2000) examined the effect that selected concrete materials have on certain aspects of students mathematical skills development. The examination
compared the effects of using concrete materials with the effects of more abstract instruction. Balkie ibid suggests that, teachers should use manipulative materials in mathematics instruction more regularly in order to give students hands-on experience that helps them construct useful meanings for the mathematical ideas they are learning. Use of the same material to teach multiple ideas over the course of schooling has the advantage of shortening the amount of time it takes to introduce the material and also helps students to see connections between ideas (Douglass & Kristin, 2000).

The No Child Left Behind Act (NCLB) defines teacher-quality variables as: the highest academic degree, type of teaching certificate, major/minor in mathematics, and number of years a teacher taught mathematics (NCLB, 2002). Klecker (2008) conducted a study using a secondary analysis of the 2007 National Assessment of Educational Progress (NAEP). Results were reported in terms of statistical significance. This study found out that an eighth-grade mathematics teacher is more effective with either a major or minor in mathematics, a professional degree, a regular/standard teaching certificate, with 20 and above years of experience in preparation and teaching of mathematics. The teacher quality variables had an impact on the average scale scores of the student academic performance.

Teacher preparation and knowledge of mathematics is pivotal to their capacity to provide effective mathematics instruction and to their ability to access students’ learning (Ball et al., 2005). The National Council for the Teaching of
Mathematics (NCTM, 2000) makes it clear that teachers need knowledge about the important ideas that are central to their grade level.

The measurement of teacher knowledge of mathematics has been a problem occupying researchers for several decades but they sort to use characteristics of teachers and their educational background. Other studies sought to focus on pedagogical content knowledge of teachers (Begle, 1999).

Rowan and Ball (2005) refer to mathematics knowledge for teaching as knowledge that is specific to the profession of teaching and is closely linked to teachers preparation and student achievement. In a study carried by Ball, et al. (2005), on the effects of teachers’ knowledge on students’ achievements, the results showed that teachers who scored higher on mathematics knowledge also produced better gains on student achievements. That is, their students achieved good grades than their counterparts who scored low on mathematics knowledge. They were knowledgeable and prepared well in mathematics before embarking on a teaching and learning process.

2.4 Teacher instructional methods and mathematics performance

There are various techniques and methods of teaching mathematics. Every teacher uses his/her specific way of presenting a lesson. On the other hand, there is no one best or most effective method in teaching mathematics. Miheso (2002) notes that no single teaching method can be the method of choice for all occasions. However, much is known about the characteristics of effective methods of teaching mathematics. What is important for every teacher is to select and use the methods with such characteristics. The quality of
implementing mathematics programs is ultimately determined by the teacher’s performance and effective work in the classroom situations (Rukangu, 2000).

Traditionally, teaching in general and teaching mathematics in particular strongly relied on teacher’s exposition followed by practice of the fundamental skills. Many mathematics teachers support the idea that practice makes perfect. They strongly contend that practice or drill alone can help students to master fundamental skills and procedures.

According to Morris and Arora (1992), mathematics teachers at all levels reverted to an emphasis on facts and skills in mathematics (through drill) became very common in many classrooms. It was monkey see, monkey do mathematics, with little or no reason given. Busbridge and Womack (1991) note that teachers explain a rule on the blackboard, give some examples of the rule in operation, and then set the class many more examples and exercises to do for themselves. They also noted that teachers believe that understanding would eventually come through sufficient practice. However, research has shown that drill alone cannot even guarantee recording of the learned theories.

Bergeson et al., (2000) contend that drill with a fact or skill does not guarantee immediate recall. They posit that student competence with a mathematical skill does necessitate extensive practice. Drill alone contributes little or nothing to growth in a student’s mathematical understanding.

There are a number of principles that appear frequently in any literature on effective mathematics instruction. These include a problem-oriented learning,
focusing on meaning, whole-class discussion and small group-work. Effective teaching requires continuing efforts to learn and improve. Many scholars have addressed various issues relating these topics as effective methods of teaching mathematics.

Research findings clearly support the use of small groups as part of mathematics instruction. This approach can result in increased student learning as measured by traditional achievement measures, as well as in other important outcomes (Douglass & Kristin, 2000)

In a review of 80 research studies on grouping in mathematics classrooms, it was concluded that students working in small groups significantly outscored students working individually in more than 40 percent of the studies (Bergeson et al., 2000). Mihaso (2002) argues that most studies on achievement on cooperative learning found that, there was significantly greater achievement in cooperative classes than in the control classes.

Douglass and Kristin (2000) observes that considerable research evidence within mathematics education indicates that using small groups of various types for different classroom tasks has positive effects on student learning. Reviews of studies of the effects of cooperative learning have generally yielded positive findings. Research has shown that these programs enhance various effective outcomes, including inter-group relations, acceptance of mainstream academically handicapped students by their classmates, self-esteem, enjoyment of class or subject, and general acceptance of others. Further, achievement effects of cooperative learning are generally positive (Douglas, 1992).
According to Posamentier and Stepelman (1999), a classroom in which problem solving plays a central role can provide a good environment for mathematics learning to take place. When confronted with an appropriately challenging and interesting problem, students feel both the urge to solve that problem and the concomitant tension that it arouses.

A problem needs two attributes if it is to enhance student understanding of mathematics. First, a problem needs a teacher who has the potential to create a learning environment that encourages students to discuss their thinking about the mathematical structures and underlying computational procedures within the problem's solution. Second, a problem needs a teacher who has the potential to lead student investigations into unknown yet important areas in mathematics (Bergeson et al., 2000).

Douglass and Kristin (2000) note that investigations have consistently shown that an emphasis on teaching for meaning has positive effects on student learning, including better initial learning, greater retention and an increased likelihood that the ideas will be used in new situations. Similarly, Rachel (2003) found that focusing on the meanings gives students a strong foundation for learning new related ideas. It also helps them to know when to apply particular skills or procedures, because they see the underlying reasons that these methods work. The research findings indicated that achievement levels were significantly different in interactive from those in traditional classrooms at computational levels. However, differences in achievement were evident between interactive and traditional classrooms in application and
comprehension levels of cognitive growth’ (Miheso, 2002:83). She also found in her research that currently didactic teaching accounted for 75% of mathematics teaching and only 25% accounted for classroom interaction.

On the other hand, research suggests that whole-class discussion can be effective when it is used for sharing and explaining the variety of solutions by which individual students have solved problems. It allows students to see the many ways of examining a situation and the variety of appropriate and acceptable solutions (Douglass & Kristin, 2000). Some mathematics educators believe that for a mathematics teaching method to be effective, it should contain various and balanced pedagogical approaches and activities so that students with different types of learning styles can be catered for.

Cockcroft (1982) notes that mathematics teaching at all levels should include opportunities for: Exposition by the teacher; discussion between teacher and pupils and between pupils themselves, appropriate practical work, consolidation and practice of fundamental skills and routines, investigational work and problem solving, including the application of mathematics to everyday situations.

In Singapore as cited by UNESCO, (2009) the problems of teaching mathematics needed qualified mathematics teachers who are equipped with necessary skills and knowledge in presentation of mathematics concepts.

Many pupils fail examination due to poor methods of teaching. Teachers who do not assess learners’ acquisition of knowledge in a course may not be able to
judge the effectiveness of the approaches in the teaching. Assessment of pupils’ performance will therefore assist the teacher to modify the teaching strategy where necessary.

There are various techniques and methods of teaching mathematics. Instructional methods are categorized as teacher –centered and learner-centered. The most common teacher centered method is lecture method. A lecture is usually an exposition where the teacher tells the learner what he/she thinks they should know. In lecture method there is minimal participation by the learners.

Learner–centered methods places the learner at the center of teaching learning process. These methods actively and meaningfully engages the learner in learning activities. They include learner inquiry, experimentation, group activities, discussion and problem solving. Miheso (2012) notes that no single teaching method can be the method of choice for all occasions. Limited background preparation by teachers in the teaching of mathematics, lack of mathematics teaching equipment and materials has been cited as factors contributing to poor performance in mathematics (Githua, 2001). According to Rukangu, (2000) the quality of implementing mathematics program is ultimately determined by the teacher’s performance and effective work in classroom situations.

Various researchers however, have identified factors that attributed to poor performance (Miheso, 2012, Manoal 2011,Benson, 2011) these include teachers not using learner–centered approaches, lack of experiments, practical
modeling activities and lack of professional exposures that could have articulated the teaching of mathematics in schools (Eshiwani, 2001). Teaching or instructional methods greatly influence learners mathematics performance.

2.5 Teacher in-service training and mathematics performance

Shiundu and Omulando (1992) refer to in-service training as an on-going process that promotes professional and personal growth for teachers. This is supported by Bishop (1995) that a more conventional way of introducing teachers’ to new ideas and techniques and methodologies in education is by courses ranging from a few days to several weeks. Some common forms of in-service programs include courses like seminars, workshop and conferences.

It is through the in-service training that teachers get the opportunity to advance their knowledge on their areas of specialization. In-service training of teachers greatly affect the quality of curriculum implementation. Teachers are an important resource in the teaching and learning process and their training and continued professional development is pivotal to achieving the vision and aspirations of the country, (Sessional paper No. 14 of 2012).

Primary school teachers are prepared in the Teacher Training Colleges (TTCs) where training focus mainly on pedagogical and subject knowledge content, which combines both the professional and academic disciplines then, awarded Primary Teacher Certificate known as (P1) certificate.

You (2009) describes experience as a long period of practice over a period of ten years, or more, an individual who is skilled takes in developing an activity,
or mastering a performance. Madsen and Cassidy (2005) claim that research findings have shown that experienced teachers are more critical in their classroom teaching than pre-service teachers. Learners find their course materials given by experienced teachers interesting and meaningful. They find that explanations and activities given in class by this category of teachers are clear.

Clotfelter et al. (2007) performed a longitudinal analysis of a 10-year administrative data set from North Carolina and concluded that teacher experience had positive impact on student mathematics achievement. Klecker (2008), in his research paper entitled ‘Teacher quality of eight-grade math achievement,’ presented at the annual meeting of mid-south Educational Research Association, argued that the eighth-grade students who were taught by teachers with 20 and above years of experience had the highest average scale scores

In-service training remains one of the approaches most often employed to upgrade teacher skills and competence the world over. According to Kenya Education Management Institute (KEMI, 2014) in-service training (INSET) is the whole range of activities by which serving teachers and other categories of educationists within the formal school system may extend and develop their competencies and general understanding of the role which they and their schools are expected to play in their changing societies. As a dynamic profession, teaching requires continuous capacity building, with emphasis on content knowledge on curriculum implementation
The Kenya government in collaboration with donor agencies has consistently implemented teacher-based educational interventions aimed at improving pupils’ achievement in mathematics and science in primary schools. These interventions include; Strengthening Primary Education (SPRED) program, school-based Teacher Development (SbTD) program and Strengthening of Mathematics and Science Education (SMASE) program. (Republic of Kenya 2008, CEMASTEA, 2010, SMASE-WECSA, 2010). Despite these interventions, pupils’ performance in mathematics in primary schools in Kenya National examinations have remained below expectations (KNEC,2010) the knowledge gap in this study.

The SMASE is an INSET program that trains mathematics and science teachers in primary schools so as to improve performance of the subjects by the pupils in Kenya Certificate of Primary Education (KCPE). The INSET focuses on the attitude of the teacher and mastery of content and teaching learning materials. The SMASE –INSET advocates Activity, Student, Experiment, Improvisation (ASEI). Plan, Do, See and Improve (PDSI) pedagogical Approach.(KEMI, 2014). ASEI-PDSI is a pedagogical paradigm that is a deviation from tradition to innovative instructional design. It helps teachers to plan and use methods that create learning environments, opportunities and strategies and enable learners to be in charge of their own learning.
2.6 Teacher motivation and mathematics performance

Internationally, a plethora of research on motivation (Agezo, 2010; Cogneau, 2003; Dolton & Marcenaro - Gutierrez, 2011; Lambert, 2004; Ololube, 2006; Rebore, 2001; Sargent & Hannum, 2005) have found that teacher motivation is associated with student learning outcomes. In a cross-country analysis of the relationship between teacher motivation and pupils performance, Dolton and Marcenaro-Gutierrez (2011) observe that countries with poor records of teacher motivation have low teacher performance leading to poor educational outcomes.

Motivation according to Ofoegbu (2004), includes those inner driving conditions, described as wishes, desires, urges to stimulate interest of a person’s inactivity. Educators do well in curriculum implementation when they are motivated. According to Maslow (1943) theory, people have the need for esteem. These include factors such as recognition, attention, social status and accomplishment. The atmosphere in our education system should motivate mathematics teachers and learners to work hard for successful implementation of the compulsory mathematics curriculum. Mathematics teachers must feel that they are supported by school management, advisory teachers and supervisors for them to successfully implement the compulsory mathematics curriculum. (Ngara, R., & Ngwarai, R. 2013).

Numerous authors and researchers agree that teacher commitment is central to the work of teaching and functioning of education system. Elliott and Creswell (2002) argue that teacher commitment and engagement have been identified as
amongst the most critical factors in the success and future of education. It contributes to teacher’s work performance, absenteeism, burnout, and turnover as well as having an important influence on student achievement. Becker (1999) defines commitment as the investment in a particular career, in this case, teaching. Lortie (1995) regards commitment as the willingness an individual enacts in investing personal resources to the teaching task.

Nias (1991) looks at teacher commitment like an organizational commitment, which is conceptualized as being multidimensional. Joffress et al. (2006) wrote that teachers’ commitment is a crucial factor to an effective school, teacher satisfaction, and retention. They claim that low levels of teacher commitment results into decreased student achievement tests, than in areas where teachers were found not to be committed to their responsibilities, learners performed poorly. It is important to note that teachers’ commitment to their duties is quite significant to pupils’ performance. Committed teachers tend to produce good results at national examinations.

Woods in Truman et al. (2008) in the study entitled “primary teacher commitment and attractions,” claims that teacher commitment takes three forms, with the most important one being professional commitment. They argue that a professionally committed teacher rates their teaching abilities very highly and are committed to their professional advancement. Elliott, and Kingston (2005) argue that there are different forms of commitment to teaching. According to them, the nature and intensity of commitment to teaching depends on factors derived from personal and professional lives.
Commitment is a word they use to distinguish those who are caring, dedicated, and who take their job seriously from those who put their own interest first. The professionally committed teachers take their job seriously and they get enjoyment from it (Elliott & Croswell, 2001). Becker (1999) defines commitment as the investment in a particular career, in this case, teaching. Lortie (1995) regards commitment as the willingness an individual enacts in investing personal resources to the teaching task. Nias (1991) and Tyree (1996) wrote that teachers who are committed are those who see their students’ welfare; they care for, responding to, and meeting students’ needs. They strive to improve on their practice and look at pedagogies and research. They also talk and listen to their children, at the same time they work as a team with others, appropriately prepared for their lessons, and are reflective practitioners. Another view shared by committed teachers is that teaching is not just a job. Teachers invest their personal time even outside school contact hours. They have made teaching as a lifestyle.

2.7 Summary of literature review
This section has reviewed relevant literature on performance of mathematics in particular with special reference to meaning, rationale and application both locally and internationally. Performance of mathematics across regions and locally vary significantly with certain regions posting very good performance while others perform poorly. The government has endeavored to address these discrepancies (knowledge gap) through interventions which are not supported by systematic studies and adequate data. Therefore this study will seek to
demonstrate whether teacher preparation, instructional methods, in-service training and teacher motivation influences mathematics performance in KCPE in Likoni sub-county.

2.8 Theoretical framework

This study will be guided by social constructivism theory that was developed by Vygotsky (1978). In his theory, Vygotsky observed that when children were tested on tasks on their own, they rarely did as well as when they were working in collaboration with an adult (teacher). It was by no means always the case when the adult was teaching them how to perform the task, but that the process of engagement with the adult enabled them to refine their thinking or their performance to make it more effective. Hence, for him the development of language, arithmetic and articulation of ideas was central to learning and development.

The theory is considered to be related to the teaching and learning to a large extent. Constructivism is not pedagogy, but it has a wide ranging impact on learning theories and teaching methods in education. The constructivism view involves two principles. First, knowledge is actively constructed by the learner, not passively received from the environment. Knowledge is a changing body not fixed. Secondly, knowledge is internalized by learners in a social atmosphere, combining previous experience and contribution from all members in the social group (teachers and peers). Knowledge is formed by the process of combining experience and previous learning with ideas presented to the learner by instructors (Atherton, 2010).
In the constructivist classroom’ methodology, the teachers’ role is to promote and facilitate learning. A facilitator (teacher) needs to prepare and plan well in order to achieve his/ her objectives, choose the appropriate instructional methods, be conversant with the trends in mathematics (in-service training) and be highly motivated in order to achieve the expected outcomes. This theory is appropriate for the study in the sense that it addresses learning process in mathematics which is part of improving performance in mathematics.

2.9 Conceptual framework
A conceptual framework is a scheme of concepts or variables which the researcher will operationalize in order to achieve set objectives.

![Conceptual framework of the study showing factors that play a role in pupils’ performance in mathematics](image)

**Teacher preparation**
- Schemes of work
- Lesson plan
- Records of work
- Instructional materials

**Teacher instructional methods**
- Learner -centered
- Teacher -centered

**Teacher in-service training**
- SPRED
- SbTD
- SMASE

**Teacher motivation**
- School management support
- Recognition
- Rewards

**Implementation process**
- Teaching
- Assessment

**Performance in mathematics**
- Upgrade average scores
- Increased high scores
- Decreased low scores
- Effective teaching

Fig 2.1: Conceptual framework of the study showing factors that play a role in pupils’ performance in mathematics
The independent variables in Fig 2.1 are embedded in teachers’ preparation, teaching methodology, teacher in-service training and motivation towards mathematics. The intervening factors are presented as possible interventions and are considered to be the ones that catalyze the improvement of results. Pupils improved performance is shown as the possible outcome. Dependent variable in this study was mathematics performance in KCPE. Performance of KCPE mathematics results to upgrading of average student scores, increasing of number of students with high scores in KCPE and thereby decreasing the number of students who get low scores in the same terminal examination.

Teacher preparation entails having a schemes of work which is based on the syllabus whereas the lesson plan narrates the teaching / learning activities and instructional materials employed in the lesson. Teacher preparation determines the implementation process which can adversely affect the performance on both extremes that is positively or negatively.

Teacher instructional methods are categorized into learner- centered and teacher centered. The teacher’s choice of methodology has an influence on learner’s performance. Teacher in-service training plays a major role in updating teachers with the trends of mathematics. Lack of in-service training can influence the delivery of the content and thereby affect the learning outcome in the KCPE. Teacher motivation can affect the implementation process which in turn adversely affects learners’ performance. The independent variables have direct influence on the dependent variable. Independent variables can influence mathematics performance by upgrading average scores,
increasing high scores or decreasing low scores depending on the implementation process as fore said, that is teaching and assessment. However this relationship may be confounded by extraneous variable such as pupils intelligence, health, economic status and teacher’s skills.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This section will present a detailed description of research methodology used in the study. The section will be organized along the following sub-headings namely: research design, target population, sample size, sampling techniques, research instruments, instrument validity, instrument reliability, data collection procedure and data analysis techniques.

3.2 Research design

Ordho (2005) defines research design as an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance with research purpose. It is the conceptual structure within which research is conducted. It constitutes the blue print for the collection, measurement and analysis of data (Kothari, 2003) The researcher used descriptive survey design. Descriptive survey method of collecting information by interviewing or administering a questionnaire to a sample of individuals (Orodho, 2003). The descriptive survey was used in this study because it allowed the researcher to study the phenomena without manipulation of variables.

3.3 Target population

Target population is defined as that population which the researcher uses to generalize the result of the study (Mugenda & Mugenda, 2003). The target population for this study consisted of 24 public primary schools excluding private schools in Likoni sub-county. The study therefore targeted 24 head

3.4 Sample size and sampling techniques

Babbie (2004) contends that stratified random sampling produces estimates of overall population parameters with greater precision and ensures a more representative sample derived for a relatively homogenous population. Stratified sampling was used to select the required sample of pupils in order to take care of gender. Purposive sampling was used to select 2 mathematics teachers per school to participate in the study. To calculate the sample size from the target population, a table by Krejcie and Morgan for determining sample size was adopted as cited in Kathuri & Pals (see Appendix F). According to Krejcie & Morgan (1970) a sample of 20 headteachers, 20 teachers and 300 pupils were used for this study. Purposive sampling was applied because mathematics teachers possess reasonable understanding of the information the researcher sought for in this study.

Table 3.1

Sample framework

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Target population</th>
<th>Sample</th>
<th>Sample %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head teachers</td>
<td>24</td>
<td>20</td>
<td>83.3</td>
</tr>
<tr>
<td>Teachers</td>
<td>48</td>
<td>20</td>
<td>41.6</td>
</tr>
<tr>
<td>Pupils</td>
<td>1200</td>
<td>300</td>
<td>25.0</td>
</tr>
<tr>
<td>Total</td>
<td>1272</td>
<td>340</td>
<td>149.9</td>
</tr>
</tbody>
</table>
3.5 Research instruments

The researcher prepared questionnaires, interview guide and an observation schedule to collect data. According to Mugenda & Mugenda, (2003) a questionnaire is commonly used to obtain information about the population with each item in the questionnaire addressing a specific objective. The questionnaires contained both structured and open ended questions that allowed more information to be solicited from respondents in the teacher–related factors influencing performance of primary mathematics. The questionnaires sought information on teacher preparedness, teaching methods, in-service training and motivation in teaching of primary mathematics.

Interview guide provide flexibility and ability to probe and clarify response, they note non verbal behavior and they provide response rates and are adaptable (Macmillian & Schumacher, 2001). It is deemed appropriate in this study because it allowed direct interaction with respondents and the collection of in depth information that the questionnaire may not gather.

Observation schedule was used to observe the behavior and characteristics of the learners as different instructional methods are used by the teachers. Characteristics such as interest of learners was observed the role of the teacher was also be observed and recorded using the instrument. Observation schedule records naturally occurring behavior and avoids some of the disadvantages associated with questionnaires and interview.
3.6 Instrument validity

Validity refers to the degree to which the instrument used in research collects the data desired for the study. (Mugenda&Mugenda 2003, Ordho, 2005). The instruments were validated through content validity which is the extent by which data collected using a particular instrument represents a specified domain of indicators or content of a particular content (Mugenda&Mugenda, 2003). Face validity was also be checked which included clarity of printing, font size, appropriateness of language among others Construct validity was evaluated to determine the characteristics being measured by the instrument.

3.7 Pilot study

A pilot study was carried out to pre-test the questionnaires. Questionnaires were administered to 4 schools that did not participate in the main study. The respondents in the pilot study were; 1 head teacher, 2 mathematics teachers and 2 pupils per school. The teacher and pupil questionnaires were administered to the respondents, and an interview was carried out for the head teachers. The data collected was then be analyzed for validation.

3.8 Instrument reliability

According to Mugenda & Mugenda (2003) reliability is the measure of the degree to which a research instrument yields consistent results or data after repeated trials. To ensure reliability of the instrument the researcher used the Test retest technique of assessing the reliability of the instrument. The technique involved administering the same instruments to the same respondent twice. This was administered at an interval of two weeks. A comparison
between the responses obtained was made using Pearson’s correlation coefficient formulae (r) as indicated below.

\[ r = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{[N \sum x^2 - (\sum x)^2][N \sum y^2 - (\sum y)^2]}} \]

N= Number of scores  
X= First set of scores  
Y=Second set of scores  
\[ \sum xy=\text{Sum of the product of the first and second scores} \]  
\[ \sum x = \text{Sum of the first set of scores} \]  
\[ \sum y = \text{Sum of the second set of scores} \]  
\[ \sum x^2 = \text{Sum of the square of the first set of scores} \]  
\[ \sum y^2 = \text{Sum of square of the second set of scores} \]

If the reliability of the instrument is above 0.8, it is considered to have a good reliability. (Mugenda & Mugenda, 2003). The calculated value was 0.82 for teachers and 0.8 for pupils and hence the researcher considered the instruments reliable for data collection.

**3.9 Data collection procedure**

A letter of introduction permit was obtained. After getting the research permit from National Commission for Science, Technology and Innovation (NACOSTI) the researcher will report to the County Director of Education to inform them about the study.
The County director of education further issued authority to visit the schools under his area of jurisdiction (Likoni). The researcher contacted the 19 head teachers through writing letters and thereafter arranged for actual school visit. Through the permission of the school administration questionnaires were administered to the teachers and learners. The researcher explained to the respondents the procedure and gave clarification where it was required. Research instrument verification and interview of head teachers were done on the same day.

3.10 Data Analysis Techniques

According to Mugenda & Mugenda (2003), data analysis is the process of bringing order and meaning to raw data collected. The data was edited and information categorized into topics based on the research questions. Descriptive statistics such as frequency distribution, percentages, graphs and charts was used to analyze the quantitative data collected. Tables were constructed to indicate responses for each item that was used. Quantitative data from open ended questions was organized into sub-topics. Responses were coded, processed and tabulated using the Statistical Package for Social Science (SPSS) version 15.0 windows.

To analyze the qualitative data obtained from the open-ended questions in the Teacher and Student questionnaires, first the data was coded under themes which were pre-determined considering the research questions and the sections and questions in the questionnaires.(content analysis technique) The codes
under each theme were identified from the answers provided. Later, the coded data under thematic categories was converted to frequencies and percentages.

3.11 Ethical consideration

The respondents best interest need to be kept foremost in the researcher’s, mind (Rosnow, 1995). The information gathered from the respondents was treated as confidential and for the purpose of the study only. The researcher sought consent and permission from teachers and administrators who were involved in the study.
CHAPTER FOUR
DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter deals with data analysis and interpretation of findings from the study. It analysis’s teacher related factors influencing pupils’ mathematics performance at Kenya Certificate of Primary Education in public schools Likoni sub-county. The study sampled 20 head teachers, 20 mathematics teachers and 300 pupils. The researcher personally collected the data. The collected data were processed using Statistical Package for Social Sciences (SPSS). All themes discussing the same research objectives were presented and analyzed together. The analysis was presented in both narrative and tabular forms. The research objectives were; the influence of teacher preparedness, instructional methods, in-service training and teacher motivation in the performance of mathematics in Kenya Certificate of Primary Education.

4.2 Questionnaire return rate

Data was collected from 20 head teachers, 20 mathematics teachers, and 300 pupils making a total of 400 respondents. The instrument return rates is shown in Table 4.1

Table 4.1:
Questionnaire return rate

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Sample</th>
<th>Returned Instruments</th>
<th>Return Rates (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics teachers</td>
<td>20</td>
<td>20</td>
<td>100.0</td>
</tr>
<tr>
<td>Pupils</td>
<td>300</td>
<td>300</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>380</td>
<td>380</td>
<td>100.0</td>
</tr>
</tbody>
</table>
According to the information in Table 4.1 there were 20 questionnaires for mathematics teachers and 300 pupils’ questionnaires returned which represents 100 percent. The overall instrument return rate was 100.0% which was above the 80% that Mugenda and Mugenda(2005) recommends as adequate for a study.

4.3 Demographic information of respondents

This section deals with gender of head teachers, mathematics teachers and pupils. The gender of respondents was considered to ensure conclusive information was obtained bearing in mind that some issues could vary from males to females. This information is shown in Table 4.2

Table 4.2

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F%</td>
<td>F%</td>
<td>%</td>
</tr>
<tr>
<td>Head Teachers</td>
<td>15</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Mathematics teachers</td>
<td>14</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Pupils</td>
<td>180</td>
<td>120</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>209</td>
<td>131</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.2, indicates that majority of head teachers 75.0 percent were male while 25.0 percent were female. 70.0 percent of the Mathematics teachers were male and 30.0 percent were female while 60.0 percent of the pupils were male and 40.0 percent were female. This implied that there was gender disparity between male and female head teachers, mathematics teachers and pupils.
There is so such significant difference in gender between male and female pupils. Teacher’s gender had an impact on learning achievement (UNESCO, 2004). The fewer female mathematics teachers imply that girls have few role models and also reinforces the dogma that mathematics is a man’s subject.

The significant difference in gender of mathematics teachers could be because of female are less likely to pursue mathematics related courses because of the stereotype that mathematics is hard for women. The government through SMASE, INSET affirmative action should strive to ensure that there are more female mathematics teachers to improve on the perception that girls are weak on mathematics as a subject.(SMASSE,2004)

4.3.1 Teachers’ academic qualification

The study sought to establish head teacher’s and mathematics teacher’s academic qualification. The findings from the survey are presented on table 4.3

**Table 4.3:**

**Teachers academic qualification**

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Head teachers</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F%</td>
<td>F</td>
</tr>
<tr>
<td>Masters</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Bachelor</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Diploma</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Certificate</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

n=20
According to Table 4.3 most of the head teachers 50 percent had Diploma qualification while 60 percent of the mathematics teachers had certificate qualification which is the minimum requirement of teachers to teach in primary school level.

Ball (2005) says that, trained teachers are more associated with better teaching approaches than untrained teachers. Teacher knowledge of mathematics is pivotal to their capacity to provide effective mathematics instruction and to their ability to assess pupils learning. The National Council for Teaching Mathematics (NCTM, 2000) makes it clear that teachers need knowledge about the important ideas that are central to their grade level.

### 4.3.2 Professional qualification of mathematics teachers

The selected mathematics teachers were asked their professional qualifications. Table 4.4 shows a summary of their responses.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Diploma</td>
<td>10</td>
<td>50.0</td>
</tr>
<tr>
<td>P I</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 4.4 shows that 50 percent of the sampled mathematics teachers were Diploma holders while 30 percent were P1 and 20 percent were approved teachers. Therefore all the mathematics teachers in Likoni sub-county were
qualified to teach mathematics in primary school level. From this it can be inferred that most of the teachers in the sampled schools were skilled professionals hence they were likely to have a professional approach to the teaching of mathematics.

4.3.3 Teaching Experience in Mathematics

The researcher sought to establish teachers working experience in mathematics. The findings are indicated in Table 4.5

In the questionnaire the teachers were further asked to indicate the number of years of teaching experience in mathematics that is tied to the factors such as commitment and ability to deliver content effectively (NTCM 2000). Figure 4.5 shows their responses

Table 4.5:

<table>
<thead>
<tr>
<th>Years</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 years</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>3-4 years</td>
<td>3</td>
<td>15.0</td>
</tr>
<tr>
<td>5-6 years</td>
<td>5</td>
<td>25.0</td>
</tr>
<tr>
<td>Over 7 years</td>
<td>10</td>
<td>50.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The study established that most of the respondents 50 percent had more than seven years of teaching experience meaning that they were well experienced
and capable of influencing good performance of mathematics in primary school level in Likoni sub-county.

The researcher also wanted to establish work experience for head teachers by the number of years they had stayed as head teachers in that particular station. The information is presented in Figure 4.1

![Head teacher’s working experience in the current school](image)

**Figure 4.1**

**Head teacher’s working experience in the current school**

Figure 4.1, shows majority of the head teachers 60 percent had been in the current school for at least 1- 2 years, 30 percent for 3- 5 years while only 20 percent had been in their current station for more than 5 years. There is a high turnover of head teachers in Likoni sub-county. Experienced head teachers are more associated with high pupils’ achievement levels. (Indimuli, 2009). This is because they understand their current school well enough to experience proper management and running of the school.
4.4 Teacher preparedness and performance in mathematics

Teacher preparation entails making the schemes of work, lesson plan and teaching/learning materials. This study sought to find out how prepared teachers were before embarking on teaching of mathematics. Teachers were asked to rate whether they always, rarely, or never prepared before teaching mathematics. The results are indicated in Table 4.6

Table 4.6

Teacher preparation of professional documents

<table>
<thead>
<tr>
<th>Teachers preparedness</th>
<th>Always</th>
<th>%</th>
<th>Rarely</th>
<th>%</th>
<th>Never</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schemes of work</td>
<td>14</td>
<td>70.0</td>
<td>4</td>
<td>20.0</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Lesson plan</td>
<td>6</td>
<td>30.0</td>
<td>12</td>
<td>60.0</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Record of work covered</td>
<td>10</td>
<td>50.0</td>
<td>6</td>
<td>30.0</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Lesson notes</td>
<td>10</td>
<td>50.0</td>
<td>6</td>
<td>30.0</td>
<td>4</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Table 4.6 indicates that 70 percent of teachers always prepared schemes of work and 60 percent rarely prepared lesson plans while only 30 percent of the teachers always prepared lesson plans. About 50 percent maintained records of work and prepared lesson notes respectively. The findings unveiled that most teachers in Likoni sub-county primary schools went to class when they were ill prepared in lesson planning and this greatly hindered the process of meaningful teaching and learning as such there was no way good results in upgrading individual learner scores could come out of unprepared teachers.
Effective teaching is influenced by how well a teacher has prepared for the lesson before teaching start. It originates with one’s interaction with the syllabus and it’s interpretation, the ability to make good schemes of work and lesson plan. (Armstrong, 2009). As Armstrong (ibid) stated, the scheme of work is a detailed, logical and sequential plan that breaks down the syllabus into units that can be used in teaching/learning situation. It makes teaching both systematic and orderly since it ensures that topics in the syllabus are taught in an orderly manner starting with simplest to the most complex which results to increased high scores in mathematics(Indimuli,2009).

A lesson plan is a work plan showing clearly all activities that are going to take place during the lesson and order in which they are going to follow. Lessons should be well prepared to suit the learner capabilities and interest if the teacher wishes to upgrade and decrease low scores in mathematics. Lessons must stimulate learners to want to learn new information. Lesson preparation therefore improves teacher’s performance by acting as a base for lesson presentation. In the absence of quality teacher preparations, poor performance is inevitable (Indimuli,2009).

4.5 Supervision of mathematics curriculum implementation in school level
The researcher sought to find out if the head teachers who are charged with supervision of the curriculum in school level were effectively doing so especially in reference to mathematics. One of the roles of the head teacher is to carry out internal supervision of curriculum implementation in his/her school. This involves physical observation or checking of teachers
preparedness and use of professional documents while teaching or when lesson
is in progress. Result on table 4.7 shows the teachers preparation and utilization
of professional documents by mathematics teachers as observed by the head
teachers.

Table 4.7

Preparation and utilization of professional documents by mathematics
teachers as observed by the head teachers

<table>
<thead>
<tr>
<th>Availability of professional documents (professional indicators)</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sets clear relevant and specific objectives.</td>
<td>F 19</td>
<td>% 90.0</td>
<td>F 2</td>
<td>% 10.0</td>
</tr>
<tr>
<td>Prepares schemes of work that reflect the syllabus.</td>
<td>F 4</td>
<td>% 20.0</td>
<td>F 16</td>
<td>% 80.0</td>
</tr>
<tr>
<td>Prepares lesson plans in line with schemes of work.</td>
<td>F 2</td>
<td>% 10.0</td>
<td>F 4</td>
<td>% 20.0</td>
</tr>
<tr>
<td>Incorporates learning objectives into lesson plan.</td>
<td>F 2</td>
<td>% 10.0</td>
<td>F 2</td>
<td>% 10.0</td>
</tr>
<tr>
<td>Clearly states these at the beginning of the lesson.</td>
<td>F 18</td>
<td>% 90.0</td>
<td>F 2</td>
<td>% 10.0</td>
</tr>
<tr>
<td>Schemes of work and lesson plans are seen by the head teacher.</td>
<td>F 1</td>
<td>% 5.0</td>
<td>F 3</td>
<td>% 15.0</td>
</tr>
<tr>
<td>Mathematics lesson plan are done on daily basis before going to class.</td>
<td>F 4</td>
<td>% 20.0</td>
<td>F 16</td>
<td>% 80.0</td>
</tr>
<tr>
<td>Teacher prepares teaching learning mathematics materials.</td>
<td>F 4</td>
<td>% 20.0</td>
<td>F 16</td>
<td>% 80.0</td>
</tr>
<tr>
<td>Does doing the above improve performance in mathematics?</td>
<td>F 16</td>
<td>% 80.0</td>
<td>F 2</td>
<td>% 10.0</td>
</tr>
</tbody>
</table>

n=20
According to head teachers' views, preparation and use of professional documents (Table 4.7) indicate that 90 percent of the head teachers agreed that most of the teachers set clear relevant and specific objectives. 90 percent of the head teachers said that almost all teachers had their schemes of work and lesson plans seen by the head teachers, and 80 percent agreed that if teachers prepared their professional documents well, mathematics performance would improve. About 80 percent of the head teachers strongly agreed that most teachers prepared schemes of work that reflected the syllabus and also prepared teaching learning materials respectively. Some head teachers disagreed that teachers incorporated learning objectives into lesson plans and that mathematics lesson plans are done on a daily basis before going to class. This indicates that most of the professional documents were prepared but were not consulted by teachers while teaching in most cases. This could be a factor of poor mathematics performance in most schools.

### 4.6 Head teachers’ frequency of checking professional documents

The responsibility of checking the professional documents like schemes of work, lesson plans, records of work covered and registers lies in the hand of the head teacher. This may be done in person or he/she may delegate to the deputy head teacher or the senior teacher. Preparation and use of schemes and lesson plans by the teacher enhances sequential teaching and results to improved performance. Teachers’ lesson plan is a professional document prepared by the teacher for the purpose of presentation of a lesson. Lesson plans are prepared for each day of learning in a subject. The teacher indicates whether a lesson has
been taught or not taught. If not taught, then the teacher indicates the reason why it is not taught and when he/she intends to cover it. If the lesson objectives are not achieved the teacher plans for remedial lessons in order to make the concept be understood by the pupils. The frequency of checking teacher’s professional records was therefore looked into as shown in Table 4.8

### Table 4.8

**Head teachers’ frequency of checking professional documents**

<table>
<thead>
<tr>
<th>Documents</th>
<th>Weekly</th>
<th>%</th>
<th>Fortnightly</th>
<th>Monthly</th>
<th>%</th>
<th>Termly</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schemes of work</td>
<td>Nil</td>
<td>6</td>
<td>30.0</td>
<td>4</td>
<td>10.0</td>
<td>10</td>
<td>50.0</td>
</tr>
<tr>
<td>Lesson plan</td>
<td>2</td>
<td>10.0</td>
<td>8</td>
<td>40.0</td>
<td>10</td>
<td>50.0</td>
<td>Nil</td>
</tr>
<tr>
<td>Record of work</td>
<td>Nil</td>
<td>4</td>
<td>20.0</td>
<td>12</td>
<td>60.0</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Covered Registers</td>
<td>Nil</td>
<td>Nil</td>
<td>16</td>
<td>80.0</td>
<td>4</td>
<td>20.0</td>
<td></td>
</tr>
</tbody>
</table>

n=20

According to Table 4.8 most head teachers 80 percent checked pupils attendance register on monthly basis. Record of work 60 percent was checked monthly. Schemes of work 50 percent was checked termly while lesson plans 50 percent was checked monthly. The 50 percent termly head teachers checking of schemes of work indicates that they do not do any follow up on curriculum implementation during the course of the term. Checking of teachers schemes of work should be done fortnightly to allow the head teacher monitor curriculum implementation. Lack of this close monitoring could be a factor contributing to poor performance of mathematics. Head teachers should monitor lesson plan preparation weekly; otherwise it may lead to poor
performance of mathematics. Asked if they supervise classroom teachings, most of the head teachers said they do not supervise mathematics classroom teachings. Head teachers non-supervision on mathematics classroom teaching and average 50 percent checking of lesson plans and schemes of work (vital tools of teaching) was not sufficient and could be a factor leading to poor performance by the pupils. One of the roles of the head teacher is to carry out internal supervision of curriculum implementation in his/her school (Tella, 200). This involves physical observation of teacher’s lessons in progress. Failure to do so may lead to poor performance in national examinations. The pupils were asked to indicate whether they liked their teachers’ mathematics teaching presentation. Their responses are indicated in Figure 4.2

Figure 4.2

Pupils responses on teachers’ lesson presentations

Figure 4.2 indicates that 60 pupils liked mathematics teacher teaching presentation while 240 pupils did not like teacher’s mathematics presentation.
Teacher presentation affects learning outcomes (Posamentier, 1999). Teachers lesson presentation is associated with increased or decreased learner scores in mathematics (Gauther, 2004). Teachers poor presentation could have contributed to poor performance of mathematics. Teachers were asked to indicate the forms of mathematics tests they administered to pupils in their schools, their responses are indicated in Figure 4.3

![Forms of Assessment tests administered](image)

**Figure 4.3**

**Forms of assessment tests administered to pupils**

According to Figure 4.3, 40 percent of the teachers administered class exercises to learners, 30 percent tests and 10 percent terminal examinations. Tests are best known form of assessment for positive outcomes (Makewa, 2012). According to Figure 4.3, 30 percent of the teachers in Likoni indicated that they gave tests as a form of assessment which may have been inadequate for good results in mathematics performance. The pupils were asked to indicate
how often their mathematics books and assignments were marked. Table 4.9 shows their responses.

Table 4.9

Pupils’ observation on teachers’ frequency of marking mathematics books

<table>
<thead>
<tr>
<th>Intervals</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>54</td>
<td>18.0</td>
</tr>
<tr>
<td>Weekly</td>
<td>246</td>
<td>82.0</td>
</tr>
</tbody>
</table>

n=300

Table 4.9, indicates that majority of the mathematics teachers 82.0 percent mark pupils’ mathematics books on weekly basis while only 18.0 percent mark them on daily basis. Marking of mathematics books and assignment on a weekly bases delays prompt feedback for learners’ performance (Githua, 2001). Hence it could be a factor of pupils’ poor performance of mathematics.

4.7 Frequency of mathematics assessments

Accurate assessment of pupils’ academic abilities has been identified as one of the most crucial variables related to effective instructional planning and positive pupil outcomes. It has been argued that without varied assessment of pupils’ academic skills, instructional decision making is unlikely to promote academic competence (Martens & Witt, 2004). According to Stiggins, Arter, & Chappuis, 2007), there are two kinds of assessment during instruction and assessment for learning. Assessment for learning involves use of homework assignments, quizzes, and self assessment drafts. This kind of assessment is
child centered and gives the learner an opportunity to find information about areas of strength and areas of further learning. Assessment of learning is a periodical assessment like mid-terms and final examinations which are teacher centered and judgmental for they are meant to inform the final grade of the learner. The study sought the opinions from pupils on how many times in a term their mathematics teachers gave them mathematics tests. Their responses are shown on Table 4.10.

Table 4.10

Pupils’ responses on the frequency of tests provided per term

<table>
<thead>
<tr>
<th>Frequency of assessment</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once a term</td>
<td>162</td>
<td>54.0</td>
</tr>
<tr>
<td>Twice a term</td>
<td>102</td>
<td>34.0</td>
</tr>
<tr>
<td>Thrice a term</td>
<td>12</td>
<td>4.0</td>
</tr>
<tr>
<td>More than thrice a term</td>
<td>24</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

According to table 4.10, most of the pupils54 percent were of the opinion that teachers administered mathematics tests once a term and only 4 percent of the pupils indicated that teachers administered tests thrice a term. Continuous assessment in mathematics is vital for good performance (Stiggins,2007).About 54 percent of the pupils showed that teachers administered tests once a term which was insufficient and could have contributed to poor performance in mathematics.
4.8 Teachers’ views on the use of teaching and learning materials during mathematics lesson.

The adequacy and use of teaching and learning materials affect the effectiveness of a teacher’s lesson. Teaching and learning resources enhance understanding of abstract ideas and improves performance (Douglas, 2000). The teacher were asked to indicate whether they used teaching learning materials during mathematics lessons. The following were their responses.

Table 4.11
Teachers use of teaching and learning materials

<table>
<thead>
<tr>
<th>Rating on use of teaching learning materials</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>Sometimes</td>
<td>16</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Table 4.11, indicates 80.0 percent of the teachers sometimes use teaching and learning materials while 20.0 percent always use teaching and learning materials. According to Douglas and Kristin,(2000) use of teaching learning materials has the advantage of shortening the amount of time it takes to introduce the content being taught and also helps learners to see connections between ideas. Majority of the teachers did not use teaching and learning materials when teaching mathematics this could be the cause of poor performance. The study also sought comments from pupils on whether mathematics teachers use teaching and learning materials during lessons. Table 4.12 shows their responses.
Table 4.12

Pupils’ observation on use of teaching and learning materials

<table>
<thead>
<tr>
<th>Rating on use of teaching and learning aids</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td>102</td>
<td>34.0</td>
</tr>
<tr>
<td>Sometimes</td>
<td>198</td>
<td>66.0</td>
</tr>
</tbody>
</table>

According to Table 4.12, 66.0 percent of pupils agreed that mathematics teachers sometimes used teaching/learning materials. About 34.0 percent said that teachers always use teaching and learning materials. Lack of learning/teaching materials contribute to poor performance in national examinations (Eshiwani, 1983) Teachers and pupils both agreed that the use instructional materials was minimal and this could be a factor contributing to poor performance of mathematics. Adequate prior preparation before a teacher goes to class leads to good performance by the pupils. Prior preparation by the teachers leads to systematic delivery of concepts to pupils and enhances performance. Therefore, teachers prior preparation was not sufficient and could be a factor leading to poor performance of mathematics by the pupils in Likoni Sub-County.

Performance of mathematics in KCPE is influenced by how well a teacher has prepared for each of mathematics lesson before teaching starts. Preparation originates with one’s interaction with the syllabus and its interpretation and the ability to make the schemes of work and lesson plans. Performance of mathematics is also influenced by effective supervision of mathematics.
curriculum implementation by the head teacher and classroom utilization of the teachers professional documents.

Head teacher’s frequency of checking professional documents, teacher subject presentation, forms of assessment tests administered to learners and their frequency greatly influences performance in mathematics. Performance is also influenced by teachers use of teaching and learning materials during mathematics lessons. When proper or adequate preparation is adhered to, it influences the performance by upgrading individual learners average scores, increases the sum of high scores and consequently decreases the number of low scores of individual learners. Teacher preparedness enhances effective teaching and hence influences learners performance.

4.9 Instructional methods and mathematics performance

The second objective of the study was to find out whether teacher instructional methods influence performance of mathematics. The study therefore first sought to find out the teachers views on the extent to which teaching strategies influence performance of mathematics. A teaching strategy is a way and means of organizing and facilitating learning experiences (Makewa,2012). They used the key scale; Very large Extent(VLE), Large Extent(LE), Some Extent(SE) and Not at All(NA). Their responses are shown on table 4.10.
Table 4.13

Teachers views on the instructional strategies and mathematics performance

<table>
<thead>
<tr>
<th>Instructional strategies.</th>
<th>VLE</th>
<th>LE</th>
<th>SE</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Learner- centered approaches.</td>
<td>2 10.0</td>
<td>6 30.0</td>
<td>8 40.0</td>
<td>4 20.0</td>
</tr>
<tr>
<td>Teacher –centered approaches.</td>
<td>10 50.0</td>
<td>6 30.0</td>
<td>2 10.0</td>
<td>2 10.0</td>
</tr>
<tr>
<td>Use of computer technology.</td>
<td>2 10.0</td>
<td>2 10.0</td>
<td>6 30.0</td>
<td>10 50.0</td>
</tr>
</tbody>
</table>

n=20

Table 4.13 shows that teacher- centred approaches to a very large extent 50 percent, influence mathematics performance. Learner-centred approaches according to the teachers view to some extent 40 percent, influence mathematics performance while use of computer technology does not 50 percent influence mathematics performance at all. It is important for teachers to be aware of learner-centred approaches as the best strategies and means of carrying out teaching of mathematics for successful out outcomes. The overall way in which the process of instruction in the classroom is organized and executed greatly influence pupils performance of mathematics (Makewa, 2012). The organization and execution influence learners high ,average or low sores attainment in mathematics. Some extent 40 percent minimal use of learner-centred strategies responses by teachers and very large extent 50 percent use of teacher-centred approaches could be a factor contributing to poor mathematics performance by the learners.
Mathematics curriculum can be implemented in various ways and the study sought to find out from the teachers which teaching methods were mostly used by teachers to teach mathematics. The teachers responses about the teaching methods they used in their mathematics classes are summarized and presented in Table 4.14

Table 4.14

Teaching methods used according to teachers.

<table>
<thead>
<tr>
<th>Teaching Methods</th>
<th>Very Often</th>
<th></th>
<th>Often</th>
<th></th>
<th>Rarely</th>
<th></th>
<th>Not at All</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Lecture method</td>
<td>12</td>
<td>60.0</td>
<td>6</td>
<td>30.0</td>
<td>1</td>
<td>5.0</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Small group</td>
<td>4</td>
<td>20.0</td>
<td>8</td>
<td>40.0</td>
<td>6</td>
<td>30.0</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Discussion</td>
<td>6</td>
<td>30.0</td>
<td>8</td>
<td>40.0</td>
<td>4</td>
<td>20.0</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>Demonstration</td>
<td>10</td>
<td>50.0</td>
<td>7</td>
<td>35.0</td>
<td>2</td>
<td>10.0</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Question and answer</td>
<td>7</td>
<td>35.0</td>
<td>6</td>
<td>30.0</td>
<td>4</td>
<td>20.0</td>
<td>3</td>
<td>15.0</td>
</tr>
</tbody>
</table>

N=20

Data obtained in Table 4.14 indicate that over a half of the teachers very often 60 percent use lecture method, 50 percent very often use demonstration, 40 percent often use small group, 40 percent often use discussion method and 35 percent very often use question and answer. These results agree with Wasike (2006). According to Wasike, lecture method is ineffective in that it turns the learners into passive participants in the learning process which influence to the learners low scores in mathematics. However, despite the disadvantage, lecture method is useful in covering large content (SMASSE, 2007). Demonstration, just
like lecture method has the disadvantage of placing learners in a more passive role for they are denied opportunity to practice some manipulative skills (Wasike, 2006). Discussions, small group, question and answer methods create an enabling environment for learners and ensures that individual differences are taken care of. The lecture method is also commonly used due to large classes but it has a disadvantage of not assessing every individual in the learning process. Asked to indicate reasons for using the identified methods, most teachers said that they used lecture and demonstration methods because they are suitable for large classes as their classes are highly populated and are economical as they require only limited resources.

Teachers were asked to give challenges they faced when using the suggested methods. They said they faced challenges of inadequacy of instructional materials, large classes and slow learners who make coverage of the syllabus impossible. They were also asked to indicate any part of mathematics they were not adequately conversant with. Many teachers reported that they have some parts of mathematics which they were not adequately conversant especially the algebraic expressions part of mathematics. When asked to indicate the most commonly used methods in teaching of mathematics in their schools, the head teachers concurred with the teachers that lecture and demonstration methods were the most commonly used which could be a factor contributing to poor performance of mathematics. Pupils were asked to indicate the teaching methods used by their mathematics teachers in their classes. Table 4.15 shows their responses.
Table 4.15

Pupils’ responses on instructional methods used by their mathematics teachers

<table>
<thead>
<tr>
<th>Methods</th>
<th>Very Often</th>
<th></th>
<th>Often</th>
<th></th>
<th>Never</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Lecture method</td>
<td>132</td>
<td>44.0</td>
<td>120</td>
<td>40.0</td>
<td>48</td>
<td>16.0</td>
</tr>
<tr>
<td>Small group</td>
<td>90</td>
<td>30.0</td>
<td>30</td>
<td>10.0</td>
<td>180</td>
<td>60.0</td>
</tr>
<tr>
<td>Question and answer</td>
<td>60</td>
<td>20.0</td>
<td>210</td>
<td>70.0</td>
<td>30</td>
<td>10.0</td>
</tr>
<tr>
<td>Discussion</td>
<td>60</td>
<td>20.0</td>
<td>210</td>
<td>70.0</td>
<td>30</td>
<td>10.0</td>
</tr>
<tr>
<td>Demonstration</td>
<td>120</td>
<td>40.0</td>
<td>210</td>
<td>70.0</td>
<td>30</td>
<td>10.0</td>
</tr>
</tbody>
</table>

n=300

Table 4.15 indicates that 44% of the sampled pupils agreed that teachers very often used lecture method. They often use question and answer, and discussion 70% respectively while 60% of the pupils said that teachers never use small group discussion. The very often use of traditional lecture method to teach mathematics may be a factor of poor performance of mathematics. These results agree with Wanjohi (2006) who found out that lecture method was the main method used in teaching of mathematics in most schools. Some methods such as question and answer, discussion and small groups are known to improve pupils’ confidence and ability to solve mathematics problem. However, the methods were just often used or not used at all and this could explain why mathematics performance was not satisfactory.
4.10 Classroom observation schedule

Observation procedures recorded naturally occurring behavior and avoided some of the advantages associated with questionnaires and interviews. It was used in the study to gather information on teaching and learning methods in a classroom by the observer. Table 4.21 shows the methods used by teachers.

Table 4.16

Teaching methods from classroom observation

<table>
<thead>
<tr>
<th>Methods</th>
<th>Frequently used</th>
<th>Not frequently used</th>
<th>Never used</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Lecture method</td>
<td>20</td>
<td>100.0</td>
<td>0</td>
</tr>
<tr>
<td>Small group</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Question and answer</td>
<td>0</td>
<td>0.0</td>
<td>5</td>
</tr>
<tr>
<td>Discussion</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Demonstration</td>
<td>0</td>
<td>0.0</td>
<td>5</td>
</tr>
</tbody>
</table>

n=20

Table 4.16 shows what really happened in the classrooms when the researcher visited the schools. It indicates that all the teachers (100%) frequently used lecture method. On the other hand, no teacher used either small group, question and answer, discussion or demonstration methods frequently. Questioning and answer (25%) and demonstration (25%) methods were sometimes used. Small group (100%) and discussion (100%) were never used at all.

According to the teachers’ responses, 50% of the teachers very often used demonstration method of teaching. However, the findings from the classroom
observation indicated that sampled teachers never used other methods apart from lecture method. These differences can be attributed mainly to the fact that the real meanings of the teaching methods mentioned in the questionnaire, such as small group and discussion were not clear to most teachers. Instructional methods greatly influence learners achievement of high, average or low scores in mathematics. Continued use of lecture method could be a factor of mathematics poor performance in Likoni sub-county.

Instructional strategies and methods of teaching influence performance of mathematics. Teacher organization and facilitation of learning experiences influences performance of learners. Mathematics subject matter is built on previous knowledge. Teachers should always start with the simplest examples that will achieve their objectives to more complex examples. The form of strategies employed influences performance of learners and has a bearing to increasing or decreasing scores of learners. Teachers choice of instructional method determines the performance of learners. Appropriate strategies and proper utilization of corresponding instructional method influences the scores of individual learner in mathematics. It results into upgrading of average scores of each learner decreasing of low scores and facilitates effective teaching.

4.11 Teacher in-service training and mathematics performance

Teacher in-service training is one of the indicators of experience. In-service programmers include courses like seminars, workshops and conferences. It is through in-service training that teachers get the opportunity to advance their knowledge on their areas of specialization. In-service of teachers greatly affect
the quality of curriculum implementation (SMASE, 2007). The mathematics teachers were first asked to indicate if mathematics was a minor, major or general subject among others in their training and their responses are tabulated in the Table 4.17

**Table 4.17**

Teacher’s mathematics training

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Major</td>
<td>16</td>
<td>80.0</td>
</tr>
<tr>
<td>General</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

As shown in Table 4.17, 80% of the teacher took mathematics as a major in teacher training. Only a small percentage (20%) took mathematics as a general subject. Asked to say how long they had taught mathematics, most of the teachers indicated that they had taught for less than four years. These are the new recruits who joined teacher training colleges when specialization was introduced as grouped in science and arts. Madsen and Cassidy (2005) claim that research findings have shown that experienced teachers are more critical in their classroom teaching than pre-service teachers. Learners find their course materials given by experienced teachers interesting and meaningful. They find that explanations and activities given in class by these categories of teachers are clear. The teachers were also asked to indicate if they were well equipped in the mathematics knowledge (content). Rowan and Ball (2005) refer to
mathematics knowledge for teaching as knowledge that is specific to the profession of teaching and is closely linked to student achievement. Table 4.18 analysis’s their responses.

**Table 4.18**

**Extent of teachers’ mathematics knowledge**

<table>
<thead>
<tr>
<th>Extent</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large extent</td>
<td>14</td>
<td>70.0</td>
</tr>
<tr>
<td>Small extent</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td>Not at all</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

As shown in Table 4.18 majority (70%) of the teachers were well equipped in mathematics knowledge to a large extent. Only 30% were equipped with mathematics knowledge to a small extent. In a study carried by Ball,(2005) on the effects of teachers’ knowledge on students’ achievements, the results showed that teachers who scored higher on mathematics knowledge also produce better gains on student achievements. That is, their students achieved good grades than their counterparts who scored low mathematics knowledge.

When asked to indicate if they had attended SMASE in-service, about 60% indicated that they had never attended SMASE in-service while the rest 40% indicated that they attended in-service training as shown in Figure 4.18.
Teachers’ response on SMASE in-service attendance

SMASE trained teachers have significant relationship with pupils high score achievement in mathematics (Githua, 2001). Lack of SMASE in-service training could be a factor that contributed to poor mathematics performance. Mathematics teachers were asked to indicate the mathematics INSET they had attended. Figure 4.4 shows their responses.

Table 4.19
Teachers frequency of mathematics INSETS

<table>
<thead>
<tr>
<th>Training</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMASE</td>
<td>4</td>
<td>20.0</td>
</tr>
<tr>
<td>SPRED</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>SbTD</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td>SMASE/SPRED</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>SMASE/SbTD</td>
<td>3</td>
<td>15.0</td>
</tr>
<tr>
<td>SPRED/SbTD</td>
<td>2</td>
<td>10.0</td>
</tr>
<tr>
<td>SMASE/SPRED/SbTD</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
According to Table 4.19, 30% of mathematics teachers had attended SbTD in-service training, 20% had attended SMASE, 15% had attended both SMASE and SbTD, 10% had attended SPRED, SMASE/SPRED, SPRED/SbTD respectively and only 5% had attended all the three in-service training courses. Continuous INSET of mathematics teachers is a prerequisite for successful implementation of mathematics curriculum (KEMI, 2014). INSET in mathematics has undeniable value to the efficiency and effectiveness of mathematics curriculum delivery. It yields increased teacher productivity, reduction of costly mistakes, increased job expertise and work standardization which influence the learners understanding of mathematics which leads to the good performance of the subject. Mathematics teachers were also asked to respond to their use of ASEI-PDSI teaching approach. ASEI-PDSI is a pedagogical paradigm that is a deviation from tradition to innovative instructional designs. It helps teachers to plan and use methods that create learning environments, opportunities and strategies and enable learners to be in charge of their learning (KEMI, 2014). Their responses are indicated in the Table 4.20.

**Table 4.20 ASEI-PDSI teaching approach**

<table>
<thead>
<tr>
<th>Teaching approach</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>ASEI-PDSI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>teaching approach</td>
<td>30.0</td>
<td>40.0</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td>14</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>knowledge-based</td>
<td>70.0</td>
<td>20.0</td>
<td>10.0</td>
</tr>
<tr>
<td>text book</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>procedures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inductive</td>
<td>8</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>approach</td>
<td>40.0</td>
<td>20.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Deductive</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>approach</td>
<td>30.0</td>
<td>30.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Team-teaching</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>approach</td>
<td>20.0</td>
<td>30.0</td>
<td>50.0</td>
</tr>
</tbody>
</table>

n=20
According to Table 4.20 results, traditional knowledge–based text book procedures 70%, inductive 40%, ASE-PDSI 30%, deductive 30% and team-teaching 20% teaching approaches are always used by mathematics teachers. ASEI-PDSI 40%, deduction 30%, and team-teaching 30% approaches are sometimes used by mathematics teachers. Team-teaching 50% approach is never used by teachers. The minimal use of ASEI-PDSI mathematics teaching approach may affect mathematics teaching outcome (KEMI, 2014). ASEI-PDSI is a new participatory teaching approach which is learner-centred. It is induced to teachers through SMASE-INSET programmes.

The use of ASEI-PDSI greatly influence learners high, average or low achievement of mathematics. The findings indicate that teachers are not updated with the new and current teaching approaches of the 21st century that engage the learners in a variety of instructional approaches that influence or make the teaching/learning of mathematics process interesting, stimulating and learner-centred like ASEI-PDSI which could be a factor that contribute to poor performance of mathematics.

The teachers were also asked to indicate how often they attended mathematics INSET. Their responses are tabulated in Table 4.21
Table 4.21

Teachers mathematics INSET attendance

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Monthly</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Termly</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Yearly</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td>Never</td>
<td>14</td>
<td>70.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

According to table 4.21, 70% of the teachers never attended INSETs. About 30% of mathematics teachers have attended a mathematics INSET yearly. Majority of the teachers have never attended the INSETs. Those few who have attended the INSETs yearly said that they greatly benefited from in-service training and recommended that all mathematics teachers should be exposed to such training. This concurred with Bishop (1995) who established that a more conventional way of introducing teachers to new ideas, techniques and methodologies in education is by courses such as seminars, workshop and conferences. During these sessions teachers get the opportunity to advance their knowledge in their areas of specialization hence improving the quality of curriculum implementation. The teachers were also asked to indicate if they enjoyed SMASE-INSETS. Their responses is tabulated in figure 4.5
Figure 4.5

Teachers responses on enjoyment of SMASE INSETs

According to Figure 4.5, 80% of those mathematics teachers who have attended SMASE-INSET did not enjoy the training. Only 20% of them enjoyed the training. Carpenter and Lubinski (1990) show that classroom strategies used to teach a subject are influenced by teacher attitudes, which in turn influence pupils attitudes. This implies that teacher attitudes towards the subject actually produce the same attitudes on the learner. It is therefore assumed that teachers who hold more learner-centered, socio-constructive oriented beliefs would translate into their classroom practices greater enthusiasm towards actively engaging their learners in acquiring mathematics concepts and developing mathematical thinkers and problem solvers (Ernest, 2000). SMASE-INSET trainings help teachers to effectively teach and upgrade learners scores, increase them and decrease low scores in the learners terminal mathematics examination. According to findings most teachers do not attend in-service training. They mostly use teacher-centered
approaches which influence poor mathematics performance. Teaching approaches and delivery is the most crucial aspect in mathematics teaching learning process.

In-service training and orientation of mathematics teachers ensures that mathematics curriculum is implemented and carried out effectively. Capacity building for mathematics teachers equips them with necessary professional development that enables them to deal with the trend of mathematics changes effectively. It is through in-service training that teachers get the opportunity to advance their knowledge and methodologies that when employed in classroom influences the performance of learners and ultimately determine upgrading, increasing high or decreasing of scores and consequently effective teaching.

4.12 Teacher motivation and performance in mathematics
Motivation, according to Ofoegbu (2004), includes those inner driving conditions, described as wishes, desires urges to stimulate the interest of a person in an activity. Motivation, therefore, triggers behavior. For performance to improve, teachers and pupils must be motivated. Overall achievement in mathematics is due to teachers and learners motivation through incentives. The teachers were asked to indicate their views on teacher motivation and mathematics performance. Table 4.22 shows their responses.
Table 4.22

Teacher motivation and mathematics performance

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>SA</th>
<th>A</th>
<th>DA</th>
<th>SDA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Motivation is one of the driving force in learning process</td>
<td>14</td>
<td>70.0</td>
<td>6</td>
<td>30.0</td>
</tr>
<tr>
<td>Rewarding of teachers and learners help in improving performance</td>
<td>8</td>
<td>40.0</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Teachers and learners who are not motivated perform poorly</td>
<td>4</td>
<td>20.0</td>
<td>8</td>
<td>40.0</td>
</tr>
<tr>
<td>Guardians expect their children to perform well in Mathematics</td>
<td>8</td>
<td>40.0</td>
<td>4</td>
<td>20.0</td>
</tr>
</tbody>
</table>

n=20

Most teachers (70%) strongly agreed that motivation is one of the driving forces in a learning process. While 40% agreed that teacher and learners who are not motivated perform poorly. About 10% of the teachers strongly disagreed that rewarding of teachers and learners helped in improving performance or that guardians expect their children to perform well in mathematics. They were also asked to indicate the motivating factors in the teaching and learning of mathematics. Most of them indicated monetary rewarding of teachers, availability of teaching and learning materials and pupils’ positive attitude towards mathematics as a subject greatly influence
teachers and learners performance in mathematics. Teachers’ lack of motivation could be a factor that influenced poor mathematics in performance.

4.13 Pupils’ views on teacher motivation and performance in mathematics.

The pupils were asked to indicate how committed their mathematics teachers were in mathematics. Their responses are shown in the Table 4.23

**Table 4.23**

*Pupils view on teachers’ commitment in teaching of mathematics*

<table>
<thead>
<tr>
<th>Commitment</th>
<th>Very committed</th>
<th>Committed</th>
<th>Not committed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Marking pupils work</td>
<td>180</td>
<td>60.0</td>
<td>90</td>
</tr>
<tr>
<td>Assisting pupils after class</td>
<td>210</td>
<td>70.0</td>
<td>60</td>
</tr>
<tr>
<td>Attending mathematics lessons</td>
<td>192</td>
<td>64.0</td>
<td>84</td>
</tr>
</tbody>
</table>

n=300

The pupils’ views were that 70% of the teachers assisted pupils after class, 64% attended mathematics lessons and 60% of the very committed marked pupils’ work. About 30% are committed and that only 8% are not committed in teaching of mathematics. Teacher and pupils commitment is central to the work of teaching and learning and functioning of education system. Elliot and Cresswell (2002) argue that teacher and pupil commitment and engagement have been identified amongst the most critical factors in the access and future of education. It contributes to teachers and pupils performance. According to the findings, most of the pupils agreed that motivation and rewarding of
teachers and pupils influenced achievement of high scores in mathematics. Lack of pupils’ motivation could be a factor of poor mathematics performance in Likoni sub-county.

Pupils were asked to indicate if they and their teachers were rewarded when they performed well in mathematics. Rewards are motivational things given to someone for doing well or for encouragement. Rewards motivate both the teachers and learners. The motivations can either be intrinsic or extrinsic. Their responses is shown on Figure 4.6

![Figure 4.6](image)

**Bar graph showing motivation rewards**

When pupils were asked to indicate if they were rewarded when they perform well in mathematics, 70% said that they were not rewarded when they performed well in mathematics and only 30% said that they were rewarded. Asked if their teachers are rewarded for good performance in mathematics; 90% said that teachers were rewarded and only 10% said teachers were not
rewarded. About 92% of the pupils indicated that their parents and guardians are concerned on how they perform mathematics. Only about 8% indicated that their parents and guardians are not concerned on how they perform in mathematics. Most of them (80%) agreed that some areas in mathematics are not easily understood for example hire purchase, algebraic expressions, ratio and proportion and construction. 20% said that there were no particular areas in mathematics they did not understand when being taught.

These results agree with Tella (2000) who noted that teachers and parents can motivate or sustain the learners interest in mathematics by approaching the subject with pleasure, confidence, empathy, warmth and genuineness. Teachers in particular can motivate the learners personally by creating a favourable atmosphere in the classroom by supporting the learners effort and using reinforced techniques like rewards or focusing of success in upgrading average scores of learners which influence performance in mathematics.

Motivation triggers behavior. It is also reciprocates where teachers motivates pupils and pupils performs well and motivate the teachers. Performance of pupils and teachers is affected by how well they are motivated. Highly motivated teachers and pupils performs better in examinations. This translates to upgrading of average scores of individuals, increasing high scores and vice versa. Motivation has a basis on effective teaching.

From the interviews, it was clear that to continuously improve teaching of mathematics, the following suggestions by head teachers and teachers were being considered; workshops, seminars and in-servicing of teacher on current trends in mathematics education and introducing mathematics hours on school time table for remedial teaching to help the weak pupils, emphasize pupils self and peer tutoring through discussion group, increase the monitoring and supervision functions of school administration, increase the pupils and teachers motivation when they excel in mathematics, teachers to include class management as part of the preparation to teaching and learning process and that teachers should adopt teaching methods that enable pupils to actively participate in learning.

4.15 Summary

According to the findings from the study, it is clear that major teacher related factors influencing pupils’ mathematics performance at Kenya certificate Primary Education is teacher preparation. The response from the instruments related to teacher preparation was high according to every respondent and many mathematics teachers had not attended any SMASE-INSET programmes nor were they aware of ASEI-PDSI approach to mathematics teaching.
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings of the study and presents conclusions and recommendation on teacher related factors influencing pupils’ mathematics performance at Kenya Certificate of Primary Education in public schools in Likoni sub-county.

5.2 Summary of the study

The purpose of this study was to investigate the teacher related factors that influence pupils’ performance of mathematics at Kenya Certificate of Primary Education in public schools in Likoni sub-county. Four research questions were formulated to guide the study. The research questions sought to determine how teacher preparedness, teacher instructional methods, teacher in-service training and teacher motivation influences performance of mathematics in KCPE. The study employed descriptive survey design. The population included 24 head teachers 48 mathematics teachers and 1200 pupils in Likoni sub-county. The study used questionnaires, interview guide and classroom observation schedule.

After in-depth search on information from the respondents, the researcher was able to establish that there is a large gender disparity between male and female head teachers as well as mathematics teachers. Male pupils who participated in the study were slightly more than the female. The study established that majority of teachers 50 percent had diploma qualification and are therefore qualified to teach in primary schools. Most of the head teachers 40 percent had
diploma qualification too. Majority of the head teachers had served for more than ten years as head teachers in the same school. A study on professional qualification of mathematics teachers revealed that 50 percent of them were P1 certificate holders and therefore also qualified to teach in primary school.

The findings on teacher preparation influence on performance of mathematics revealed that teacher preparation influence the performance of mathematics in Kenya Certificate of Primary Education. Teacher preparation entails making the schemes of work, lesson plan and teaching/learning materials. About 70% of teachers always prepared schemes of work, 30% always prepared lesson plans. The findings unveiled that most teachers went to class when they were ill prepared in lesson planning and this greatly hindered the process of meaningful teaching and learning and as such, there was no way good results of upgraded individual learners scores could come out of unprepared teachers. As a teacher prepares a scheme of work, it is necessary for him or her to pay attention to changing times changing nature of learners, the available learning facilities as well as changes in subject matter which influence learners individual scores and performance in mathematics. Lesson plans give the teacher security and confidence gained from having a well developed and organized framework for the days instruction which greatly influences the teacher’s effectiveness in teaching of mathematics.

Instructional teaching and learning materials are a means of conveying information. Use of teaching / learning materials simplifies content being taught which enhance teachers interactions with learner, simplify abstract
concepts as well as allowing for skill development. The materials may include diagrams, pictures, textbooks, counters, cut-outs, flash cards and other models that influence and boost mathematics activities. In the absence of quality teacher preparations, poor performance is inevitable.

Most of the professional documents as observed by the head teachers 80% in reference to supervision of mathematics curriculum were prepared but were not consulted by teachers in most cases. Findings of head teachers’ frequency of checking professional documents showed that head teachers 50% checked schemes of work termly while lesson plans also 50% were checked monthly. The 50% termly head teachers checking indicates that they do not do any follow up on curriculum implementation during the course of the term. Checking of schemes of work should be fortnightly to allow the headteacher monitor curriculum implementation. Most of the pupils 80% did not like teachers’ ways of mathematics presentation. Teacher presentation affects learners’ outcome and is associated with increased or decreased learners scores in mathematics. Teachers marked pupils mathematics books and assignment on a weekly basis which delayed prompt feedback for learners. Teachers 54% administered tests once a term which was not sufficient. About 66 percent of the pupils reported that mathematics teachers sometimes used teaching and learning materials.

According to the study findings 90 percent prepared schemes of work from the syllabus and only 70 percent of them prepared lesson plans on a daily basis while 60 percent maintained record of work. Effective teaching include;
preparation, implementation and evaluation. In preparation the teacher must refer to the syllabus so as to make the schemes of work and lesson plans. Most of the head teachers check teachers’ professional documents but do not supervise mathematics classroom teachings. Most of the teachers 82 percent mark pupils’ mathematics books on daily basis. Classroom teaching process is challenged by lack of teaching learning materials and proper assessment and evaluation of pupils learning.

The findings on teacher instructional methods influence on performance of mathematics revealed that instructional methods influence mathematics performance in KCPE. Instructional strategies results findings showed that teacher centred approaches to a large extent 50% influenced mathematics performance. Learner centered approaches are the best strategies means of carrying out teaching of mathematics. Over half of the teachers 60% used lecture methods. Lecture method is ineffective and turns the learners into passive participants in the learning process which influences learners scores attainment in mathematics. When observed in the classroom all teachers (100%) frequently used lecture method. According to the study findings majority of the teachers used lecture and demonstration methods whereas small group discussion and question and answer were rarely utilized. Lecture method relegates the learner to be passive in the teaching learning process and does not cater for individual learner’s ability. Teachers inadequately used teaching learning materials and some had issues in particular areas of mathematics content.
The findings of teachers in-service training influence on performance of mathematics showed that in-service training of teachers influence mathematics performance in KCPE. Most of the teachers 80% took mathematics as a major. Experienced teachers are more critical in their classroom teaching than the preschool teachers. Most of the teachers had taught for less than four years. More than 70% of the teachers were well equipped in mathematics knowledge. About 60% of the teachers indicated that they had never attended SMASE in-service training. SMASE trained teachers have significant relationship with pupils high score achievement in mathematics.

Only 15% of mathematics teachers had most INSETS in mathematics which includes SPRED, SMASE and SbTD. Continuous INSET of mathematics teachers is a prerequisite of successful implementation of mathematics curriculum. The minimal use of ASEI-PDSI (40%) mathematics teaching approach may have affected mathematics teaching outcome. The conventional way of introducing teachers to new ideas, techniques and methodologies in education is through courses such as seminars, workshops and conferences. Only 20% enjoyed SMASE- INSET training. The study revealed that majority of the teachers had not attended INSETS related to mathematics. This is an indication that mathematics teachers were not updated on new trends of the subject since this changes are best communicated during in-service training.

The findings on teacher motivation influence on performance of mathematics showed that teacher motivation influence the performance of mathematics in KCPE. Most teachers 70% strongly agreed that motivation is one of the driving
forces in a learning process. Most of the teachers indicated that monetary rewarding, availability of teaching learning materials and pupils positive attitude towards mathematics greatly influence teachers and learners performance in mathematics. According to the pupils 30% of the teachers were committed to teaching of mathematics. Motivation and rewarding of teachers influence the achievement of high scores in mathematics. The study found that motivation is one of the driving forces in the teaching learning process. Teachers and learners agreed that rewarding of teachers and learners help in improving performance. The study also revealed that concern of children’s performance by parents/guardians help to improve mathematics performance and that teachers’ in-service training is a form of motivation which ensures that mathematics curriculum implementation is carried out effectively.

Performance of mathematics in KCPE is influenced by how well a teacher has prepared for each of mathematics lesson before teaching starts. Preparation originates with one’s interaction with the syllabus and its interpretation and the ability to make the schemes of work and lesson plans. Performance of mathematics is also influenced by effective supervision of mathematics curriculum implementation by the head teacher and classroom utilization of the teachers professional documents.

Head teacher’s frequency of checking professional documents, teacher subject presentation, forms of assessment tests administered to learners and their frequency greatly influences performance in mathematics. Performance is also influenced by teachers’ use of teaching and learning materials during
mathematics lessons. When proper or adequate preparation is adhered to, it influences the performance by upgrading individual learners’ average scores, increases the sum of high scores and consequently decreases low scores of individual learners. Teacher preparedness enhances effective teaching and hence influences learners’ performance.

Instructional strategies and methods of teaching influence performance of mathematics. Teacher organization and facilitation of learning experiences influences performance of learners. Mathematics subject matter is built on previous knowledge. Teachers should always start with the simplest examples that will achieve their objectives to more complex examples. The form of strategies employed influences performance of learners and has a bearing to increasing or decreasing scores of learners. Teachers’ choice of instructional strategies determines the performance of learners. Appropriate strategies and proper utilization of corresponding instructional method influences the scores of individual learner in mathematics. It results into upgrading of average scores of each learner or decreasing of low scores and facilitates effective teaching.

In-service training and orientation of mathematics teachers ensures that mathematics curriculum is implemented and carried out effectively. Capacity building for mathematics teachers equips them with necessary professional development that enables them to deal with mathematics changes effectively. It is through in-service training that teachers get the opportunity to advance their knowledge and methodologies that when employed in classroom influences the performance of learners and ultimately determine upgrading of average scores.
increasing high scores or decreasing low scores and has a bearing to effective teaching.

Motivation triggers behavior. It is also reciprocates where teachers motivates pupils and pupils performs well and motivate the teachers. Performance of pupils and teachers is affected by how well they are motivated. Highly motivated teachers and pupils performs better in examinations. This translates to upgrading of average scores of individuals, increasing high scores and vice versa. Motivation has a basis on effective teaching.

5.3 Conclusions of the study
The study established that there are certain teacher related factors influencing pupils’ mathematics performance at Kenya Certificate of Primary Education in public schools in Likoni sub-county. This was supported by the fact that most teachers did not attend mathematics lessons fully prepared which influenced poor performance of mathematics. The instructional methods applied by most teachers were teacher centered and not learner centered. Most of the teachers have never attended in-service training either school based or otherwise. The study established that most teachers are not motivated either intrinsically or extrinsically. Teachers should be exposed to conditions that promote intrinsic motivation and improve performance. This can either be school based or national based rewards. The study identified teacher related problems that mathematics teachers face when teaching mathematics and gave solutions to them.
5.4 Recommendations of the study

In the light of the findings of the study, the researcher noted that;

i. Teachers went to the classroom ill prepared. The study recommends that head teachers should always ensure that mathematics teachers prepare for mathematics lessons before teaching starts. Mathematics teachers should interact with the syllabus and interpret it well so that they are able to make good schemes of work and lesson plans and utilize them in the teaching learning process. The study also noted that internal supervision of mathematics curriculum implementation was not effective since the head teachers rarely checked the utilization of the professional documents prepared by the teachers. The study recommends that internal supervision of mathematics implementation be intensified in all schools in Likoni sub-county. The study found that mathematics teachers assessed learners once a term. This was deemed inadequate. The study recommends that learners be assessed preferably on monthly basis.

ii. The study revealed that the instructional methods and strategies used by mathematics teachers were teacher-centred. Teacher-centered methods are not best for the learners at this level since they do not facilitate learners involvement. The study therefore recommends that teachers should employ learner-centred methods in order to improve mathematics curriculum implementation and performance.

iii. The study revealed that mathematics teachers never attended in-service training. The study therefore recommends that mathematics teachers
should have regular refresher courses (INSET) for proper mathematics curriculum implementation. They should be in-serviced through seminars and workshops so that they can fully understand and implement the mathematics curriculum. The area education office and other stakeholders should organize in-service training programmes to enhance the teachers’ capacities on the current changes in mathematics teaching strategies in order to improve its performance.

iv. The study also revealed that most teachers were not motivated. They all agreed that motivation is the driving force to good performance on both learners and teachers. They study recommends that the government should provide good conditions for learning (education facilities) for learners and should look with keen interest into the plight of teachers by reviewing upward their welfare package (as reward), conditions of service and other benefits. If this is done, it will raise the standard of living for teachers, which will enhance impetus on academic performance of learners in mathematics. Increasing packages (salaries) will increase the morale to teach. This is because the teacher must be interested in what they teach and the children when they are teaching. If they are not interested in the work themselves, they can never motivate the class to learn.
5.5 Suggestions for future research

The study recommended the following for further research.

i. Since the study was limited to Likoni sub-county, there is a need for replication of this study in other sub- counties in order to elicit more accurate and representative perception on teacher related factors influencing pupils’ mathematics performance at Kenya Certificate of Primary Education.

ii. A similar study on mathematics performance should be carried out in private schools, also in KCPE examination institutions so that other comprehensive issues influencing mathematics poor performance can be identified.
REFERENCES


AIR (2007), New International bench-marking to measure state and district mathematics performance against the world, Thomas Jefferson Street, Washington D.C, American Institute of Research.


SMASSE (2004). *Ministry of Education Science and Technology*


Dear Sir /Madam

**RE: Participation in research**

I am a postgraduate student from University of Nairobi Department of Education Administration and Planning. I am carrying out a research on Teacher related factors influencing mathematics performance in Kenya Certificate of Primary Education in Likoni Sub-county, Mombasa

Your school has been identified to participate in this study. The attached questionnaires are designed to assist the researcher to gather data from respondents for the purpose of research study.

Your assistance will generate information that will help in the improvement of mathematics performance in the area of study. All information gathered will receive maximum confidentiality.

Yours faithfully

Emma Njenga
APPENDIX B

QUESTIONNAIRE FOR MATHEMATICS TEACHERS

This questionnaire is for the purpose of research only; please tick (√) in the appropriate bracket or fill in the information as your response to all the following questions. Do not write your name or name of your school anywhere.

Part. A Demographic information.

1. What is your gender?

Male [ ] Female [ ]

2. What is your highest academic qualification?

(a) Masters [ ] Bachelor [ ] Diploma [ ]

O-level [ ]

(e) Others (please specify)……………………………………

3. What is your professional qualification?

Graduate [ ] Diploma [ ] ATS IV [ ] ATS III [ ]

ATS II [ ] ATS I [ ] PI [ ]

Others (please specify)………………………………………………

4. Indicate number of years of teaching experience in mathematics…………
Part. B Teacher preparedness and performance in mathematics.

For each of the following kindly respond using a tick (✓) to indicate whether Always, Rarely, Never

<table>
<thead>
<tr>
<th>Professional documents</th>
<th>Always</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schemes of work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson plans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Records of work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Register</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Do you frequently utilize the documents in teaching? Yes [ ] No [ ]

3. How do you assess pupils in your school?

Test [ ] Class exercises [ ] Quizzes [ ] Terminal examinations [ ]
**Part. C Teachers instructional methods and mathematics performance**

On the scale of 1-5 below, rate the extent to which teaching methods influence performance of primary mathematics.

1. To a very large extent. 2. To a large extent. 3. To some extent. 4. Not at all.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>VLE</th>
<th>LE</th>
<th>SE</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Teacher not using learner –centered approach influence mathematics performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Teacher –centered approaches influence mathematics performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Use of computer, technology affects mathematics performance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. For each of the following teaching methods kindly respond using a tick (√) to indicate whether Very often, Often, Rarely, Not at all

<table>
<thead>
<tr>
<th>Teaching method</th>
<th>Very often</th>
<th>Often</th>
<th>Rarely</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Lecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Small group discussion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Discussion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Demonstration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. Question &amp; Answer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Reasons for using the identified methods………………………………………
3. Give any two challenges that you face when using the suggested methods
   (i) .....................................................................................................
   (ii) .....................................................................................................

4. (a) Is there part of mathematics you are not adequately conversant with?
   Yes [ ] No [ ]
   (b) If yes specify .................................................................

Part. D Teacher in-service training and mathematics performance

For each of the following questions kindly respond using a tick (√)

1. Was mathematics a minor, major or general in teacher training?
   Minor [ ] Major [ ] General [ ]

2. How long have you taught mathematics? ......................... .......................  

3. Are you well equipped in the mathematics knowledge (content)?
   Large extent [ ] Small extent [ ] Not at all [ ]

2. Have you attended SMASE in-service?
   Yes [ ] No [ ]

3. Kindly indicate the mathematics INSET you have been trained?
   SMASE [ ] SPRED [ ] SbTD [ ]
4. For each of the following questions, kindly respond by using a tick (✓) to indicate whether Always, Sometimes, Never

<table>
<thead>
<tr>
<th>Questions</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. How often do you use PDSI during mathematics teaching?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. How often do you use ASEI during mathematics teaching?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. How often do you use team-teaching in mathematics?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. How often do you allow other teachers to observe your mathematics lesson?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. Does SMASE (INSET) improve performance in mathematics?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. How often do you attend mathematics INSETS?

Weekly [ ] Monthly [ ] Termly [ ] yearly [ ] Never [ ]

6. Do you enjoy (attitude) SMASE? Yes [ ] No [ ]
**Part. E Teacher motivation and performance in mathematics.**

Please indicate on the scale of 1-4 below, how motivation influences the performance of primary mathematics.

Strongly agree (SA)  Agree (A)  Disagree (DA)  Strongly disagree (SDA)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>SA</th>
<th>A</th>
<th>DA</th>
<th>SDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Motivation is one of the driving force in a learning process.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Rewarding of teachers and learners help in improving performance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Teachers and learners who are not</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.(a) Are there any particular concepts you don’t understand in the teaching of mathematics? Yes [  ]  No [  ]

(b) If yes, specify.................................................................

3. What are the motivating factors in the teaching and learning of mathematics?

.................................................................................................................
APPENDIX C

QUESTIONNAIRE FOR PUPILS

This questionnaire is for the purpose of research only; please tick (√) in the appropriate bracket to fill in the information as your response to all the questions. Do not write your name or the name of your school anywhere.

Part A. Demographic information

1. What is your gender?  Female [   ] Male [   ]

2. Have you ever repeated in any class?  Yes [   ] No [   ]

3. When did you join the school?  ……………………………………….

Part B. Teacher preparedness and performance in mathematics

1. How often are your mathematics books and assignments marked?
   Daily [   ] Weekly [   ] Monthly [   ]

2. Does the mathematics teacher use teaching and learning material during the lesson?
   Always [   ] Sometimes [   ] Never [   ]

3. How many times in a term does your mathematics teacher give you mathematics tests?
   Once [   ] Twice [   ] Thrice [   ] More than thrice [   ]

4. Do you like your teacher’s mathematics lesson presentation?
   Yes [   ] No [   ]
Part. C. Teaching instructional methods and mathematics performance

Indicate with a tick (√) how often the following teaching learning methods are used by your mathematics teacher in your class.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Very often</th>
<th>Often</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small group discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question &amp; Answer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem-solving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part. D. Teacher motivation and performance in mathematics

1. Indicate with a tick (√) how committed your mathematics teacher is by using Very committed (VC), Committed (C), Not committed (NC)

<table>
<thead>
<tr>
<th>Commitment</th>
<th>VC</th>
<th>C</th>
<th>NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marking student work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assisting pupils after class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attending mathematics lessons</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Are you rewarded when you perform well in mathematics?
   Yes [ ]  No [ ]

3. Are your teachers rewarded for good performance in mathematics?
   Yes [ ]  No [ ]

4. Are your parents /guardian concerned on how you perform mathematics?
   Yes [ ]  No [ ]

5. (a) Are there particular areas in mathematics that you don’t understand when being taught?
   Yes [ ]  No [ ]

(b) If yes which one? ..........................................................
APPENDIX D

RESEARCHER’S OBSERVATION SCHEDULE

Part. A. General Information

School Name: ----------------------------- Class: -------------

No of Students: ------------------ Sex of Teacher: ---------------

Part B: Instructional methods

Key: FU-frequently used, NFU-Not frequently used, NU- Not used

<table>
<thead>
<tr>
<th>Teaching method</th>
<th>FU</th>
<th>NFU</th>
<th>NU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small group discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question and answer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part .C. Classroom interaction

<table>
<thead>
<tr>
<th>Class interaction</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher-Pupil interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupil-Pupil interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varieties of learning activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupils asking and answering questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher reinforcement of pupils attempts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Part. D. Feedback provision**

Key: RD-regularly done, NRD-Not regularly done, NDA- not done at all

<table>
<thead>
<tr>
<th>Feedback</th>
<th>RD</th>
<th>NRD</th>
<th>NDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher moves around the class helping pupils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework given at the end of the lesson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making correction of specific assignments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marking pupils assignments</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Part. E. Teaching instructional materials**

Key: FU- frequently used, NFU- Not frequently used, NU- Never used

<table>
<thead>
<tr>
<th>Instructional materials</th>
<th>FU</th>
<th>NFU</th>
<th>NU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compasses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagrams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rulers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textbooks</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E
INTERVIEW GUIDE FOR HEAD TEACHERS

1. How long have you been a headteacher in this school?

2. What is your highest academic qualification

Masters [ ]  Bachelor [ ]  Diploma [ ]  A-level [ ]  O-level [ ]

Part A. Teacher preparedness and mathematics performance.

1(a). Do you consider the way teachers’ teach mathematics satisfying?

Mathematics teachers’ professional preparation

<table>
<thead>
<tr>
<th>Availability of professional documents</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Sets clear relevant and specific objectives.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Prepares schemes of work that reflect the syllabus.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Prepares lesson plans in line with schemes of work.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Incorporates learning objectives in to lesson plan.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. Clearly states these at the beginning of the lesson.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi. Schemes of work and lesson plans are seen by the head teacher.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii. Mathematics lesson plan are done on daily basis before going to class.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Teacher prepares teaching learning mathematics materials.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ix. Does doing the above improve performance in mathematics?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. How often do you check the following documents?

<table>
<thead>
<tr>
<th>Professional documents</th>
<th>Always</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schemes of work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson plans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Records of work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson notes</td>
<td></td>
<td></td>
<td></td>
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3. (a) Do you supervise mathematics classroom teachings?

   (b) How often do you supervise?

**PART.B. Teacher instructional methods**

4. Which are the methods commonly used in the teaching of mathematics in your school?

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PART .C. Teacher in-service training

5. How often do teachers’ attend mathematics INSETs
   Weekly [  ]  Monthly [  ]  Termly [  ]
   Yearly [  ]  Never [  ]

PART. D. Teacher motivation

6. How do you motivate mathematics teachers in your school?
APPENDIX F

TABLE FOR DETERMINING SAMPLE SIZE

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APPENDIX G

PERMIT

THIS IS TO CERTIFY THAT:

MS. EMMA MURUGI NJENGA
of UNIVERSITY OF NAIROBI, 0-80100
MOMBASA, has been permitted to
conduct research in Mombasa County
on the topic: TEACHER RELATED
FACTORS INFLUENCING PUPILS
MATHEMATICS PERFORMANCE AT
KENYA CERTIFICATE OF PRIMARY
EDUCATION IN PUBLIC SCHOOLS LIKONI
SUBCOUNTY KENYA

for the period ending:
14th December, 2016

[Signature]
Applicant's

[Signature]
Director General

National Commission for Science,
Technology & Innovation
APPENDIX H

AUTHORIZATION LETTER

NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

Ref. No. NACOSTI/P/15/21983/8641

Emma Murugi Njenga
University of Nairobi
P.O. Box 30197-00100
NAIROBI,

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Teacher related factors influencing pupils Mathematics performance at Kenya Certificate of Primary Education in public schools Likoni Sub county Kenya,” I am pleased to inform you that you have been authorized to undertake research in Mombasa County for a period ending 14th December, 2016.

You are advised to report to the County Commissioner and the County Director of Education, Mombasa County before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

Dr. M. K. Rugutt, PhD, BSc.
DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Mombasa County.

The County Director of Education
Mombasa County.

15th December, 2015