INFLUENCE OF STRATEGIC MANAGEMENT PRACTICES ON PERFORMANCE OF MATHEMATICS IN PUBLIC SECONDARY SCHOOLS IN MAKUENI SUB-COUNTY

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A Research Project Submitted in Partial Fulfillment of the Requirements for the Award of Master of Business Administration of South Eastern Kenya University

2019

DECLARATION

I understand that plagiarism is an offence and I therefore declare that this research report is my original work and has not been presented to any other institution for any other award.

…… …….

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D61/WTE/20704/2016

This research report has been submitted for examination with my approval as the University Supervisor.

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ACKNOWLEDGEMENT

Let me start by thanking the Almighty God for His sufficient grace, love, strength and mercies while I was working on this research report. Secondly, I would like to thank my supervisor Dr. Susan Wamitu for her guidance, assistance, direction, facilitation and expertise throughout the preparation process of this research report. Also, I would like to extend a heartfelt appreciation to my wife, children and family members for their unending support, love and for being there for me during crunch time. I would like to extend special appreciation to the entire management of SEKU for the guidance towards the accomplishment of this course. May the Almighty God bless you all.

DEDICATION

This work is specifically dedicated to my beloved wife Florence Minoo, my children; Mutunga, Mbula and Maingi. Let this body of knowledge be an inspiration to you. Aspire to set goals and strive beyond measures to accomplish them bearing in mind that you can do anything through Christ who strengthens us all. He gives power to the faint and to those that have no mighty, He increases strength.

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ABBREVIATIONS AND ACRONYMS

CFSK:	Computer for Schools Kenya
GoK:	Government of Kenya
INSET:	In-service education Training
E- LEARNING:	Use of computer based electronic technologies to learning
ICT:	Information and Communication Technology
KCSE:	Kenya Certificate of Secondary Education
KNEC:	Kenya National Examination Council
SMASSE:	Strengthening Mathematics and Science in Secondary Education
CEMASTEA:	Centre for Mathematics Science and Technology Education In Africa
CAL:	Computer Assisted Learning
CAI:	Computer Assisted Instruction
DGS:	Dynamic Geometry Systems
CSLR:	Computer Support Learning Resource
NCETM:	National Centre for Excellence in Teaching Mathematics
TPACK:	Technological Pedagogical Content Knowledge
KICD:	Kenya Institute of Curriculum Development
SDGs:	Sustainable Development Goals
MOEST:	Ministry of Education, Science and Technology
PSS:	Public Secondary School
SPSS:	Statistical Package for Social Science
EFA:	Education Funding Agency/Education for All
CD:	Compact Disc
ROM:	Read Only Memory
DVD:	Digital Versatile Disc
UTD:	University of Texas at Dallas
USA:	United States of America
NSDC:	National Staff Development Council
CAS:	Computer Algebra Systems
BOM:	Board of Management

DEFINITION OF TERMS

Training: It is the teaching, or developing in oneself or others, any skills and knowledge that relate to specific useful competencies. Training has specific goals of improving one's capability, capacity, productivity and performance (Kafyulilo, 2014).

Team-teaching: This refers to (a) a simple allocation of responsibilities between two or among several teachers, (b) team planning but with individual instruction or (c) cooperative planning, instruction and evaluation of learning experiences, (McKenna, 2009).

Teaching Experience: The length of time or the duration the teacher has spent while teaching (Ladd, 2014).

ICT: This is a range of information technological tools and resources used to communicate, create, disseminate, manage and store information (Kaffash, 2011).

ICT Integration: Use of ICT in support and enhancement of attainment of curriculum objectives engaging students in meaningful learning (Mbodila, 2012).

Teaching Pedagogy: The methodology used in teaching a particular skill or value by a teacher (Mbodila, 2012).

Performance: This is the accomplishment of a given task measured against currently known speed, cost, completeness and standards of accuracy, (Adino, 2015).

Public Schools: Schools that acquire government assistance such as funding (Corcoran, 2008).

School Administrators: These are the officers who oversee the daily operations of schools, colleges, universities, day care centers and preschools. A school administrator's specific responsibilities differ between organizations, but often these administrators are an important link between students and local communities (Evans, 2008).

ABSTRACT

Strategic management is a concept that is concerned with making decisions and taking corrective actions to achieve long term targets, objectives and goals of an organization. Firms obtain a sustained competitive advantage through exploiting internal strength, by responding to environmental opportunities while neutralizing external threats and avoiding internal weaknesses. This study was entitled, "Influence of Strategic Management Practices on Performance of Mathematics in Public Secondary Schools in Makueni Sub-County." The main objective in this study was to establish the influence of strategic management practices on the learners' academic achievement in Mathematics in government high schools in Makueni Sub-County. This study was directed by four objectives; to determine the influence of; training, team teaching, teaching experience of Mathematics' tutors and that of ICT integration in teaching Mathematics on the learners' academic achievement in Mathematics in PSS in Makueni Sub-County. The study was guided by four theories which include contingency theory, learning theories, diffusion of information theory and human resource based theory. The empirical review conducted revealed that the tutors' training level, team-teaching, teachers' experience and ICT integration in teaching have a direct impact on the student's performance in Mathematics. This study employed a descriptive survey research approach. The study target population consisted of the 46 registered government high schools in Makueni Sub-County. The study used two types of sampling; census on the school principals while 30% of the Mathematics teachers from every school were randomly selected to form a sample of 118 study participants. Data collection was conducted through the administration of questionnaires. The data was processed by use of descriptive and inferential figures with the help of statistical package for social scientists (SPSS) version 21, discussed as per the objectives and presented in tables as per the study objectives. Descriptive statistics and regression analysis indicated that performance in Mathematics was positively influenced by the four objectives. The results of this research concurred with the literature reviewed. The study concluded that team teaching was the main predictor of the learners' academic achievement in Mathematics. This study recommended that the school administrators as well as the other stakeholders in secondary schools in Makueni Sub-County should embrace team work, teacher training, ICT integration and opportunities where they can diversify their experience as teachers for students' optimum performance in their respective secondary schools.

CHAPTER ONE

1.0. INTRODUCTION

This chapter highlights the background of the study, statement of the problem, the aim, objectives, research questions, the significance of the study, limitations, delimitations and the assumptions of the study.

1.1. Background of the study

With regard to set up of a learning institution, management practices mean the ways in which the school administration, under the leadership of the school principal, uses the resources available; human and material, to promote the most suitable ways as well as the methods in which the learning institution works with its governing body. These management practices also means the usage of the most relevant and realistic techniques to achieve the school objectives while making the best use of the firm's resources (Holmes, 2014). This study aimed at answering the question, "to what extent does these strategic management practices influence the student's academic achievement in Mathematics?" the traditions about the management of learning institutions are often similar to those regarding management in other organizations. The school principal, being the leader of the other managers of other departments within the school, he/she is considered very important in ensuring successful functioning of the various component areas of a school (Ndinza, 2015).

A study conducted by Marvel (2006) on the teacher attrition and mobility identified that the principal is the most important person in a learning institution. The principal takes care of all programmes that happen within and outside the learning institution. Mainly, it is his/her administrative approaches that set the pitch of the learning institution, the environment for working, the altitude of professionalism, the spirits of tutors and the level of concern for what the learners can or cannot become. Another study by Seashore (2010) established that if a learning institution is energetic, innovative and learner-centered, it has a culture for quality in teaching, the learners are excelling in academics, then, one can always point to the principal's administrative techniques as key to the achievement.

According to Karen (2014) the heads of learning institutions are believed to implement a number of important roles which include, shaping the vision of academic achievement for all the learners, providing a conducive environment for teaching and learning, refining administrative skills in others, up scaling teaching methodologies, administering workers and data processes to further school improvement. Nowadays, improving the management of learning institutions is given the highest priority for reforms in learning institutions. Another detailed survey carried out by Wallace foundation in 2010 found that principal's leadership is one of the most crucial subject on the list of issues in government school education system. Although there exists a variety of leadership patterns in any school, among the heads of learning institutions, deputies, tutors and parents, the school head remains the key person influencing the administration of the learning institution (Andrew, 2012).

While writing on leadership, Andrew (2012) noted that successful heads of learning institutions are in-charge of setting up a wide vision of assurance to high standards and success for all students in the learning institution. For many years, the head teachers of government high schools have been seen as the school administrators. He as well established that in a learning institution that starts with the school head spelling out high principles and meticulous learning goals, high prospects for everyone. This includes definite public standards which is an important factor to bridging the gap between the privileged and less privileged learners and for elevating the general academic attainment for all learners (Andrew, 2012).

Anderson (2014) further concluded that an effective school head ensures that the idea of academic achievement for all gets picked up by the education department and emphasizes a school broad learning development program that is learner-centered towards the learners' academic development. The most successful principals aim at instilling a sense of a school community with characteristics of an attendant which consist of value for every stakeholder of the school community. These characteristics include friendly, answer-oriented, blamelessness, professionalism, and the ability to include school workers and learners in a variety of activities in a variety of ways related to the school (Anderson, 2014).

Senior school administrators who attain high grades from tutors for building a conducive atmosphere for teaching in their learning institutions also get high scores

than other head teachers for encouraging administration in their academic departments. According to another study by Seashore (2010), efficient administration from all sources; school heads, influential tutors, staff groups and other workers, is linked with high learners' academic achievement in Mathematics and other reading tests. The study established that the school heads are the most influencial in decision making in all learning institutions (Seashore, 2010).

However, the school heads maintain their influence as others gain. This is suggested by the available literature which shows that the academically leading learning institutions are awarded greater influence to school associates. The school principals concur, almost unanimously on the importance of various practices which include keeping track of tutors, career progress needs and evaluating tutors' work in the classroom; assessing and conversing on what is working well or not (Mlozi, 2013). In addition, they move the trend of the yearly assessment cycle to one of on-going and non-formal relations with tutors (Michael, 2011).

Michael (2011) in his study explained several important responsibilities of the school heads. The first responsibility is to come up with a vision of academic attainment for all learners which is based on high academic achievement. The second responsibility is to create a climate which is friendly to teaching and learning while considering and ensuring cooperative spirit, security, and other fundamentals of fruitful relation prevails. The third responsibility is upgrading the teaching methodologies to enable tutors to work at their best and learners to learn to their optimum. The fourth responsibility is administering workers, information and procedures to promote improvement in learning institutions. The fifth responsibility is fostering administrative skills in others so that tutors and other workers to perform their obligations in the realization of the vision of the organization (Michael, 2011).

Similar to other countries, Kenya values education due to its extrinsic and intrinsic gains. Learning is a key ingredient in the community since it aids the particular students to conquer their limitations and progress so that they can have their dreams attained. The Kenyan government has a responsibility to make sure that its people are learned to make them to fully participate in the growth and progress of their nation. Learning is essential component in Kenya since the kind of occupation one pursues is overall determined by the individual's level of academic achievement. Usually, the

more and individual is learned, the more likely that one gets a more prestigious job with greater higher income (Mlozi, 2013).

According to Muya (2015), the education system of Kenyan is biased towards assessment, since the academic achievement of any learning institution is determined by the worthiness of the results in national examinations. According to The Daily Nation as reported by Muya (2015), it was revealed that government academic evaluations have become a "do or die" issue in Kenya since we are living in an examination-based community. A bright future for an individual who lacks a decent academic certificate is not guaranteed. In Kenya, there is a high competition among the government learning institutions hence each is trying to produce good results every year. There has been a lot of stress on high academic achievement in exams and possession of good academic certificates that which can facilitate those leaving the learning institutions while furthering their education or seeking employment. Parents, guardians, and other stakeholders have been mounting pressure on learning institutions' academic attainment in national examinations (Muya, 2015).

The learning institutions have been evaluated based on learners' academic achievement in the national examinations. It has become evident that some high schools rank higher than others in national examinations every year. The differences in the management of the learning institutions and the managerial approaches of the school heads are some of the key factors which are responsible for this outcome. According to Ocham (2013) the school administration techniques can differ extremely sometimes not depending on the official goals of the learning institution and that the school heads use a range of methods in administering and inspiring tutors to upgrade their activities at work.

The school head is one of the key persons when the learning institutions are considered to be formal institutions.

The position he/she holds within the learning institution gives him/her a chance to inspire his/her workers as well as upgrading the level of academic achievement of the learning institution. The head teachers of learning institutions are deeply responsible for the academic attainment of their learners. In another study Wekesa (2003) concurred that the teaching procedures are either positively or negatively influenced

by the several administrative approaches which are practiced by the head teachers of learning institutions. The head teachers are charged with the task of managing human resources in their schools. The school principal's administrative actions have an immense influence on the academic attainment of the learning institution (Wekesa, 2003).

Effective school heads (effective strategic managers) normally focus on forecasting, synchronizing and supporting the workers without forgetting how the learners and the other workers relate with each other within the learning institution. Studies conducted by (Andrew, 2012; Wekesa, 2003) all concurred that, strong administration skills of the school heads was the greatest predictor of the learners' academic achievement in the national examinations.

They also observed that the administrative approaches of the school head teachers determines how tutors get well-organized and use of the teaching time within the classroom (Wekesa, 2003). More efficient head teachers are more probable to set a high performance in their learning institutions and lead to enhanced academic achievement in the national examinations. According to a study carried out by Brookover (2009) it was noted that well performing learning institutions are managed by head teachers who practice assertive administration while the poorly performing learning institutions are administered by head teachers with inadequate management skills hence they not effective in the management of their institutions, this has rendered them not able to engage in administrative practices.

Therefore, in the structure of the learning institutions, the head teachers occupy a key position in creating an environment within the learning institution which is learning friendly. Since it is in the learning institutions where the success of the tutors and learning takes place, the education worthiness is to a great extent influenced by the administrative activities and approaches of the school head. These practices play a major role in shaping the academic attainment of the learning institution in the national examinations. Public Secondary Schools are part of the public sector and they have adopted the new style of management.

There are challenges facing their performance in Mathematics which include lack of teacher motivation, inadequate human resource particularly in Mathematics, poor

academic implementation, poor school governance, inadequate funding and mismanagement of school funds (Hill, 2015). School principals are often confronted by issues of drugs and social problems which requires a concerted effort with all school stakeholders (Mlozi, 2013). This raises questions on the effectiveness of strategic management the school purports to practice. Moreover it is not clear on how the practices have impacted on the performance of Mathematics in PSS in Makueni Sub-County.

1.2. Statement of the problem

The general public and educationists recognize that a variety of learning institutions attain different levels of academic achievements. This is so even when the schools have similar learning facilities. There is enormous struggle nowadays among the schools as all are attempting to generate improved outcomes in national examinations. A number of learning institutions have consistently developed a culture of producing good results while at the same time, others have experienced a drop in their performance, a situation that has been associated with the varied administrative activities of the principals and Mathematics teachers in their respective learning institutions. Accomplishment of attaining desirable outcomes in national examinations is mostly determined by the various approaches of school administration practices the head teacher employs.

The team's administrative techniques are key in influencing the institutional atmosphere of the learning institution and the learners' achievement in academics. The secondary schools in Kenya are classified into national, extra-county, county and Sub-County levels. When an analysis of the KCSE results was done by the researcher on how the schools have performed for the last five years, it was observed that there has been a declining performance in Mathematics. This phenomenon has been observed in all the schools that presented candidates for the KCSE national examinations from 2013 to 2017.

Table 1.1: KCSE performance for all PSS from 2013-2017

Year	Number of Public Secondary Schools (N)	KCSE Targeted Mean Score in Math.	KCSE Actual Score in Math.	Deviation	KCSE Overall Performance Mean Score in the Sub-County
2013	36	8.50	5.07	-3.43	5.896

2014	39	7.00	6.05	-0.95	5.846
2015	40	7.50	4.35	-3.15	5.580
2016	44	5.50	2.59	-2.91	4.650
2017	46	5.80	2.32	-3.48	4.217

Source: Makueni County Director of Education

In the year 2013, only 36 PSS presented form four candidates for KCSE in the sub-county. The targeted Mathematics mean score was 8.50 but managed an actual Mathematics mean score of 5.07 reflecting a deviation of -3.43 and finally posting an overall KCSE mean score of 5.896. What the researcher checked for in the year 2013 was also checked for in the subsequent four years as shown in table 1.1. Based on the literature reviewed in the background information, the researcher has associated this phenomenon with poor strategic management practices by the school leadership in PSS. This study investigate to find out if the strategic management practices are the ones associated with the undesirable performance in Mathematics or not and provide recommendations which may reverse the clinch to produce an improved performance in the said subject as well as overall.

1.3. Objectives of the Study

1.3.1. General objective

The main objective of this study was to determine the influence of strategic management practices on the performance in Mathematics in public secondary schools in Makueni Sub-County.

1.3.2. Specific Objectives

To achieve the above general objective, this study was guided by the following specific objectives:-

i. To determine the influence of training of Mathematics' teachers on the performance of Mathematics in public secondary schools in Makueni Sub-County.
ii. To determine the influence of team-teaching in Mathematics on the performance of Mathematics in public secondary schools in Makueni Sub-County.
iii. To establish the effect of teacher's experience on the performance of Mathematics in public secondary schools in Makueni Sub-County.

iv. To establish the influence of ICT integration in teaching Mathematics on the performance of Mathematics in public secondary schools in Makueni Sub-County.

1.4. Research Questions

The aim of this study was to answer the following research questions:-

i. What is the influence of training of Mathematics' teachers on the performance of Mathematics in public secondary schools in Makueni Sub-County?
ii. What is the influence of team-teaching in Mathematics on the performance of Mathematics in public secondary schools in Makueni Sub-County?
iii. What is the effect of teacher's experience on the performance of Mathematics in public secondary schools in Makueni Sub-County?
iv. What is the influence of ICT integration in teaching Mathematics on the performance of Mathematics in public secondary schools in Makueni Sub-County?

1.5. Significance of the Study

The researcher considered this study important because it was anticipated that its findings would be of great use to several stakeholders in the sector of education. On one hand, the findings will help the Government in formulating education policies aimed at improving the performance in Mathematics and the general performance of students in Public Secondary Schools in areas similar to Makueni Sub-County. On the other hand, the research findings will also help the school managers in understanding the factors leading to the poor academic performance in Mathematics hence addressing the issues geared towards improving the current undesirable performance in the national examinations. The study also provided additional knowledge which will enlighten the general public on factors associated with poor academic performance in Mathematics in Makueni Sub-County; this help them to know how they can be in engaged in improving the current undesired performance in Mathematics.

1.6. Scope of the study

The study confined itself in the investigation of the influence of strategic management practices specifically training, team teaching, the teaching experience of the teachers

and ICT integration in teaching Mathematics on its performance in public secondary schools in Makueni Sub-County. The data was collected through administration of questionnaires on the managers and teachers of the public secondary schools in Makueni Sub-County. A total number of 46 schools was identified within the Sub-County. Method of selection is discussed in chapter three. The findings of this study will be generalized to the population of Makueni Sub-County.

1.7. Limitations and Delimitations of the study

The first limitation of this study was related to the study target population. There are two main types of schools in the area of study; public and private investigation of which would lead to a bigger study area. To address this limitation, the private secondary schools were not included in this study. Therefore, to ensure collection and presentation of reliable data, only the public secondary schools were studied. The second limitation was on the part of the type of data collected. Generally, there are two broad categories of data; quantitative and qualitative data. Collection of both types requires a lot of expertise in analysis and presentation. Therefore, to ensure quality analysis and reliable results, the study collected quantitative data only. The third limitation was that there were multiple strategic management practices which influence the performance of students in Mathematics in secondary schools. Investigation of all of them would broaden the study area which would relatively reduce the accuracy and reliability of results. To address this challenge, the researcher investigated only four strategic management practices to ensure more accurate and reliable results.

1.8. Assumptions of the study

The main assumption was that the data collected from the study respondents was accurate and its analysis would provide reliable findings and recommendations which would help improve the current academic performance of students in Mathematics in public secondary schools in Makueni Sub-County. The researcher also assumed that the respondents gave reliable information by filling the questionnaire. Lastly, the researcher assumed that the data collection tool was not biased in anyway hence collected accurate information.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Introduction

This chapter presents the theoretical review and the empirical review of the studies that have been carried out on the four main variables to be studied in the study. The chapter also provides the conceptual framework, summary of the literature review and the research gaps identified through the analysis of the previous studies.

2.2. Theoretical Review

This section discusses the following strategic management theories relevant in studying the factors influencing the student's performance in Mathematics in secondary schools. This study was guided by four theories which have been discussed below. The theories include contingency theory, survival based theory, human resource based theory and learning theories.

2.2.1. Contingency Theory

Contingency is a theory profound by Fieldler (1958) on leader attitudes and group effectiveness. This theory centers on the notion that there is no single best approach to manage organizations, people or work best in every situation. In other words, organizations should not be managed by one-size-fit all approach but should work out unique managerial strategies depending on the particular condition of situation they are facing. This perspective encourages managers to study individual and situational differences before deciding on a course of action.

This is due to the differing environmental and organizational needs and structures that affect an organization, coupled with differing resources and capabilities pertaining to individual organization. Similarly, for the learners to do better in all the subjects and specifically in Mathematics there is need for the teachers to employ a combination of a variety of ways which include in-service training, team teaching, experience in teaching and the use of the ICT in the process of teaching Mathematics for better results in the national examinations.

2.2.2. Learning Theories

In the past century, educational psychologists and researchers have established many theories to explain how individuals acquire, organize and deploy skills and knowledge. To help readers organize and apply this extensive body of literature, various authors have classified the learning theories in three different ways which include Behaviorist learning theories, Cognitive-information processing learning theories and Cognitive-constructivist learning theories. The researcher found, the association of ideas, which is one of the behaviorist learning theories, more relevant and applicable in this study. The Association of Ideas, following a tradition begun by Ebbinghaus (1885), studied learning in terms of memory for individual items, most commonly nonsense syllables and individual words.

The assumption was that understanding simpler forms of learning would lead to understanding of more complex phenomena. During this time, the predominant research methods were those of serial list learning and paired associate learning. These methods have allowed researchers to study, predict, calculate and calibrate the "associations" or the degree/ likelihood that a nonsense syllable or word could elicit a particular response from the learners. In summary, the basic premise underlying associationistic views of learning was that, ideas become connected, or associated, through experience. Furthermore, the more frequently a particular association is encountered, the stronger the associative bond is assumed to be.

Behavioral learning theories have contributed to instruction and education in several significant ways which include Behavior Modification, Classroom Management, and in the Management of Instruction. This study focused on the application of the behavioral learning theories in the management of instruction. Behavioral principles have proved useful in both management of student behavior and in managing the way instruction is delivered. The most prominent examples of how behavioral learning theories have been applied to the management of instruction include the development of behavioral objectives, contingency contracts, and personalized systems of instruction (PSI). Behaviorists and other scholars argue that the only evidence of learning comes from the study of overt behaviors. How can one be sure that a student acquired knowledge or a skill unless we can see them actually do something with that knowledge or skill? Therefore, to assess the level to which a student achieved a goal,

it is important to specify desired instructional outcomes in terms of clear, observable behaviors (behavioral, learning, instructional, or performance objectives).

An instructional application that often makes use of both instructional objectives and behavioral modification is the contingency contract. When it is used with individual students, the contract sets out the terminal behavior the student is expected to achieve, along with the conditions for achievement and the consequences for completion (or non-completion) of assigned tasks. Keller (1968) this is a whole new approach to school instruction based on behavioral principles known as the personalized system of instruction (PSI). The PSI calls for course materials to be broken up into units, each with a set of behavioral objectives. Students tackle course materials on their own, often aided by study guides which provide practice on unit objectives. To proceed, students are required to demonstrate mastery of content by taking a unit quiz. Students receive feedback immediately and if they pass, they can go on to the next unit. If they fail, they must remediate and take the quiz again, but with no penalty. The same approach is deemed very relevant and appropriate if applied by the Mathematics teachers towards improving its performance in national examinations in Public Secondary Schools in Makueni Sub-County.

2.2.3. Diffusion of Innovation Theory

Diffusion of innovation is a theory whose proponent was Everett Rogers and it seeks to explain how, why, and at what rate new ideas and technology spread. In this theory, Rogers argues that diffusion is the process by which an innovation is communicated over time among the participants in a social system. According to Rogers (2003), adoption is a decision of "full use of an innovation as the best course of action available" and rejection is a decision "not to adopt an innovation".

In this theory, Rogers defines diffusion as "the process in which an innovation is communicated thorough certain channels over time among the members of a social system." As expressed in this definition, communication channels, innovation, social system, and time are the four key components of the diffusion of innovations. Similarly, the speed at which the teachers in the public secondary schools learn the new and effective ways of teaching Mathematics through arrangements such as the CEMASTEA, SMASSE, workshops, seminars and conferences, is more likely to

positively influence the way they teach and the way the students in such schools perform in the national examinations.

Therefore, the school management should put in place the necessary measures and resources to ensure a smooth and fast adoption of new teaching methods that enhance understanding and hence better performance in the national examinations. Such measures that encourage sharing or diffusion of ideas would include frequent training, team teaching, teaching experience and the integration of information and communication technologies in the teaching Mathematics, which are the four main independent variables to be studied in this study.

2.2.4. Human Resource Based Theory

This theory by Golding (2010) stems from the principle that the source of organizational competitive advantage depends on the unique resources and capabilities that a firm possesses and not mainly their positioning in the external environment or simply evaluating environmental opportunities and threats in conducting the business. This theory emanates from the principle that the source of a firm's competitive advantage lies in its highly skilled and efficient workforce which is not easily copied by competitors. Similarly, since the PSS are always struggling to find ways in which they can produce better results in the national examinations, it is important that they also focus on how strengthen skills, knowledge and the abilities of their Mathematics teachers which form part of their human resource.

Such an improvement is likely to be achieved through training, organizing for the teachers to attend Mathematics workshops, symposiums, conferences, contests and seminars. This will go a long way to improve how the teachers teach Mathematics with an emphasis on methods that enhance understanding of mathematical concepts. It is based on such an approach that the schools need to do a lot in enhancing skills and professional development of their Mathematics teachers to realize better and improved performance in the subject. However, there is very limited literature on the whether the school principals in the study area are implementing any skill and knowledge development activities of their human resource particularly Mathematics teachers, so as to deal with the problem of poor academic performance in Mathematics which has been witnessed over the last five years.

2.3. Empirical Review

This section reviews empirical studies that have been carried out by different scholars on areas related to this study such as teacher qualification, teacher training and teacher experience in relation to performance in Mathematics in KCSE examination.

2.3.1. Training and Students' Performance in Mathematics

Several previous studies have compared teacher training programs and students' academic achievement. According to Kafyulilo (2014), holding other factors constant, there is a positive correlation between teacher training and general student academic achievement in final examinations. In another study carried out by Suan (2014) in Rift Valley and Nyanza provinces on staff development programs in relation to teacher effectiveness, it was noted that teachers in high performing schools took more interest in staff training programs compared to their colleagues in the average and low performing schools.

According to Atsenga (2002), in his study of the English language, it was revealed that effective teaching methods have high influence on learning. Teacher training programs, which promote knowledge on choice and use of effective teaching methods, have an influence on the teachers' effectiveness hence high student academic achievement. Morgan (2010), in his study, he revealed that training provides knowledge and skills to improve and encourages better performance and quality output. Studies done in the US by Harris (2010) and National Staff Development Council (NSDC., 2013) both agreed that training had visible influence in student academic achievement.

Wested (2010) noted that training had a positive influence on the accountability and student results, that is, the more the trainings the Mathematics teachers attended, the more likely the students would perform better in the national examinations. Porter (2002) also agreed that teacher training was a key factor in performing schools. In addition, Wenglinsky (2012) worked with special populations of students and discovered that there was a positive relationship between higher students test scores in Mathematics and Science and teacher training. Nyangarora (2006) concurred that mastery of content area facilitated effective teaching and therefore enhances student academic achievement. In a separate study carried out by Rivers (2013) on the

influence of trained teachers on future student academic achievement, it was noted that a trained teacher receiving students from untrained teacher can facilitate excellent academic gain for his/her students during the school year.

Ferguson (2012), in his study, he suggested that teacher training may play an important role in student academic achievement. In the US, greater attention has been given to the role teacher training plays in student achievement (NCTAF., 2008). In order to improve student achievement, more than twenty five states have enacted legislation to improve teacher development (Darling-Hammond, 2011). Rivers (2013) observed that teacher effectiveness is highly influenced by teacher training. By reviewing the above, the research study ascertained the truth about the same in Gem district.

Teachers get involved in training which lets them try out new instructional approaches and get immediate feedback. In the District of Columbia teachers are granted five in-service days during the school year which takes place in August. When teachers participate in training, it can improve teacher quality (Hanusheek, 2011). A national study of over 1,000 Mathematics and science teachers found similar results. Therefore, sustained and intensive training is more likely to have an influence on enhanced teacher knowledge and skills and consequently student achievement than short training activities (Porter, 2002). In his study, Guskey (2013) noted that the ultimate goal of teacher training is improving student outcomes. It is also worth noting that teachers who are well prepared and trained are more effective teachers in the classroom and therefore have the greatest influence on the student achievement (Killion, 2009).

It is also assumed that a well trained teacher would deliver the subject content more professionally and effectively compared to a less trained teacher. This should be a reality by all manners of fairness though studies show that apart from the acquired skills by these teachers, factors such as environmental, economic and socio-cultural, among others, also play a major part in determining the students' performance in examinations (Jackson, 2010). For better grades to be attained in schools there is need for proper linkages amongst these factors (Paauwe, 2014). A trained teacher usually analyses these factors and in cooperates them in the teaching practices. That is the reason for emphasizing the emerging issues at the end of every topic in the secondary

syllabus. The above studies are connected to this study in that they explored the influence of teacher training on the students' academic performance while, among other factors, the study investigated the influence of teacher training on the students' performance in Mathematics.

2.3.2. Team-Teaching and Students' Performance in Mathematics

Jang (2011) conducted a study in Taiwan on the effects of team teaching upon two secondary school teachers. The research findings revealed that the average final examination scores of students receiving team-teaching were higher than those of students receiving traditional teaching. The two teaching methods showed a significant difference in respect to students' performance. More than half of the experimental students preferred team-teaching to traditional teaching. The discrepancy between team teachers' expectations of team teaching and its implementation was noticeable.

The differences in the teaching strategy also exposed team teachers to the challenge and being compared with each other by students in class. Besides, the team-teachers had been unprepared for this comparison, especially in relation to class management. The implementation of team-teaching, however, did not win the support of the school administration, which impeded teachers in holding team-meetings and caused students' doubts regarding team teaching. Collaboration is increasingly identified as a key aspect in teachers' professional growth (Jang, 2011). Educational reformers have recommended placing more consideration on the relations of teachers for the purposes of professional growth (Lieberman, 2015; Little, 2013). Efficient professional growth must be collaborative, involving the sharing of knowledge among teacher communities of practice rather than concerning individual teachers (Darling-Hammond, 2009; Firestone, 2009; Roth, 2015).

Researchers report that regular opportunities for interaction with colleagues are essential in creating professional school cultures (Lieberman, 2015). A community of peers is important not only in terms of support, but also as a crucial source of generating ideas and criticism Roth et al, (2014). Little (2013) examined prominent forms of collegial relations-assistance, sharing and joint work. Joint work is a strong version of collegiality that shifts teaching from the individualistic to the collective,

breaking down the barriers of privacy and leading towards new kinds of teaching (Abell, 2010). Professional development activities must provide regular and frequent opportunities for both individual and collegial reflection on classroom and institutional practice (Porter, 2002).

However, it needs to be investigated why collaboration has been largely ignored in schools. First, in many schools, opportunities for collaboration among teachers are limited and communication tends to be informal and infrequent, even though teachers believe their teaching could be improved by working with colleagues (Corcoran, 2008). Second, the dominant school structure continues to emphasize teacher autonomy rather than collaboration; for many years, schools have expected teachers to teach students independently without assistance from others (Lortie, 2005).

The practice of this pattern has hindered attempts to create collaborative environments where teachers regularly talk with each other, and observe one another. Third, collaboration is not necessarily easy in the form of team teaching: it takes time and energy for teachers to work together in planning, teaching and evaluating. A related approach to increased collaboration among teachers exists in team teaching. Team teaching is, in fact, a typical element of primary school level education (Golner, 2012) but has less frequently been implemented at the secondary school level. Perhaps this is due to traditional departmental barriers (McKenna, 2009) that have often made collaborative teaching difficult, or even impossible. Cook (2006) stated that collaboration is, indeed, a problematic relationship, which is also about collegiality and professional sharing.

Similarly, (Bennett, 2008) observed that collaborative cultures take time to develop, require trust and mutual understanding, and are derived from day-to-day interaction as well as long-term relationships of participants. In school restructuring, teacher isolation has been identified as the most powerful impediment to implementing reform (Lieberman, 2015) and little change indeed occur in schools unless teachers constantly observe, help and interact with one another (Barth, 2016).

Welch et al. (2015) noted that teaching terminologies of collaboration are often exchanged and used synonymously. For example, terms like co-teaching (Tobin, 2013) cooperative teaching (Bauwen, 2011) and team teaching (Welch, 2015) refer to

a similar instructional delivery system. (Cook, 2006) identified four key components of co-teaching: educators, delivery of meaningful instruction, diverse groups of students and common settings. Team teaching has a variety of operational definitions. For example, the term may refer to; a simple allocation of responsibilities between two teachers, team planning but with individual instruction or cooperative planning, instruction and evaluation of learning experiences (Sandholtz, 2013). These varying operational definitions of team teaching result in varying amounts of collaboration among teachers.

Clearly not all team teaching approaches offer equivalent opportunities to foster collaboration and enhance teachers' professional development. Co-teaching involves two or more teachers whose primary concern is the sharing of teaching experiences in the classroom, and co-generative dialoguing with each other. They take collective responsibility for maximizing learning to teach or becoming better at teaching while providing enhanced opportunities for their students to learn (Tobin, 2013). Co-teaching provides us with a zone of proximal development, the interaction between individuals and a new form of societal activity.

The central purpose of co-generative dialoguing is to further develop the existing understanding of the teaching situation in order to increase professional growth. Roth et al. (2015) considered co-teaching as an effective means of achieving deep learning of science concepts while learning alternative ways to teach the same subject-matter. Co-teaching also provides opportunities for new teachers to obtain greater opportunities of learning to teach (Cook, 2006). The presence of co-teachers increases access to social and material resources thereby increasing opportunities for actions that would not otherwise occur.

In whole-class situations, the coordination and reciprocity of the teachers' actions are crucial where the potential arises for miscues and non-complementary actions to occur (Tobin, 2013). Because co-teachers teach together, interactions continuously occur; thus the actions of any of the participants in the new classroom structure in the field are resources that provide ample opportunities for others' action. Co-teachers continuously create material and social resources that allow for new forms of subsequent agency. Such resources include physical, social spaces and meaning-

making entities: co-teachers take advantage of these resources in synchronized and coordinated ways (Tobin, 2013).

Social constructivists emphasize that the notion of inter-subjectivity is highly important. Inter-subjectivity allows the meeting of two minds, with each operating on the other's ideas, 'using the back-and-forth of discussion to advance his or her own development'. It also allows for joint thinking, problem solving and decision-making processes from which the learner appropriates new knowledge (Sandholtz, 2013). No one person construes the stream of events in the same way as others; as they interact with one another, they develop ideas that, because they are held in common, create a universe of discourse, a common frame of reference in which communication can take place (Connolly, 2012). Knowledge is collaboratively constructed between individuals from where it can be appropriated by each individual. Team-teaching gives teachers the opportunities to act on their ideas and reflect in and upon their actions.

Their understandings evolve through a meaning negotiation process, in which they discuss their own ideas and consider the ideas of others (Bayer, 2012). Bennett (2008) state that: collaboration can only be effective when there is a genuinely equal relationship between all parties; differing knowledge bases, including theoretical knowledge and practical knowledge, must be of equal importance; both parties must commit to engaging in ongoing dialogue and mutual inquiry; all participants must have opportunities to experience others' reality in a mutually supportive environment; and collaborators must be able to openly discuss any issues or problems that arise.

In addition, Bennett (2008) suggest that the following three characteristics are essential for effective partnerships: a degree of dissimilarity between the partners, the mutual satisfaction of self-interest and a measure of selflessness on the part of each partner, while assuring their satisfaction of self-interest in the partnership. The link between the above studies on team-teaching and the this study is that they have explored the influence of team-teaching on the students' academic performance generally while, the this study investigate, among other factors, the influence of team-teaching on the students' performance in Mathematics.

2.3.3. Teacher's Experience and Students' Performance in Mathematics

According to a study conducted by Adino in 2015, most experienced teachers having interacted with subject matter and diverse classroom experiences for a longer time are more likely to have a positive impact on student achievement (Adino, 2015). He also observed that in the first year of teaching, we witness the sad counterpoise of two sets of attitudes on how the teacher should act (Adino, 2015). The students are looking strong personalities and leadership. The beginning teacher however seeks a more gentle leadership style.

For some few teachers, this works for legions it fails which impacts negatively on the teacher performance and consequently learner achievement. In an analysis of Mathematics achievement and drop out in a sample of California high schools Mbugua (2013) found that schools whose dropout rates were high, had more new teachers than did schools with low dropout rates. A comprehensive analysis by Greenwald (2006) of 60 studies found a positive relationship between years of teacher experience and student test scores.

Similarly, the UTD Texas schools project data showed that students of experienced teachers attained significantly higher levels of achievement than did students of new teachers i.e. those with one to three years of experience (Rivkin, Hanshek & Kain, 2005). Given this scenario, the researcher intends to find out the relationship between teaching experience and achievement in Mathematics. Ladd (2014) in a study on teacher certification and middle school Mathematics achievement in Texas found that students taught by certified teachers scored better on the Texas state Mathematics achievement test than those taught by uncertified teachers.

A study that examined the Mathematics achievement of elementary learners also found that students taught by new uncertified teachers did significantly worse on achievement tests than did those taught by new, certified teachers. Likewise, Darling-Hammond (2009) found a significant positive association between achievement and teacher certification, she also found significant negative association between achievement and the presence of a high proportion of new or uncertified teachers in the school.

An analysis that synthesizes findings from a group of studies showed that teachers with pedagogical training performed better and their students were more to perform better academically than those who entered teaching without such training (Greenwald, 2006). There is therefore a need to establish the effect of training of teachers on students' achievements which will help the government to justify huge expenditure on training. Teachers' experience which is determine by the training that teachers go through and the duration of their teaching significantly determines their efficiency in teaching.

Teaching experience affects classroom management. Teachers with few years of teaching experience are less likely to teach effectively. The above studies on teachers' experience are linked to the this study in that they have explored the influence of teachers' experience on the students' academic performance in other areas while, the this study explore, among other factors, the influence of teachers' experience in teaching Mathematics on the students' performance in Mathematics in the national examinations in Makueni Sub-County.

2.3.4. ICT Integration and Students' Performance in Mathematics

According to Partnership for 21st century skills, 2002, pedagogical and technical skills are the enablers to facilitate the process of educational exploration. Teacher's ability to use a variety of pedagogical strategies is the key to ICT integration. In a non-threatening atmosphere, students have used calculators to study iteration of many algebraic functions and therefore computers for mathematical exploration have far much higher possibilities and because they are expensive, governmental action, to provide appropriate alternative low-cost technology becomes appropriate.

The year 2015 was the target specified by SDGs and EFA initiatives to achieve the universal primary education access. Many countries, including Kenya, did not attain these targets due to shortages of teachers and infrastructure among other impediments. Today, as developing economies think of Sustainable Development Goals, here referred to as SDGs, ICT can be an alternative avenue to improve, expand and increase quality of education as it drives students' needs, interest, strength and weaknesses in learning where the teacher is only a facilitator (Kidombo 2014).

Such innovations in the design and use of such material should be encouraged so that their use makes school enjoyable and meaningful. Findings in USA revealed that ICT has the power to remake American schooling, raising performance standards while cutting costs. Yara (2012), postulates that ICT makes a departure from the current teaching methods where all learners are treated more or less alike en-mass and that while ICT continues to advance in the western world, Africa and the developing economies are still lagging behind.

According to Yara (2012) ICT can personalize learning that produce stronger results, enable and empower students to pursue their own knowledge, enhance content and information rich resources that are not limited hard copy, given the role ICT plays in the global economy. Kenya is not exceptional, like the rest of the world, has made strides through MOEST by recognizing the role of ICT in education. National ICT policy in Kenya emphasizes its integration to improve access, learning and administration, to establish a policy framework, install digital equipment, connectivity and networking.

The ministry admits that ICT in education is the natural platform for equipping its citizens with skills for dynamic and sustainable economic growth and failure to integrate ICT, the country risks serious global marginalization (GoK, 2014). For this reason, Sessional Paper No. 1 of 2005 articulates strategies to address the challenges of ICT in education. The Sessional paper on ICT for Education (2012), points out that ICT strategies were put in place in 2006, with the aim to modernize Kenya's education system and expand access, training and research by working towards developing new models, develop ICT curriculum and incorporate necessary standards, practices and regulations.

Institutions working in ICT for education at the ministry of education in Kenya include; ICT for education department, ICT integration committee, National ICT integration and innovation centre, KICD and CEMASTEA. KICD launched the e-learning content which the CD ROMs and DVDs are produced for schools (KICD, 2012). Despite all these initiatives, Gakuu (2010) posits that ICT integration is commonly embedded in private schools unlike in the public schools with a view to attract students in these schools to improve performance. ICT pedagogy is about teaching methodologies that calls for software application to solve educational

problems, to provide student capabilities, to create products and/or communicate and share their perspectives with each other (Jhurreev, 2015).

According Flecknoe (2012), many policies seem to place great deal of emphasis on providing ICT infrastructure in schools rather than their use in pedagogy. Studies indicate that investment in new ways of teaching and learning is not the same as investment in technology and infrastructure, the balance seems to tip towards to the later. As pointed out by Daniels (2013) there is need for motivation to develop teachers' pedagogy and practice; confirmation of what pupils should learn using ICT and how teachers should facilitate this. Ottevanger (2015) recommended that effective use of ICT needs to be optimized through extensive programs of teacher support.

According to Amutabi (2013) teachers are not doing enough to improve academic performance and may not be aware of the potentials that technology offers in pedagogy. Kennewell (2012) observed that despite the dramatic impact and growth of ICT in society, students in many schools are still being taught using methods of 1950's because of ineffective use of ICT as a pedagogical tool. Jonassen (2011) observed that ICT cannot replace the normal classroom teaching but it is a positive force to enhance deeper understanding of principles and concepts that provides new, authentic, interesting, motivating and successful learning experiences. For instance, teachers can use mobile phones to access online mathematical content which include three dimensional images and videos to supplement the content available in text books and to enhance students' understanding of mathematical concepts (Rahman, 2013).

Indeed these studies proof that unless teachers see the connection between technology and Mathematics subject content, they are unlikely to develop technology-supported pedagogy. To this end and as purported by Delen (2011) the importance of ICTs in the future of education cannot be underrated. Teachers do not only need to have competent knowledge of teaching Mathematics but also need to be competent in the pedagogical use of ICT (Gakuu, 2010; Nyangarora, 2006; Rahman, 2013). The above studies on ICT integration in education are connected to the this study in that they have explored the influence of using ICT tools in teaching on the students' academic performance in other areas while the this study investigate, among other factors, the influence of ICT integration in teaching Mathematics on the students' performance in Mathematics in Makueni Sub-County.

2.4. Conceptual Framework

Independent Variables

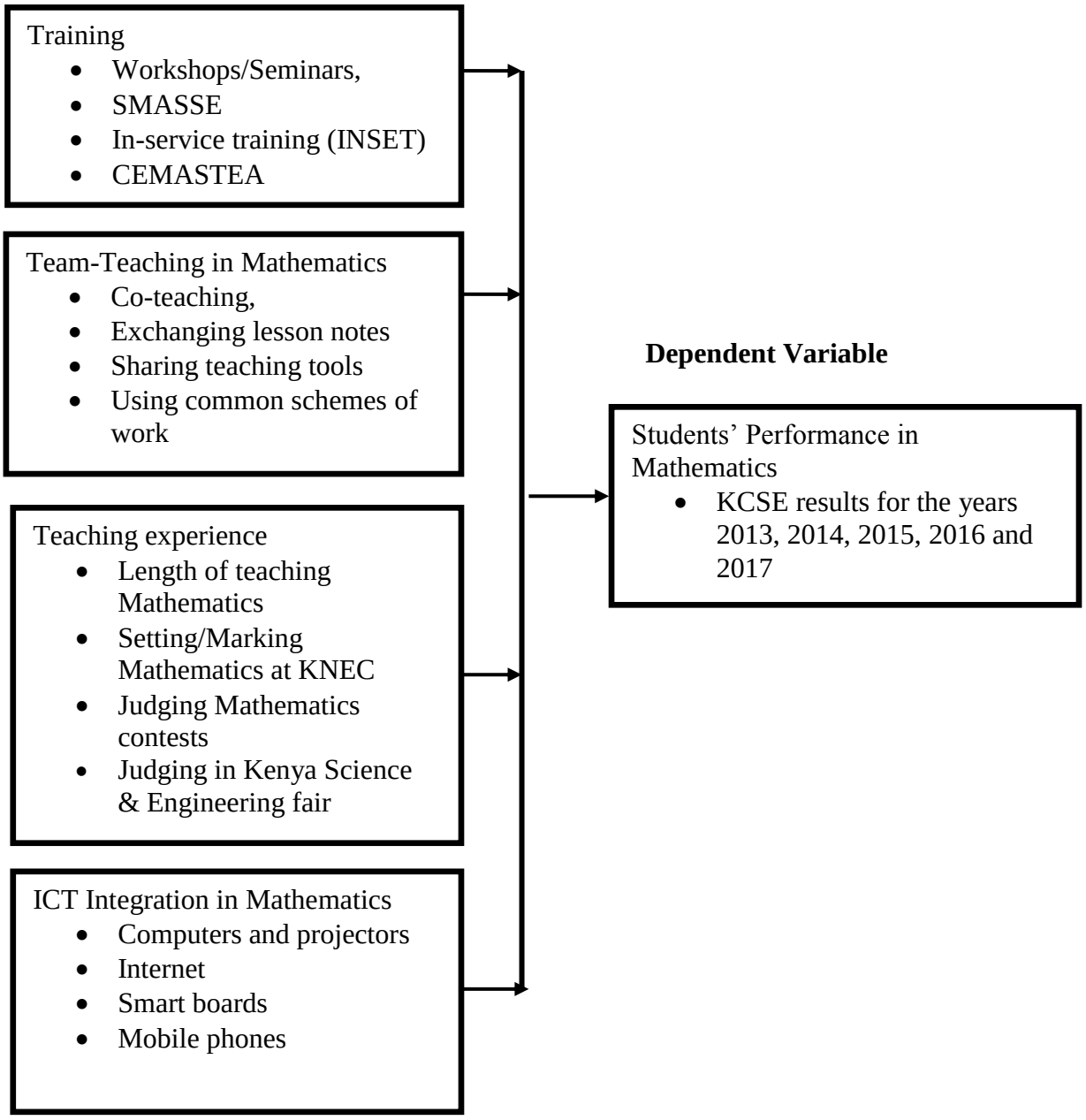


Figure 2.1: Conceptual Framework

2.5. Summary

There is very limited literature on the influence of the various strategic management practices on the performance of Mathematics in public secondary schools in Makueni sub-county. However, there is adequate literature confirming that there is a positive relationship between students' performance in Mathematics and team teaching, teacher training, use of ICT in teaching and the teacher's experience (Kafyulilo, 2014; Ladd, 2014; Sandholtz, 2013). This study intended to find out relationship between the teacher variables mentioned above and the students' performance in Mathematics especially in the National Examinations (KCSE). The findings of this study are generalizable within the Makueni Sub-county and other socio-economically similar areas in the country only.

2.6. Research Gaps

From the literature review on the impact of frequent teacher training on the students' performance in Mathematics, it is clear that training is a continuous process and it enhances the teacher's potential through skills development for better results especially in the national examinations. There is inadequate information on the impact of frequent training on the students' performance in Mathematics particularly in Makueni Sub-County (GoK, 2014).

From the literature review on the effects of team-teaching on the students' performance in Mathematics, it is clear that this teaching method is not widely practiced in developing countries besides being an effective teaching method which promotes the diffusion of ideas. This study established the frequency of using the method and its impact on the students' performance in Mathematics in the study area.

From the literature review on the teacher's experience, it is clear that no much research that has been done on the effects of the teachers' experience on the students' performance particularly in Makueni Sub-County and thus a knowledge gap still exists in understanding the effect of teachers' experience on students' performance which this study seeks to establish.

Also, according to the literature review on the effect of ICT integration on the students' performance in Mathematics, it is clear that the use of ICT in the teaching of

Mathematics has a positive impact on the students' performance especially in national examinations. However, there is limited use of ICT in teaching Mathematics particularly in Makueni Sub-County due to inadequate infrastructure and knowledge. The this study establish the use and the impact of ICT as well as the factors associated with the underutilization of the ICT in teaching Mathematics in the study area.

CHAPTER THREE

3.0. RESEARCH METHODOLOGY

3.1. Introduction

This section presents the research design, the targeted population, sampling and sampling techniques, the research instruments, the data collection procedure and the data analysis procedures to be used in this study.

3.2. Research Design

This study adopted a descriptive survey design. According to (Kothari, 2004) a descriptive survey design would be appropriate because of the following reasons: the design is considered useful in describing the characteristics of a large population, makes use of large samples, thus making the results statistically reliable even when analyzing multiple variables, many questions can be asked about a given topic giving considerable flexibility to the analysis. The design allows the use of various methods of data collection like questionnaire and interview methods and it also makes use of standardized questions where reliability of the items is determined because of the cross-sectional nature of the data collected and the comparative analysis inherent in the topic to be studied.

3.3. Study Population

According to Mugenda (2003), the population is a group of individuals, items or objects that have at least one characteristic in common and from which samples are drawn. The target population of this study included the school administrators (school principals and deputy principals) and the Mathematics teachers from the 46 registered Public Secondary Schools which presented candidates for the KCSE examinations at the end of the year 2017 in Makueni Sub-County. There are 46 school principals and 230 Mathematics teachers in the 46 PSS mentioned below to give a total target population of 276 teachers.

Table 3.1: Study Target Population

Category	Number (n)	Percentage (%)
School Administrators	46	16.67
Mathematics Teachers	230	83.33
Total	276	100

Source: Makueni County Director of Education

Table 3.1 represents the target population of this study; the total number (276) of the members of the Mathematics performance management team in the 46 schools in Makueni Sub-County. The school administrators (the school principals and deputy principals) consisted of 16.67% while the Mathematics teachers consisted of 83.33% of the target population (see Appendix IV).

3.4. Sample Size and Sampling Techniques

According to Saunders (2009) a sampling frame is a list of all the items where a representative sample is drawn for the purpose of carrying out a study. The study sample consisted of both school principals and Mathematics teachers. Census method was used to obtain 46 principals from the 46 targeted registered public secondary schools while random sampling was conducted to obtain 30% of the Mathematics teachers from every PSS to obtain a total of 118 study participants on which questionnaires were administered. According to Saunders (2009) sample size is the actual number of elements to be physically reached by the researcher to extract data using an appropriate data collection instrument.

This study utilized both census and random sampling techniques to obtain the required sample size. According to Kothari (2004), sometimes it is important to use a combination of various sampling techniques which enable the researcher achieve the required sample scientifically. The census method is mostly used when the target population is not large hence suitable to be used on the school administrators where the key administrator is the principal, who would be substituted by the deputy principal in case he was absent from the 46 registered schools in Makueni Sub-County. Random sampling techniques are used when the target population is large. When this technique is used, all the units in the target population have an equal chance of being selected to form the study sample hence suitable in selecting the

Mathematics teachers to be the study participants. Since this study intents to investigate the influence of strategic management practices; the four independent variables, on the students' performance in Mathematics for the last five years (2014-2018), the study targeted those schools that were registered and presented their candidates for national examinations as at the end of the year 2018.

At the end of 2018, only 46 public secondary schools were registered in Makueni Sub-County. This study used census method on the school principals whereby all of the 46 principals were selected to form part of the study sample. A random sampling technique was used to select only 30% of the Mathematics teachers from each of the 46 PSS mentioned above. This gave a total sample size of 118 study participants which is approximately 30% of the target population. The data collected from these respondents was analysed to provide a basis for the preparation of the research report.

Table 3.2: Sample Size and Sampling Procedure

Category	Number (N)	Number Sampled (n)	Percentage Sampled (%)
School Administrators	46	46	100
Mathematics Teachers	230	72	31.3
Total	276	118	42.8

Source: Makueni County Director of Education

Going by the 30% sample size suggested by Kothari (2004), only 118 respondents out of the possible 276 total respondents form the sample size. The questionnaires were administered on this group to provide data which was analyzed to answer the research questions. The sample size of this study is as represented in Appendix IV.

3.5. Data Collection Instrument

A standardized questionnaire was developed to capture the various variables investigated in this study. The information required to address the dependent and independent variables in the this study was captured (Mugenda, 2003). A research questionnaire is a research instrument that gathers data over a large sample with the objective of translating research objectives into specific questions and answers for each question provided. The researcher used a questionnaire in this study because the data can be collected from a large sample with minimal biasness since it is filled by

the respondents without the presence of the researcher hence confidentiality is maintained.

The questionnaire was divided into two main parts; one to capture the respondent's background information and the other part to capture information on the major areas of study. It contained both closed ended and open ended questions. The closed ended questions provided precise information minimising biasness while the open ended questions gave respondents the freedom to express themselves.

3.6. Data Collection Procedure

This study used the self administered questionnaires to collect data from the respondents. According to Kothari (2004) it is essential for the researcher to make prior arrangements before the actual data collection exercises. Prior arrangements were made during a pre-visit to the 46 PSS from which data was collected. During the pre-visit, the introduction and familiarization of the researcher and the research team with the school environment was done.

Arrangements were also made with the target group on the most convenient date and time to administer the questionnaire. With the help of two, well trained research assistants (RA), questionnaires were administered as agreed with the sampled study participants. During the data collection, the respondents were given adequate time to complete the questionnaires before they are collected by the two research assistants. The questionnaires were then sorted and arranged in preparation for coding, data entry and analysis.

3.7. Piloting

According to Patton (2010) piloting of a data collection instrument is conducted when the instrument is being used for the first time. It assesses the suitability, validity and reliability of the questions used and the entire instrument before the actual start of the data collection process. The questionnaire was piloted on 10 Mathematics teachers randomly selected from the Public Secondary Schools in Kilungu Sub-County, which neighbours Makueni Sub-County to the East. The piloting process enabled the researcher to make the necessary amendments on the questionnaire to ensure collection of accurate and reliable data leading to more reliable research findings.

3.8. Data Processing and Analysis

The data collected was analyzed using both quantitative and qualitative data analysis approaches (Musau, 2013). The qualitative data was analyzed thematically according to the study objectives and integrated within the quantitative data. The analysis of the quantitative data was by the regression model below. Descriptive statistical tools such as frequencies, percentages, mean and standard deviation were used to describe the data. To establish the effect of independent variables on dependent variable, multiple regressions were performed using SPSS version 21. The researcher used multiple regression analysis to test the effect of change of independent variables on dependent variables.

The regression was used because it gives an equation which helps in the prediction of the dependent variable from a given independent variable and vice versa. It also shows how a unit increase or decrease and how the independent variable affect the dependent variable. The study used content analysis technique to analyze qualitative data. These, along with quantitative data, formed the basis of discussion in the light of the available literature. The following regression model, which was authored by (Pardoe, 2012) and previously used by (Ladd, 2014; Lieberman, 2015; Yara, 2012) was used to express the value of the predicted (dependent) and the predictor (independent) variables and an error term:-

Regression model: $\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon}$

Where:-

Y = students' performance in Mathematics
α = Constant
β_1 - β_4 = Model coefficients
X_1 = Teacher Training
X_2 = Team teaching
X_3 = Teaching experience
X_4 = ICT integration
ϵ = Error factor

CHAPTER FOUR

4.0. RESULTS

4.1. Introduction

This chapter presents information on the findings of this study. The study sought to investigate the influence of strategic management practices on the performance of Mathematics in public secondary schools in Makueni Sub-County. The response rate and the background information of the respondents were discussed together and thereafter comprehensive findings according to the study specific objectives. The chapter also presents a detailed analysis of the descriptive and inferential statistics showing how each objective was investigated and how each hypothesis was tested.

4.2. Pilot Study Analysis

The researcher prepared and administered ten (10) questionnaires to Mathematics teachers who were randomly selected from the public secondary schools in Kilungu sub-county which is to the East of Makueni Sub-County. The basic characteristics of the piloting respondents were summarized in table 4.1 below. The questionnaires were distributed and the respondents were given a period of five (5) days to complete them before collection for analysis with an aim to improve the questionnaire.

Table 4.1: Piloting Respondents

Designation	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Principal	5	50.0	50.0	50.0
HOD	3	30.0	30.0	80.0
Teacher	2	20.0	20.0	100.0
Total	10	100.0	100.0	
Level of Education		**Percent**	**Valid Percent**	**Cumulative Percent**
Master	4	40.0	40.0	40.0
University Degree	5	50.0	50.0	90.0
Diploma	1	10.0	10.0	100.0
Total	10	100.0	100.0	
Teaching Experience		**Percent**	**Valid Percent**	**Cumulative Percent**
10-14 years	3	30.0	30.0	30.0
15-19 years	4	40.0	40.0	70.0
20 years and above	3	30.0	30.0	100.0
Total	10	100.0	100.0	

The results in table 4.1 above revealed that there was a 100% response rate since all the questionnaires piloted were collected. From the analysis of the way the questions were answered, it was observed that there were no major issues of concern which would warrant a second piloting. The only thing that was noted was that all the respondents left the open-ended questions unanswered. The researcher improved the tool by removing all the open ended questions leaving the questionnaire with closed ended questions only. There were no technical issues detected and the respondents had no problem with the format of the questionnaire. During piloting, the researcher also noted that using a motorcycle for transport was faster cheaper and convenient compared to any other vehicle. All these observations were noted and effectively applied during the main data collection process.

4.3. Response Rate

The study population consisted of administrators and Mathematics teachers from the 46 public secondary schools in Makueni Sub-County. The targeted population was 276; 46 school administrators and 230 Mathematics teachers. The study sampled all the school administrators and 30% of the Mathematics teachers giving a total of 118 study respondents. Only 112 study respondents successfully completed and returned their questionnaires. This translated to 94.92% response rate (see table 4.3).

Table 4.2: Response Rate

Category	Number Sampled (n)	Responded	Response Rate (%)
School Administrators	46	44	95.65
Mathematics Teachers	72	68	94.44
Total	118	112	94.92

The response rate of this study was high and acceptable since there were other previous studies with lower response rates (Mugenda, 2003). According to Kothari (2014), a response rate of 80% and above is acceptable. Therefore, it was justifiable to work with a response rate of 94.92% which indicated a reasonable representation of the entire population.

4.4. Background Information

This section presents the personal characteristics of the study participants which were considered important in this study. Included in the background information were their designation in the school, level of education and teaching experience.

4.4.1. Respondents' Designation

The designations were classified into five categories; principal, deputy principal, senior master, head of department and teacher. The principal and the deputy principal were considered as school administrators while the others were classified as Mathematics teachers. The designations were summarized in table 4.3 below.

Table 4.3: Respondent Designation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Administrators	44	39.3	39.3	39.3
	Senior Master	12	10.7	10.7	50.0
	HOD	29	25.9	25.9	75.9
	Teachers	27	24.1	24.1	100.0
	Total	112	100.0	100.0	

Majority of the respondents were the administrators (the principals and deputy principals) (39.3%) while the least of the respondents were the senior masters (10.7%). The heads of departments were 25.9% and the teachers were 24.1% of the total respondents. The information summarized in table 4.3 above was also presented in figure 4.1 below.

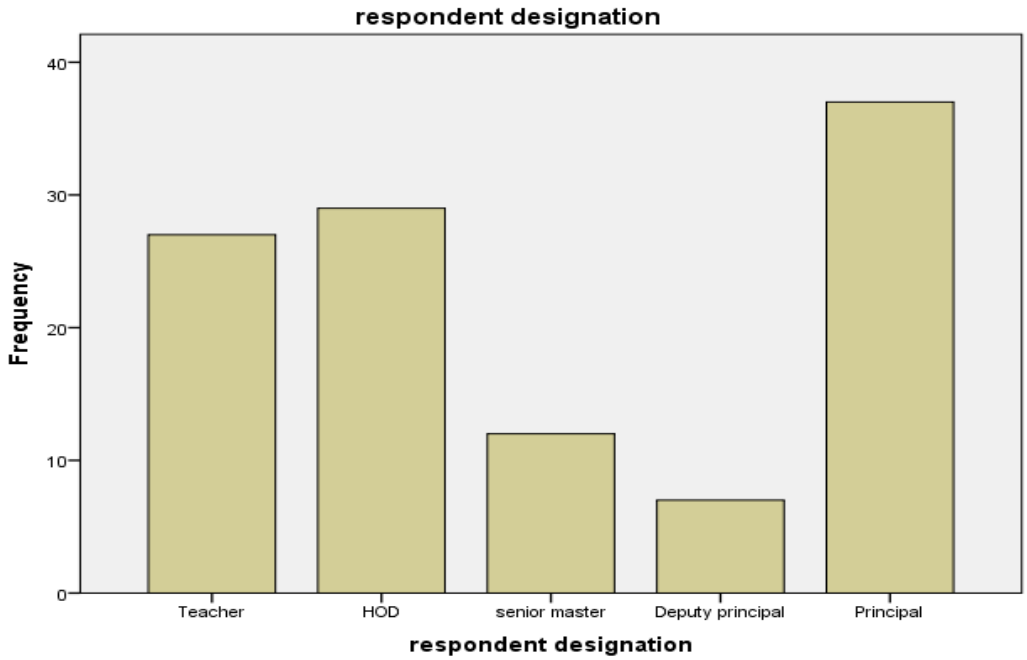


Figure 4.1: Respondent Designation

4.4.2. Teacher's Level of Education

The teacher's level of education was classified into five categories; craft certificate, diploma, bachelor's degree, master's degree and PhD. The number of respondents in each of these different levels of education was summarized and presented as shown in table 4.4 below.

Table 4.4: Level of Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PhD	4	3.6	3.6	3.6
	Master	34	30.4	30.4	34.0
	University Degree	68	60.7	60.7	94.7
	Diploma	6	5.4	5.4	100.0
	Total	112	100.0	100.0	

From table 4.4 above, none of the respondents had craft certificate as the highest level of education. Majority of the respondents were holders of a bachelor's degree (60.7%) while the least of the respondents were PhD holders (3.6%). Those with diploma as their highest level of education were only 5.4% of the total respondents conducted. The results table 4.4 were also summarized in figure 4.2 below.

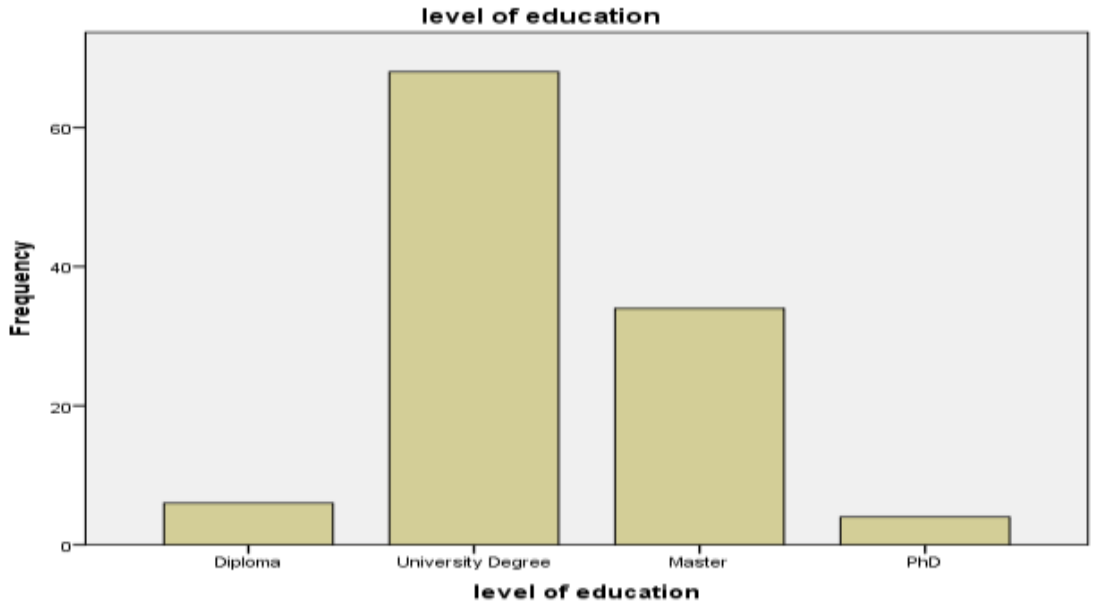


Figure 4.2: Level of Education

4.4.3. Teaching Experience

The teaching experience of the respondents was classified into five groups; those with experience below five years, five to nine years, ten to fourteen years, 15 to 19 years and those with 20 years and above. The number of respondents in each of these categories was summarized in table 4.5 below.

Table 4.5: Teaching Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 years and above	21	18.8	18.8	18.8
	15-19 years	33	29.5	29.5	48.3
	10-14 years	21	18.8	18.8	67.1
	5-9 years	16	14.3	14.3	81.4
	below 5 years	21	18.8	18.8	100.0
	Total	112	100.0	100.0	

The results presented in table 4.5 above revealed that majority of the respondents had a teaching experience of between fifteen and nineteen years (29.5%) while the least of the respondents had a teaching experience of between five and nine years (14.3%). The results in table 4.5 above were also presented in figure 4.3 below.

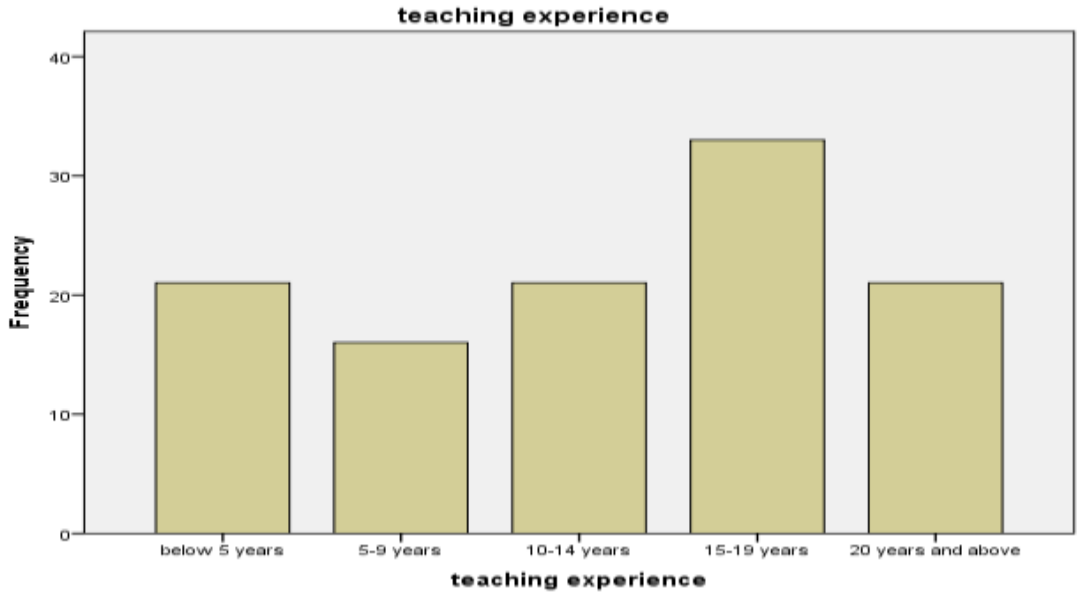


Figure 4.3: Teaching Experience

4.5. Descriptive Analysis

4.5.1. Teacher Training and Performance in Mathematics

In secondary schools, the Mathematics teachers often get opportunities to participate in a number of activities that may help them improve on their skills particularly in teaching Mathematics which can consequently improve the academic performance of their students in the subject in national examinations.

4.5.1.1. Training Opportunities for Mathematics Teachers

The teacher training activities included SMASSE, INSET, CEMASTEA, workshops, seminars, conferences and symposiums. This study collected data on the teachers' frequency of attending any of the activities mentioned above for the last five years; from 2013 to 2017. The frequency of attending the teacher training activities was summarized in table 4.6 below.

Table 4.6: Frequency of attending Training Activities

Training Activity	2013	2014	2015	2016	2017
SMASSE	64	78	75	64	84
INSET	27	39	63	68	55
Workshops/Seminars/Conferences/Symposium	72	83	91	83	83
CEMASTEA	11	8	58	35	60

The results in table 4.6 above revealed that, for the last five years, majority of the respondents attended workshop/ seminars/conferences and symposiums than any other training activity studied in this study. This was followed by SMASSE and in-service trainings. The least attended training activity attended by the Mathematics teachers was CEMASTEA.

4.5.1.2. Perceived influence of training on Performance in Mathematics

The study participants were also asked to rate in a scale of five, the level at which they felt the training activities influenced performance in Mathematics. A choice of 1 = don't know, 2 = no effect, 3 = low impact, 4 = moderate impact and 5 = high impact. Their responses were summarized in table 4.7 below.

Table 4.7: Perceived impact of training activities on performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderate	7	6.3	6.3	6.3
	High	105	93.8	93.8	100.0
	Total	112	100.0	100.0	

The results in table 4.7 above revealed that all the respondents knew the kind of influence training activities had on the students' performance; majority of the study participants (93.8%) were of the opinion that the teacher's attendance of training activities has a high impact on the student's performance in Mathematics. The others (6.3%) were of the opinion that it training activities have a moderate influence on the students' performance in Mathematics. None of the respondents was of the opinion that the training activities had a low or no effect on the students' performance in Mathematics. Their responses were also summarized in figure 4.5 below.

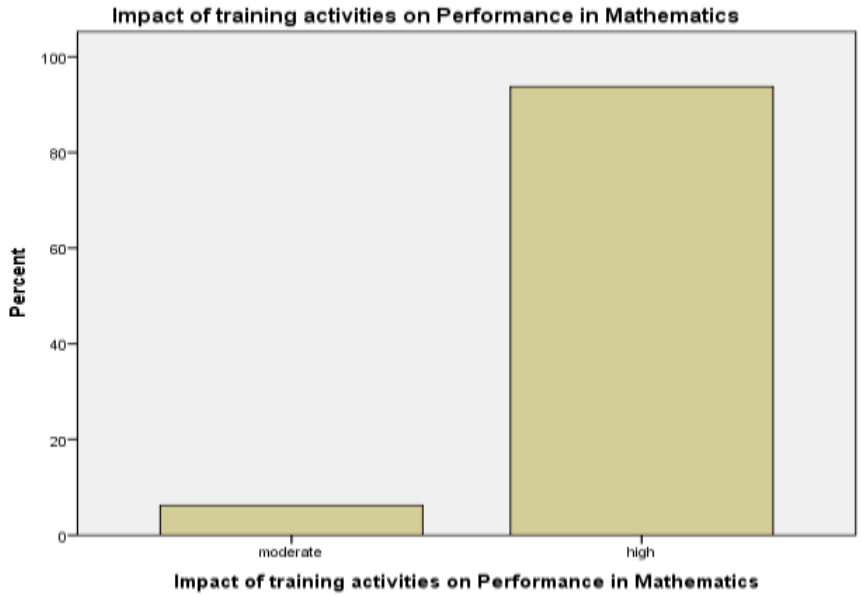


Figure 4.4: Perceived impact of training on performance in Mathematics

4.5.2. Team Teaching and Performance in Mathematics

Under team teaching, this study collected data on the number of Mathematics teachers in each school, the number of departmental meetings held per term and if they practiced team teaching in their school. Those that practiced team teaching were asked to state the frequency and the nature of team teaching they engaged in. Finally, the respondents were asked to state the challenges they faced in practicing team teaching in Mathematics in their school. Their responses were summarized and presented in tables and figures.

4.5.2.1. Number of Mathematics teachers per school

The number of teachers per school was grouped into five intervals; 1-2, 3-4, 5-6, 7-8, and 9 and above. The responses were summarized and presented in table 4.8 below.

Table 4.8: Number of Mathematics teachers per school

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2	31	27.7	27.7	27.7
	3-4	38	33.9	33.9	61.6
	5-6	30	26.8	26.8	88.4
	7-8	13	11.6	11.6	100.0
	Total	112	100.0	100.0	

The results presented in table 4.7 above revealed that the sub-county schools (27.7%) had 1-2, the county schools (33.9%) had 3-4, extra-county schools (26.8%) had 5-6 while the national schools (11.6%) had 7-8 Mathematics teachers in their schools. From these findings, it was evident that the national schools had more Mathematics teachers than the other schools in the lower levels. This was also reflected in their performance as those schools with relatively more Mathematics teachers had better performance in Mathematics compared to those with relatively few Mathematics teachers. These results were also presented in figure 4.5 below.

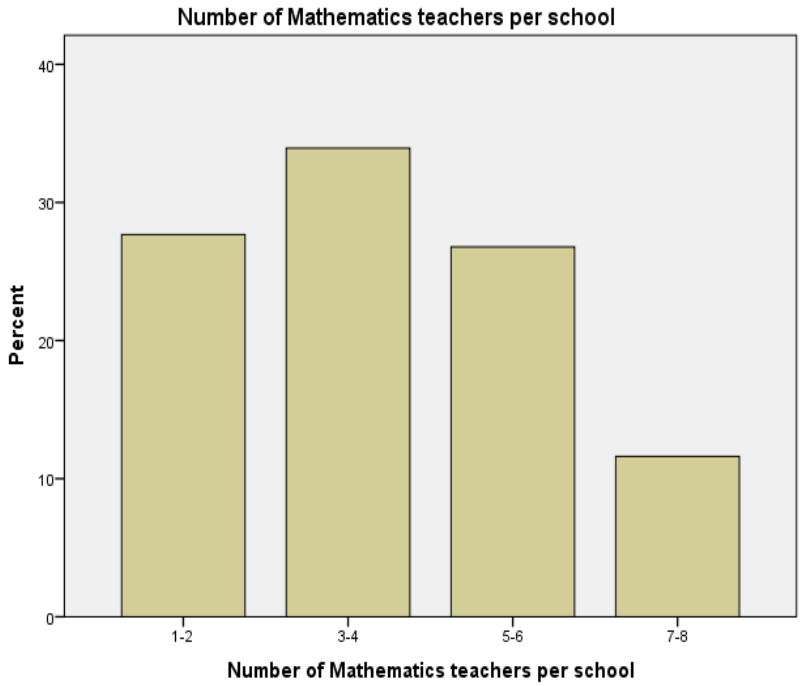


Figure 4.5: Number of Mathematics teachers per school

4.5.2.2. Departmental Meetings per Term

This study also collected data on the number of departmental meetings (Mathematics Department) the teachers had per term. The frequency of meetings was 1, 2, 3, 4 and above. The responses were summarized and presented in table 4.9 below.

Table 4.9: Number of departmental meetings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once	38	33.9	33.9	33.9
	Twice	63	56.3	56.3	90.2
	Thrice	11	9.8	9.8	100.0
	Total	112	100.0	100.0	

The results in table 4.9 above revealed that majority of the respondents (56.3%) reported that they had a Mathematics departmental meeting twice per term while the least (9.8%) reported that they had three departmental meetings per term. The respondents were of the opinion that, since the departmental meetings were held to discuss how to improve performance, more meetings were associated with improved or better performance compared to the schools that had fewer departmental meetings. These results were also presented in figure 4.6 below.

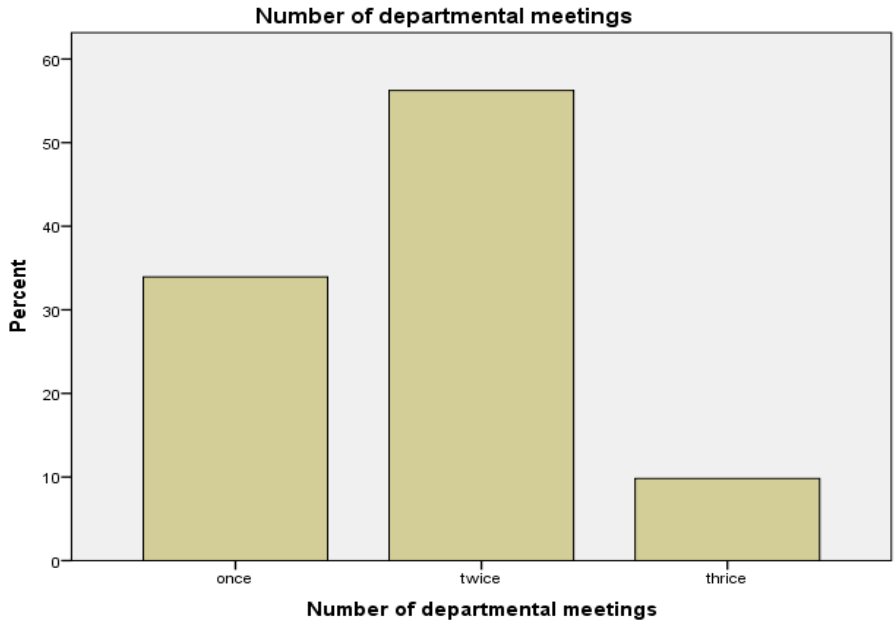


Figure 4.6: Number of departmental meetings per term

4.5.2.3. Practice of team teaching

This study sought to find out if the Mathematics teachers who participated in this study practiced team teaching. They were asked if they practiced or not and their responses were recorded as either YES or NO. Their responses were summarized and presented in table 4.10 below.

Table 4.10: Practice of team teaching

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Practiced	112	100.0	100.0	100.0

The results in table 4.10 above established that all the study participants (100%) reported practice of team teaching in their respective schools. Practice of team teaching was associated with good performance in Mathematics. However, the type of team teaching activity and frequency of practice would also determine the

performance since some of the team teaching activities are assumed to be more effective than others. This study also sought to establish the frequency at which the respondents practiced team teaching activities.

4.5.2.4. Frequency of team teaching

The study respondents were also asked to state frequency at which they practiced team teaching. The responses included rarely, sometimes, often and always. Their responses were summarized and presented in table 4.11 below.

Table 4.11: Frequency of team teaching

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rarely	18	16.1	16.1	16.1
	Sometimes	51	45.5	45.5	61.6
	Often	25	22.3	22.3	83.9
	Always	18	16.1	16.1	100.0
	Total	112	100.0	100.0	

The results in table 4.11 above revealed that majority of the study respondents (45.5%) practiced team teaching activities sometimes. The proportion of the respondents who practiced team teaching rarely and always was 16.1% each. Those who practiced team teaching often were 22.3%. More frequent practice of team teaching was associated with better performance compared to those schools that rarely practiced team teaching. These results were also summarized in figure 4.7 below.

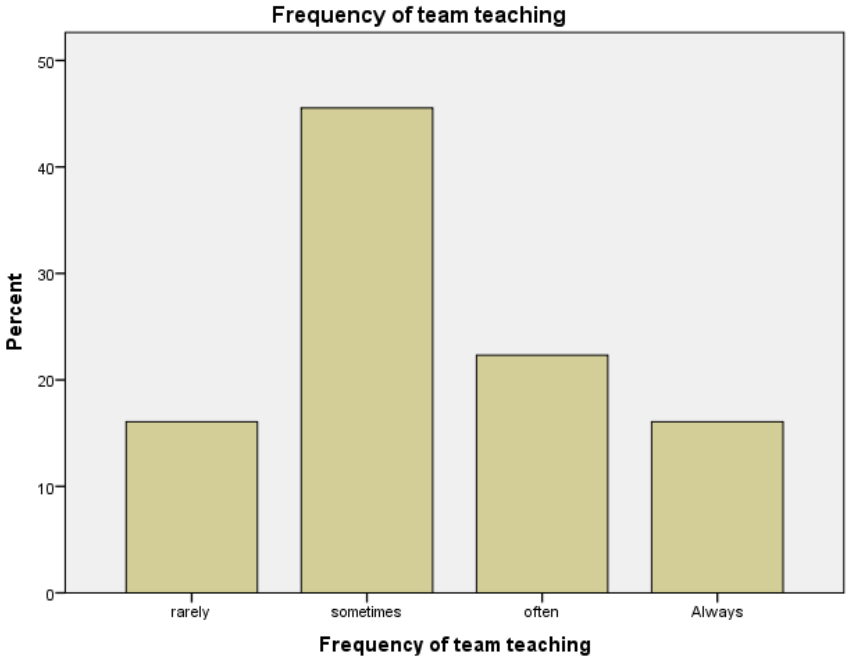


Figure 4.7: Frequency of team teaching

4.5.2.5. Team Teaching Activities in Mathematics

The respondents were asked to identify the team teaching activities they engaged in from a given list which consisted of conveyor belt marking, use of common schemes of work, use of common lesson plans and notes and sharing teaching tools. The team-teaching activities they engaged in were summarized and presented in table 4.12 below.

Table 4.12: Team Teaching Activities

Team teaching activity		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Conveyor belt marking	8	7.1	7.1	7.1
	Common schemes	25	22.3	22.3	29.5
	Common lesson plans/notes	69	61.6	61.6	91.1
	Sharing teaching tools	10	8.9	8.9	100.0
	Total	112	100.0	100.0	

The results presented in table 4.12 above revealed that majority of the respondents (61.6%) shared class lesson plans and notes while the least proportion of respondents (7.1%) participated in conveyor belt marking. The proportion of those who shared schemes of work was 22.3% while the proportion of those who shared teaching tools was 8.9%. No other team teaching activity was reported by the respondents contacted. The results in table 4.11 were also presented in figure 4.8 below.

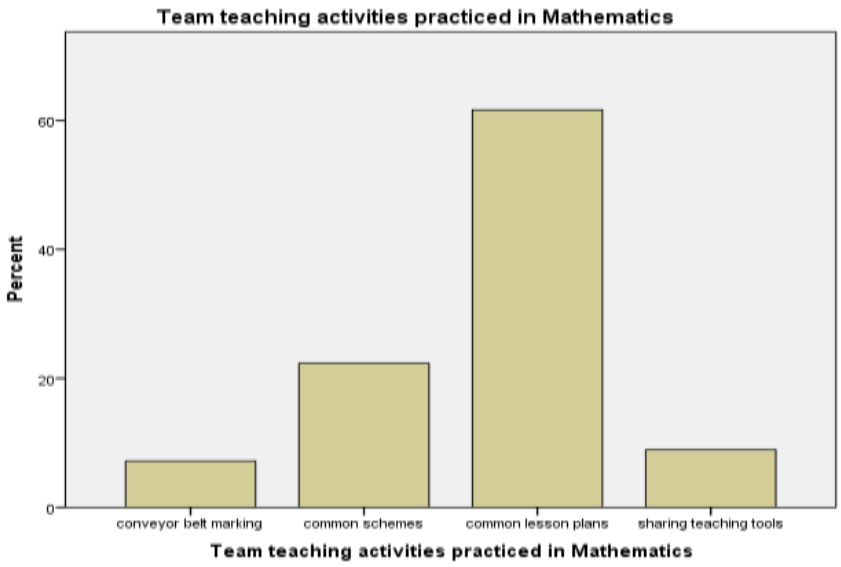


Figure 4.8: Team-teaching activities

4.5.2.6. Challenges in faced in Team Teaching

The study participants were also asked to state any challenge they faced in practicing any of the team teaching activity they engaged in. The challenges were to be picked from a given list which included lack of any of the following; teacher cooperation, administrative support, interest in sharing knowledge and team work spirit. The respondents were also at liberty of stating their challenge in case it was not among those provided above. The results were summarized and presented in table 4.13 below.

Table 4.13: Challenges in Team-Teaching

Challenges in team-teaching		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lack of teacher cooperation	64	57.1	57.1	57.1
	Lack of admin support	28	25.0	25.0	82.1
	Lack of interest in sharing knowledge	4	3.6	3.6	85.7
	Lack of team work spirit	16	14.3	14.3	100.0
	Total	112	100.0	100.0	

The results presented in table 4.13 above revealed that majority of the respondents (57.1%) experienced the challenge of lack of teacher cooperation while the least reported challenge was lack of interest in sharing knowledge (3.6%). The proportion of respondents that reported lack of administration support was (25%) while those that reported lack of team work spirit were (14.3%). These results were also presented in figure 4.9 below.

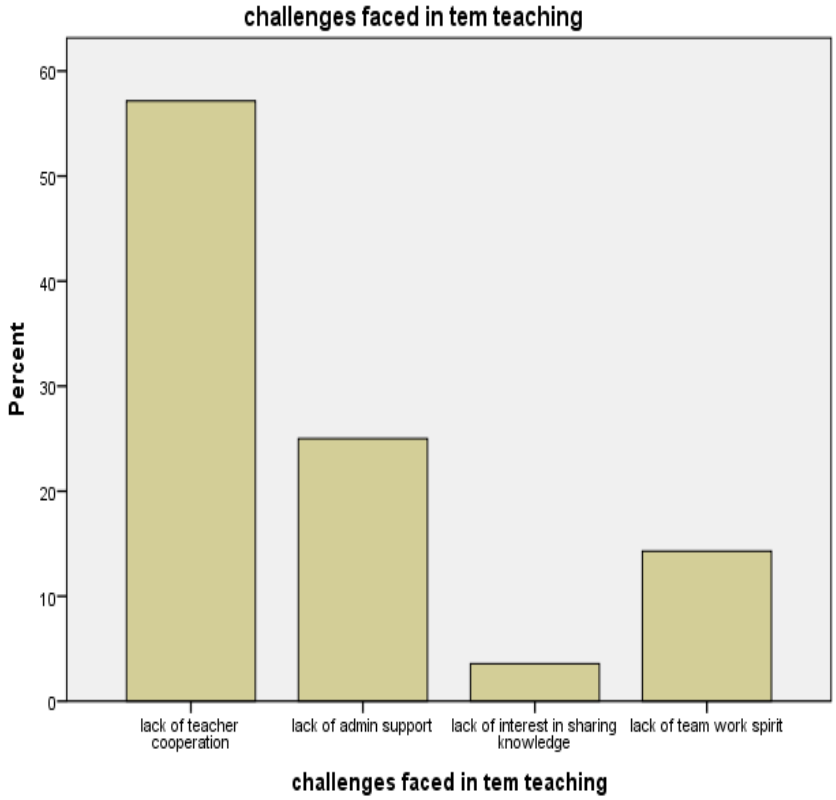


Figure 4.9: challenges in team-teaching

4.5.3. Teaching Experience and Performance in Mathematics

The teacher's experience was measured by the duration (in years) the teacher has spent while teaching or participating in other Mathematics related roles and responsibilities. Some of the areas used to measure the teachers' experience included the number of years the teacher has worked as a: KCSE maths examiner, judge in Kenya science and engineering fare, judge in math contests and experience of teaching in any of the following schools; national schools, extra county schools, county schools, sub-county schools, pure boys', pure girls' and mixed schools. The summary on those who had experience in the above listed activities was summarized and presented in table 4.14 below.

Table 4.14: Teacher's Experience

Areas of experience	Frequency	Percentage	Cumulative Percent
a. Teaching in a National School	22	3.52	3.52
b. Teaching in a Extra County School	37	5.92	9.44
c. Teaching in a County School	74	11.84	21.28
d. Teaching in a Sub-County School	99	15.84	37.12
e. Teaching pure boys' school	61	9.76	46.88
f. Teaching pure girls' school	55	8.80	55.68
g. Teaching Mixed school	108	17.28	72.96
h. Being a KCSE setter/examiner	63	10.08	83.04
i. Participation in Kenya Science & Engineering Fair as a judge	62	9.92	92.96
j. Participation in Mathematics Contest as a judge	51	7.04	100
Total	**632**	**100**	

The results in table 4.14 above revealed that majority of the respondents (17.28%) had experience teaching in mixed secondary schools while the least proportion of the respondents (3.52%) had experience teaching in national schools. Those who reported to have experience in extra county schools, county schools, sub-county schools, pure boys' schools, pure girls' schools, being a KCSE examiner, judge in Kenya Science and engineering fair and judge in Mathematics contests were 5.92%, 11.84%, 15.84%, 9.76%, 8.80%, 10.08%, 9.92% and 7.04% respectively. More and diverse teacher's experience in teaching was associated with better students' performance in Mathematics compared to those with shorter and less diverse experience in teaching. This was also found by the previous studies.

4.5.3.1. Perceived influence of experience on performance in Mathematics

The researcher also investigated the respondents' perception on the influence the teacher's experience has on the students' performance in Mathematics. The level of influence was rated in a five point scale where 1 = don't know, 2 = none, 3 = low, 4 = moderate while 5 = high. Their responses were summarized in table 4.15 below.

Table 4.15: Perceived influence of teacher's experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderate	36	32.1	32.1	32.1
	High	76	67.9	67.9	100.0
	Total	112	100.0	100.0	

The results in table 4.15 above revealed that all the respondents perceived that teachers' experience influenced the students' performance. Majority of the respondents (67.9%) were of the perception that the teacher's experience has a high impact on the students' performance in Mathematics while the rest of the respondents (32.1%) were of the perception that it had a moderate influence. None of the respondents perceived that the teacher's experience has none or a low influence on the student's performance. These results were also presented in figure 4.10 below.

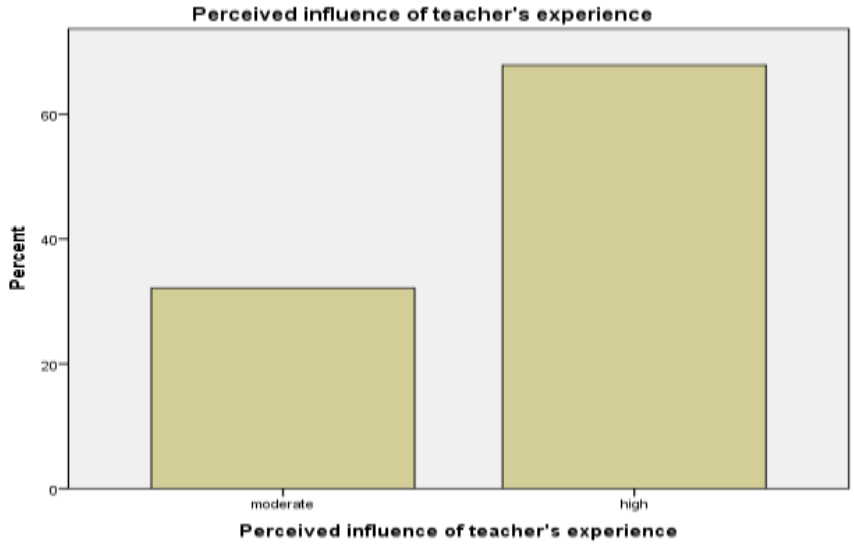


Figure 4.10: Perceived Influence of teacher's experience

4.5.4. ICT Integration and Performance in Mathematics

The ICT integration in teaching Mathematics was measured by a number of indicators which included the availability of a computer laboratory in the school, the use of ICT tools in teaching Mathematics. The respondents were also asked to state the challenges they faced towards ICT integration in teaching Mathematics.

4.5.4.1. Availability of a computer laboratory in the school

The respondents were asked to state whether they had a computer laboratory in their school or not. Their responses were summarized in table 4.16 below.

Table 4.16: Computer Laboratory Availability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Computer lab unavailable	59	52.7	52.7	52.7
	Computer Lab available	53	47.3	47.3	100.0
	Total	112	100.0	100.0	

The results in table 4.16 above suggested that only 47.3% of the respondents reported availability of a computer laboratory in their school. The majority of the respondents (52.7%) reported lack of a computer laboratory in their school. The results in table 4.16 above were also presented in figure 4.11 below.

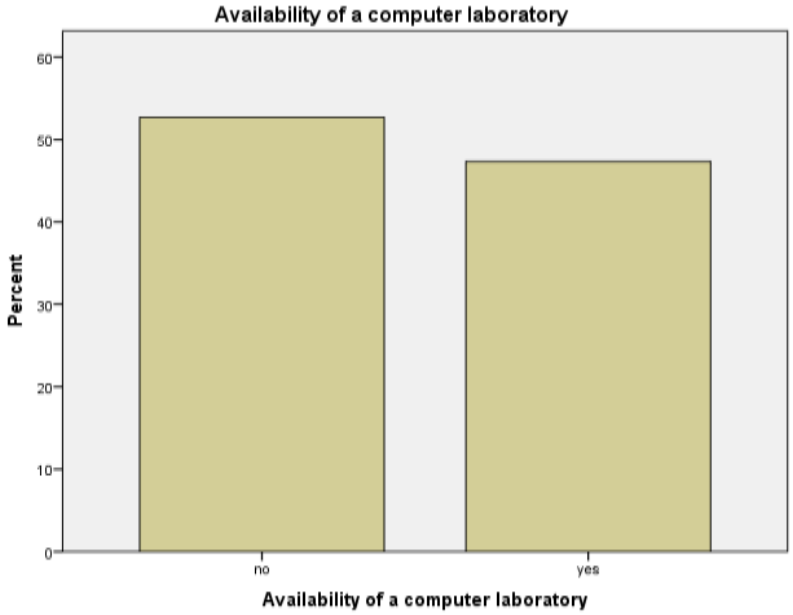


Figure 4.11: Computer Laboratory Availability

4.5.4.2. Usage of ICT tools in teaching Mathematics

The study respondents were then asked to state if they used ICT tools in teaching Mathematics. Their responses were summarized and presented in table 4.17 below.

Table 4.17: Usage of ICT tools in teaching Mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	63	56.2	56.2	56.2
	Yes	49	43.8	43.8	100.0
	Total	112	100.0	100.0	

The results in table 4.17 above revealed that majority of the respondents reported that they did not use ICT tools in teaching Mathematics while the rest of the respondents

(43.8%) used ICT tools in teaching Mathematics. Increased usage of ICT tools in teaching Mathematics was associated with good performance in Mathematics since the ICT tools enhanced understanding of concepts.

4.5.4.3. ICT Tools used in teaching Mathematics

The respondents who reported usage of ICT tools in teaching Mathematics were further asked to specify the kind of tools they used in teaching Mathematics. They were required to pick from a given list which consisted of computers, projectors, smart boards, internet and mobile phones. They were also at liberty of stating in the spaces provided, any other ICT tool not in the list. Their responses were summarized in table 4.18 below.

Table 4.18: ICT Tools used in teaching Mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Computers & Projectors	45	91.84	91.84	91.84
	Mobile phones	4	8.16	8.16	100.0
	Total	49	100.0	100.0	

The results in table 4.18 above suggested that only three ICT tools were used by the respondents in teaching Mathematics; computers, projectors and mobile phones. Majority of the ICT users (91.84%) used computers and projectors while the other respondents (8.16%) used mobile phones. The computers were used together with the projectors. No other ICT tools were reported by the respondents.

4.5.4.4. Reasons for not using ICT tools in teaching Mathematics

The researcher sought the reasons for not using ICT tools in teaching Mathematics from the 63 respondents who reported none use of ICT tools in teaching Mathematics. Their responses were summarized in table 4.19 below.

Table 4.19: Reasons for not using ICT tools in teaching Mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No electricity	4	6.35	6.35	6.35
	Poor technology	5	7.94	7.94	14.29
	Lack of ICT tools	17	26.98	26.98	41.27
	Lack of knowledge on usage of ICT tools	37	58.73	58.73	100.0
	Total	63	100.0	100.0	

The results presented in table 4.19 above suggested that lack of knowledge on the usage of ICT tools was the major reason for not using ICT tools in teaching Mathematics as it was reported by the majority of the respondents (58.73%). Poor technology and lack of electricity were the least reported reasons as they were reported by 7.94% and 6.35% of the respondents respectively. Lack of the ICT tools was reported by 26.98% of the respondents.

4.5.4.5. Challenges faced in using ICT tools in teaching Mathematics

The respondents were asked to state the challenges they faced at school towards the use of ICT tools in teaching Mathematics. Their responses were summarized and presented in table 4.20 as shown below.

Table 4.20: challenges faced in tem teaching

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lack of teacher cooperation	64	57.1	57.1	57.1
	Lack of admin support	28	25.0	25.0	82.1
	Lack of interest in sharing knowledge	4	3.6	3.6	85.7
	Lack of team work spirit	16	14.3	14.3	100.0
	Total	112	100.0	100.0	

The results presented in table 4.20 above revealed that the challenge faced by the majority of the Mathematics teachers in Makueni Sub-County was lack of teacher cooperation as was reported by 57.1% of the respondents who participated in this study. Lack of interest in sharing knowledge was reported by the least proportion of the respondents (3.6%). The other challenges included lack of administration support and lack of team work spirit as was reported by 25% and 14.3% of the study respondents respectively.

4.5.4.6. Perceived importance of ICT tools in teaching Mathematics

The respondents were asked to state if they agreed or disagreed with several statements on the usage of ICT tools. These statements covered such areas as comfort, importance of ICT tools, benefits and students' motivation when using ICT tools in teaching Mathematics. Their choices included SD=strongly disagree, D= Disagree, N= Neutral, A= Agree and SA= Strongly Agree. Their responses were summarized and presented in table 4.21 below.

Table 4.21: Perception on ICT integration in Teaching Mathematics

Statement	N (%) SD	N(%) D	N(%) N	N (%) A	N (%) SA
1) I am comfortable using ICT tools with my students	0	0	0	43 (38.4%)	69 (61.6%)
2) It is important to use technology in teaching Mathematics	0	0	0	54 (48.2%)	58 (51.8%)
3) Technology does not benefit students	105 (93.8%)	7 (6.3%)	0	0	0
4) Students are motivated to learn when technology is used	0	0	0	15 (13.4%)	97 (86.6%)

The results in table 4.21 above were on the perception of the influence of ICT integration in teaching Mathematics. The results revealed that all the respondents agreed that they were comfortable to use ICT tools in teaching Mathematics to their students with majority of them strongly agreeing to the statement (61.6%). All the respondents also agreed that it is important to use technology in teaching Mathematics with majority of them strongly agreeing (51.8%). All the respondents disagreed that technology does not benefit students with majority of them strongly disagreeing. All the respondents agreed that students were motivated to learn when technology was used with majority strongly agreeing (86.6%). ICT tools were associated with enhanced understanding and increased usage would lead to better performance in Mathematics.

4.5.5. Performance in Mathematics and Overall Performance

The respondents were asked to state their school Mathematics mean score and the overall school mean score for the last five years. The results were summarized in table 4.22 below.

Table 4.22: Mathematics and Overall Performance

Average Performance	2013	2014	2015	2016	2017
Mathematics Mean Score	5.07	6.05	4.35	2.59	2.32
Overall Mean Score	5.896	5.846	5.580	4.650	4.217

The results in 4.22 above revealed that the overall and Mathematics' performance have been declining over the last five years. Over the last five years, the highest mean score in Mathematics and overall performance were recorded in 2014 and least was recorded in 2017 respectively. The respondents were then asked to state their perceived influence of Mathematics on the overall performance of students in the national examinations (KCSE). Their responses included 1 = Don't know, 2 = No effect, 3 = Low, 4 = Moderate and 5 = High and they were summarized in table 4.23 below.

Table 4.23: Perceived impact of Math performance on overall performance

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	High	25	22.3	22.3	22.3
	Moderate	55	49.1	49.1	71.4
	Low	32	28.6	28.6	100.0
	Total	112	100.0	100.0	

All the respondents were of the perception that performance in Mathematics influenced the overall performance of students. Majority of the respondents (49.1%) were of the view that the performance in Mathematics had a moderate influence while the least proportion of the respondents (22.3%) perceived that it had a high influence on the overall performance of the students in the national examinations. The rest of the respondents (28.6%) were of the perception that performance in Mathematics had a low influence on the overall school performance.

4.6. Inferential Analysis

4.6.1. Teacher Training and Performance in Mathematics

The first objective of this study was to find out the influence of training of Mathematics teachers on the Mathematics performance of students in public secondary schools in Makueni Sub-County. Correlations between the frequencies of all the teacher training indicators and the students' performance in Mathematics were

performed. This was to establish the impact of each on the dependent variable. The results were summarized and presented in table 4.24 below.

Table 4.24: Teacher Training and Performance in Mathematics

Teacher training activities		Performance in Mathematics	SMASSE	INSET	WORKSHOPS	CEMASTEA
Performance in Mathematics	Pearson Correlation	1	.308**	.029	.459**	.261**
	Sig. (2-tailed)		.001	.763	.000	.005
	N	112	112	112	112	112
SMASSE	Pearson Correlation	.308**	1	.526**	.456**	.496**
	Sig. (2-tailed)	.001		.000	.000	.000
	N	112	112	112	112	112
INSET	Pearson Correlation	.029	.526**	1	.128	.056
	Sig. (2-tailed)	.763	.000		.178	.557
	N	112	112	112	112	112
WORKSHOPS	Pearson Correlation	.459**	.456**	.128	1	.467**
	Sig. (2-tailed)	.000	.000	.178		.000
	N	112	112	112	112	112
CEMASTEA	Pearson Correlation	.261**	.496**	.056	.467**	1
	Sig. (2-tailed)	.005	.000	.557	.000	
	N	112	112	112	112	112

**. Correlation is significant at the 0.01 level (2-tailed).

The results presented in table 4.24 above revealed that SMASSE (r=0.308, p=0.001), workshops and seminars (r=0.456, p=0.000) and CEMASTEA (r=0.261, p=0.005) had a moderate, positive and a significant relationship with the students' performance in Mathematics. Although INSET had a weak positive influence on the performance in Mathematics, it was insignificant (r=0.029, p=0.763).

4.6.2. Team-Teaching and Performance in Mathematics

The second objective of this study was to find out the influence of team teaching on the students' performance in Mathematics. Correlations were performed to establish the relationship that existed between team-teaching activities and the student's performance in Mathematics. The results were summarized and presented in table 4.25 below.

Table 4.25: Correlations: team-teaching and performance in Mathematics

Team-teaching activities		Performance in math	number of math teachers	Number of departmental meetings	frequency of team teaching
Performance in math	Pearson Correlation	1	.500**	.022	.071
	Sig. (2-tailed)		.000	.820	.454
	N	112	112	112	112
Number of math teachers	Pearson Correlation	.500**	1	.356**	-.113
	Sig. (2-tailed)	.000		.000	.237
	N	112	112	112	112
Number of departmental meetings	Pearson Correlation	.022	.356**	1	.377**
	Sig. (2-tailed)	.820	.000		.000
	N	112	112	112	112
Frequency of team teaching	Pearson Correlation	.071	-.113	.377**	1
	Sig. (2-tailed)	.454	.237	.000	
	N	112	112	112	112

**. Correlation is significant at the 0.01 level (2-tailed).

The findings in table 4.25 above revealed that, although weak, all the team-teaching activities were positively correlated with performance in Mathematics. However, only one of the team-teaching activity was found to have a significant influence on the students' performance in Mathematics; the number of Mathematics teachers (r=0.500, p=0.000). The number of departmental meetings (r=0.022, p=0.820) and the frequency of team-teaching (r=0.071, p=0.454) did not have any significant influence on the students' performance in Mathematics.

4.6.3. Teaching Experience and Performance in Mathematics

The third objective of this study was to find out the relationship between teaching experience and the students' performance in Mathematics. Correlations were performed to establish how the teachers' experience influenced the students' performance in Mathematics. The results were summarized and presented in table 4.26 below.

Table 4.26: Teaching Experience and Performance in Mathematics

		Performance in Mathematics
Performance in Mathematics	Pearson Correlation	1
	Sig. (2-tailed)	
	N	112
Years as a KCSE examiner	Pearson Correlation	.264**
	Sig. (2-tailed)	.005
	N	112
Years as a judge in KSEF	Pearson Correlation	.187*
	Sig. (2-tailed)	.048
	N	112
Years as a judge in Mathematics contests	Pearson Correlation	.323**
	Sig. (2-tailed)	.001
	N	112
Years in a National School	Pearson Correlation	.248**
	Sig. (2-tailed)	.008
	N	112
Years in an extra county school	Pearson Correlation	-.288**
	Sig. (2-tailed)	.002
	N	112
Years in a county school	Pearson Correlation	-.012
	Sig. (2-tailed)	.900
	N	112
Years in a sub-county school	Pearson Correlation	.494**
	Sig. (2-tailed)	.000
	N	112
Years in a pure boys school	Pearson Correlation	-.361**
	Sig. (2-tailed)	.000
	N	112
Years in a pure girls school	Pearson Correlation	.005
	Sig. (2-tailed)	.956
	N	112
Years in a mixed school	Pearson Correlation	.390**
	Sig. (2-tailed)	.000
	N	112

The results in table 4.26 above suggested that ten indicators were used to measure the teachers' experience. Seven out of the ten indicators used suggested a positive correlation between the teacher's experience and performance in Mathematics. These indicators included teaching in a national (r=0.248, p=0.008), sub-county (r=0.494, p=0.000), pure girls' (r=005, p= 0.956), and mixed schools (r=0.390, p=0.000), working as a KCSE examiner (r=0.264, p=0.005) and as a judge in KSEF (r=0.187, p=0.048) and Mathematics contests (r=0.323, p=0.001). The other three indicators suggested that there is a negative relationship between teaching experience and the

students' performance in Mathematics; teaching in extra county school (r=-0.288, p=0.002), county school (r=-0.012, p=0.900) and in pure boys' school (r=-0.361, p=0.000). The inverse relationship indicates that an increase in teaching experience in these schools; extra-county, county and pure boys' schools would lead to a decreased performance of students in Mathematics.

4.6.4. ICT Integration and Performance in Mathematics

The fourth objective of this study was to establish the impact of ICT integration on the students' performance in Mathematics. The researcher carried out correlations to establish the relationship between the usage of ICT tools and the students' performance in Mathematics. The researcher used the two main indicators of ICT tools; availability of computer laboratory and those that reported the usage of ICT tools in teaching Mathematics. The results were summarized in table 4.27 below.

Table 4.27: Usage of ICT tools and Performance in Mathematics

		Performance in Mathematics	Availability of Computer Laboratory	use of ICT tools in teaching maths
Performance in Mathematics	Pearson Correlation	1	.402**	.374**
	Sig. (2-tailed)		.000	.000
	N	112	112	112
Availability of Computer Laboratory	Pearson Correlation	.402**	1	.947**
	Sig. (2-tailed)	.000		.000
	N	112	112	112
use of ICT tools in teaching maths	Pearson Correlation	.374**	.947**	1
	Sig. (2-tailed)	.000	.000	
	N	112	112	112

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the two indicators used; availability of computer laboratory (r=0.402, p=0.000) and use of ICT tools in teaching Mathematics (r=0.374, p=0.000), as presented in table 4.27 above revealed a positive and a significant relationship between the usage of ICT tools and students' performance in Mathematics.

4.6.4.1. Performance in Mathematics and the Overall Performance

The researcher performed correlations to establish if performance in Mathematics had any impact on the overall performance of the students. The results were presented in table 4.28 below.

Table 4.28: Performance in Mathematics and Overall Performance

		Performance in Mathematics	Overall Performance
Performance in Mathematics	Pearson Correlation	1	-.135
	Sig. (2-tailed)		.200
	N	91	91
Overall Performance	Pearson Correlation	-.135	1
	Sig. (2-tailed)	.200	
	N	91	112

The results in table 4.28 above revealed that there was a weak negative correlation between performance in Mathematics and the overall performance of students (r=-0.135). Since P>0.05, it was concluded that the relationship was insignificant hence due to chance, that is not consistent.

4.6.5. Regression Analysis

Regression analysis was carried out to establish the extent to which the studied independent variables predicted the students' performance in Mathematics. The results were presented in table 4.29 below.

Table 4.29: Regression Model Summary

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	**.740[a]**	**.547**	.530	1.33231

a. Predictors: (Constant), ICT integration, teacher training, teachers' experience, team teaching

From the model summary in table 4.29 above, the value of R=0.740 indicates a high degree of correlation between the predictors and the dependent variable. The value of R square = 0.547 suggests that 54.7% of the change in the students' performance in Mathematics can be explained by the four predictor variables studied. Therefore, the remaining proportion (45.3%) was due to other factors and could not be explained by

the teachers' experience, teacher training, team-teaching and ICT integration in teaching Mathematics. The results were presented in table 4.30 below.

Table 4.30: ANOVA

ANOVA[s]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	229.702	4	57.426	32.352	**.000[b]**
	Residual	189.929	107	1.775		
	Total	419.631	111			

a. Dependent Variable: Students' performance in Mathematics

b. Predictors: (Constant), ICT integration, teacher training, teachers' experience, team teaching

c. df: degree of freedom

The ANOVA table 4.30 above indicates that the regression model predicts the dependent variable significantly well. This is because the p value of 0.000 is less than 0.01 which means that; overall, the regression model statistically and significantly predicts the outcome variable, meaning that it is a good fit for the data. The study used standardized coefficients because they can compare the strength of the effect of each individual independent variable to the dependent variable as shown in table 4.31 below.

Table 4.31: Regression Coefficients

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	-1.126	.417		-2.703	**.008**
	Teacher training	.020	.003	.442	6.698	**.000**
	Team teaching	.768	.153	.389	5.031	**.000**
	Teacher's Experience	.023	.007	.215	3.181	**.002**
	ICT integration in Mathematics	.634	.300	.163	2.109	**.037**

a. Dependent Variable: students' performance in Mathematics

The standardized regression coefficients in table 4.31 above were used to enable the study to compare the relative strengths of the four independent variables on the dependent variable; academic performance in Mathematics. The table provides the necessary information required to predict the students' performance in Mathematics from teacher training, team-teaching, teacher's experience and ICT integration in

Mathematics as well as to determine whether the four independent variables statistically and significantly contributed to the model.

Regression Model: $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$

Where:-

Y = students' performance in Mathematics, α = Constant, $\beta_1 - \beta_4$ = Model coefficients, X_1 = Teacher Training, X_2 = Team teaching, X_3 = Teaching experience, X_4 = ICT integration, ϵ = Error term.

Specific Regression Model: $Y= -1.126+0.020X_1+0.768X_2+0.023X_3+0.634X_4$

Students' performance in Mathematics = -1.126 + 0.442(teacher training) + 0.389 (team teaching) + 0.215(teachers' experience) + 0.163(ICT integration in Mathematics). The regression analysis in table 4.31 above indicates how a unit change in the independent variables changes the dependent variable. Holding the other factors constant, the constant influences the academic performance of students in Mathematics negatively at -1.126. Since all betas' (β**)** are positive, it means that a unit increase in the independent variables would cause a positive change in the dependent variable with the following quantities; teacher training (0.442), team teaching (0.389), teachers' experience (0.215) and ICT integration in Mathematics (0.163). The error term was not included in the specific regression model because it had a negligible influence on the academic performance of students in Mathematics when the other factors are held constant. There was a significant prediction of the students' performance in Mathematics by the first three independent variables; teacher training, team teaching and teachers' experience. The model also revealed that teacher training had the highest contribution to the regression equation, followed by team-teaching in teaching Mathematics.

CHAPTER FIVE

5.0.DISCUSSION

5.1. Introduction

This section presents a detailed discussion of the main findings of this study in as far as the impact of the independent variables on the dependent variable studied is concerned. The discussion has also compared the findings of this study with those of the other previous but related studies to establish similarities and differences.

5.2. Discussion

The discussion has been carried out as per the findings of each of the four objectives investigated in this study which include the influence of teacher training, team-teaching, teachers' experience and ICT integration on the performance of Mathematics in public secondary schools in Makueni Sub-County.

5.2.1. Teacher Training and Performance in Mathematics

According to the findings of this study, teacher training which included attendance to Mathematics related workshops, seminars, symposiums, conferences and other related activities such as SMASSE, INSET and CEMASTEA, had a positive impact on the students' performance in Mathematics. Actually, out of the four indicators classified under training, SMASSE, CEMASTEA and workshops/conferences had a positive and a significant relationship with the students' performance in Mathematics. INSET had a positive influence on the student's performance in Mathematics but it was not significant. This suggested that the more and different trainings the Mathematics teachers attended, the more their students were likely to post better results in their national examinations.

These findings were in agreement with those of the previous studies that have been carried out elsewhere which have shown that teacher training affects the teacher's ability to deliver content in the classroom hence enhanced comprehension and retention of concepts leadings to improved academic performance of students. For instance, according to a study conducted by (Atsenga, 2002), teacher training improved student learning through effects on teaching practices like delivery of

content. It was also found that teacher training enhanced the teacher's skills and knowledge hence improving their ability to deliver content (Jackson, 2007).

According to another study by Wested (2010), well trained teachers are able to have a strong knowledge and high level of understanding of the subject matter they teach their students. This is because, through training they are able to learn and inculcate various instructional techniques and ideologies hence improving their delivery of content in the classroom (Guskey, 2013). In another study by (Morgan, 2010) it was found out that those teachers with little training have too little knowledge of the subjects they teach hence they deny their learners the most basic learning resources.

Apart from developing better instructional techniques and mastering their subject content, through training, teachers are able to utilize the available resources in the teaching and learning process because according to another study conducted by Wenglinsky (2012) it was revealed that changes in the textbooks and other learning materials made very insignificant difference if teachers did not know how to use them well and the study recommended that it was only through teacher training that proper use of resources in the teaching process would be enhanced to ensure improved academic performance by students.

The researcher's view was that the findings of this study were true since teacher training is usually aimed at improving the skills and knowledge of the teacher. When a teacher receives quality and adequate training, it is supposed to reflect in the academic performance of the students he/she teaches. Therefore, holding the other factors constant, the students of a well trained teacher will perform better than those of poorly trained teacher. Therefore, teacher training is very important especially in determining the students' academic performance in all the subjects, not in Mathematics only.

5.2.2. Team Teaching and Performance in Mathematics

The study investigated the influence of team teaching on the students' performance on the assumption that those teachers who practiced different team teaching activities would stand a better chance to discuss and find solutions to issues affecting their content delivery in the classroom hence improved performance in the academics. The

findings of this study revealed that all the team-teaching activities measured had a positive correlation with performance in Mathematics among students in public secondary schools in Makueni Sub-County.

However, only one of the team-teaching indicators; the number of Mathematics teachers, had a significant influence on the students' performance in Mathematics. The researchers' opinion is that more teachers reduce the student-teacher ratio hence increases the effectiveness of the teacher while teaching. This enhances the teaching and learning process making students perform better than those in schools with relatively fewer teachers with high student-teacher ratio. The other indicators which included the number of departmental meetings and the frequency of team-teaching did not have a significant influence on the students' performance in Mathematics. This was despite the fact that the respondents reported facing multiple challenges which included lack of teacher cooperation, support from the administration and team work spirit, in trying to practice team teaching.

Although there is very little research that has been carried out on the influence of team teaching on the students' performance, the findings of the few studies that have been conducted elsewhere have concurred with the findings of this study. For instance, according to a study carried out by Roth et al (2015), it was established that team teaching is an effective way of constructing deep learning concepts while learning alternative techniques of teaching or delivering the same content or subject matter. It was also established that it was a practice that enhances students' performance even in other subjects as it provides regular opportunities for interaction with colleagues which are essential in creating professional schools cultures, Roth et al. (2014).

Despite team teaching being a good practice, it has continued to face numerous challenges especially in the secondary school level as it was established by this study and confirmed by previous studies. According to Roth (2002) team teaching is a typical characteristic of the primary school level of education but it is less practiced and implemented in secondary school level of education probably because of the potential barriers created by the departments in the secondary schools which make collaborative teaching difficult (Roth, 2002). It was also noted by Tobin (2013) that team teaching culture takes time to develop as it requires trust as well as mutual

understanding which come from day to day interactions and long term relationships of participants.

5.2.3. Teachers' Experience and Performance in Mathematics

The researcher was guided by the assumption that the teachers' experience had some influence on his/her output; that is, the performance of the students. This study measured the teacher's experience in terms of the number years served in various positions relevant in Mathematics. The findings of this study revealed that there is a positive relationship between the teacher's experience and the students' performance in Mathematics. This suggested that the longer a teacher had served as Mathematics teacher and in diverse environments, the more likely he or she was able to develop his/her skills and mastery of content as well as enhance content delivery to students which would translate to better performance in national examinations.

There is a lot of research that has been carried out on the impact of experience and productivity in many sectors including in education. The findings of this study concurred with those of previous studies although only two indicators out of the ten which were studied; teaching in a mixed school and sub-county schools, were found to have a significant impact on the students' performance in Mathematics (Greenwald, 2006). However, the researcher observed that all the public sub county secondary schools were mixed; not pure boys' or girls' schools.

According to Chiriswa (2002), most teachers who have gained a lot of experience and having interacted with the subject matter as well as divers classroom experiences for a longer time, they are likely to have a positive impact on the students' performance. Therefore, experienced teachers are not only a key ingredient for students' achievement but also in retention of students in school. According to a study that was conducted by Adino (2015) on the causes of school dropout, it was established that schools whose dropout rates were high, had more new teachers than the schools with low dropout rates.

The researcher's input is that, the findings of this study are true since, holding other factors constant; the teacher's experience has a positive and direct impact on the academic performance of the students. The amount of time a teacher has practiced

teaching, can be used to tell how much he/she has learnt because practice in different environments present the teacher with different and diverse learning experiences which he/she can use to address the challenges faced in the process of teaching. Therefore, more time in teaching would translate to more lessons learnt hence the teacher becomes more likely to overcome more difficulties faced in the process of learning and teaching.

5.2.4. ICT Integration and Performance in Mathematics

Before the study, the researcher assumed that since technology is ever changing and has led to the development of new ways of doing things, its integration in teaching should have an impact on the end result; its impact should reflect on the students' performance. This study sought to establish if the use of information and communication technology tools had any influence on the student's performance. The findings of this study established a positive and a significant relationship between the use of ICT tools and the students' performance in Mathematics.

All the respondents agreed that use of ICT tools in teaching Mathematics because they provided techniques that enhanced understanding and retention of mathematical concepts by students. However, it was noted that about half of the schools in the sub-county do not have access to the basic ICT tools because of a number of challenges which included lack of a computer laboratory in the school, lack of electricity and lack of knowledge on the usage of ICT as well as lack of financial resources. The schools that reported usage of ICT tools in teaching Mathematics mostly used computers, projectors and mobile phones.

Similarly, since there has been a lot of research on the impact of ICT on productivity in different areas, it has been noted that majority of the studies have established a positive correlation between use of ICT and output elsewhere. According Newhouse (2002) the introduction of ICT into learning has been identified as a way that makes learning more student-centered, as a technique that encourages cooperation in learning as well as stimulating increased teacher-student interaction. He also noted that teachers using ICT applications in teaching were likely to exhibit gains on measures of progressive thought process and reflection (Flecknoe, 2012). In another study, it was established that the use of ICT tools in teaching Mathematics increased

understanding and gave better insights into mathematical concepts and that teacher's assistance to students in learning using ICT tools was important as it helps students in engaging with powerful learning experiences (Ogwel, 2016).

The researcher agrees with the findings of this study. This is because ICT is about technologies which are supposed to make the process of communication and transfer of information better and easier. When better and adequate technologies are used, the students' understanding and mastery of concepts is enhanced. Holding the other factors constant, the use of ICT tools in the teaching and learning process is supposed to be reflected in the academic performance of students. Therefore, the students who have been taught using effective ICT tools will perform better academically than those who have used less or not used them at all in the learning process.

5.3. Summary

Generally, the discussion on the findings of this study can be summarized by stating that all the four independent variables; teacher training, team teaching, teacher experience and ICT integration in teaching, were found to have a positive relationship with the dependent variable; students' performance in Mathematics. All except ICT integration had a significant impact on the students' performance. The findings of this study were in agreement with those of the previous studies initially considered under the literature review.

CHAPTER SIX

6.0. CONCLUSIONS AND RECOMMENDATIONS

6.1. Introduction

This section presents the conclusions and recommendations made based on the findings of this study.

6.2. Conclusions

The conclusions of this study have been drawn from each of the four objectives investigated in this study. The objectives included; to investigate the influence of teacher training, team teaching, teacher's experience and ICT integration on the performance of students in Mathematics in Makueni Sub-County.

6.2.1. Teacher training and performance in Mathematics

The first objective investigated the influence of teacher training on the students' academic performance in Mathematics in PSS in Makueni Sub-County. The findings of this study concluded that there is a positive and a significant correlation between teacher training and the students' academic performance in Mathematics. This results confirmed that the more the administrators attempted to increase their efforts in funding and sponsoring the teachers to attend the training activities studied, the more the schools stood a better chance of improving the Mathematics mean scores hence the overall performance. This also suggested that the opposite was also true in that the more the school administration overlooked teacher training activities as a strategic management practice, the less the performance would be achieved in Mathematics and in other subjects hence poor academic performance.

Similar conclusions were also made from regression analysis which confirmed that there was a positive and a significant relationship between teacher training and performance in Mathematics. According to the findings of this study, the most attended teacher training activities included seminars, conferences, workshops and symposiums followed by SMASSE, INSET while those who attended CEMASTEA were the least. These findings suggested that there are several teacher training

opportunities for Mathematics teachers although they may still not be adequate to meet their skill development needs particularly in Mathematics.

6.2.2. Team teaching and performance in Mathematics

According to the findings on the second objective it was concluded that, team teaching influenced performance in Mathematics in PSS in Makueni Sub-County. This was confirmed by the correlation analysis which established a positive relationship between the various team teaching activities and performance in Mathematics. It also revealed that the increase in Mathematics teachers in any given school, using common schemes of work and exchanging lesson plans and notes could lead to increased performance in Mathematics. Similar conclusion was made from the regression analysis which confirmed that teaching had a positive and a significant relationship on performance in Mathematics. It was also the major predictor of the dependent variable.

The study also concluded that the smaller schools ranked as Sub-County and County were inadequately staffed with Mathematics teachers compared to the bigger schools at the national and extra county levels. From the records on the departmental meetings, it was concluded that most schools have inadequate departmental meetings which would enable them discuss issues affecting the delivery and performance of their students in their schools. It can also be concluded that all teachers are interested and would be willing to practice team-teaching since all had confessed practicing team teaching in one way or another. The main challenge faced when practicing team teaching was lack of teacher cooperation and lack of administrative support.

6.2.3. Teacher's experience and Performance in Mathematics

The correlation analysis on teacher's experience and performance in Mathematics concluded that there was a positive and a significant relationship between the two variables. These findings were also confirmed by the regression analysis performed. These findings suggested that the longer the duration a teacher had worked the more he/she was likely to have a positive impact on the academic performance of students. The results also revealed that majority of the study respondents had experience in teaching mixed public secondary schools, a typical characteristic of sub-county schools.

The study also concluded that teacher's experience has a high influence on the academic performance of students generally in all the subjects. This was the case as none of the respondents reported a perceived low influence of teacher's experience on the academic performance of students; all reported either moderate or high influence on the students' performance in public secondary schools in Makueni Sub-County.

6.2.4. ICT Integration and Performance in Mathematics

The correlations on the fourth objective revealed that there was a positive relationship between the use of ICT tools and the students' performance in Mathematics. However, the findings of this study did not find this relationship significant. Similar conclusion was made from the regression analysis which confirmed a positive relationship between the two variables. It was also established that, out of the four independent variables studied, it was the second main predictor to students' performance in Mathematics. All the respondents agreed that it is important to use ICT tools in teaching Mathematics.

The study also concluded that simple electronic devices such as mobile phones, computers and projectors were the key ICT tools used in teaching Mathematics in Makueni Sub-County. There is a grave lack of knowledge on the usage of ICT tools in the area of study as it was reported as the main reason for not using the available ICT tools. The main challenge faced while using ICT tool in teaching Mathematics was lack of ICT tools and lack of computer laboratories in almost half of the PSS in the area of study.

6.3. Recommendations

The following are some of the possible recommendations which were made based on the findings of this study. The recommendations have been put into two categories and as per the objectives; to the policy makers and to the academia.

6.3.1. Teacher Training

The study recommends that, the educational policy makers such as the ministry of education through the secondary school administrators, need to facilitate and encourage their teachers to find training and other relevant opportunities where they can enhance their teaching if better performance in Mathematics is to be realized. This

is very important in enhancing the teachers' mastery of the subject matter and development of diverse teaching methods which are learner-centred.

6.3.2. Team Teaching

The study recommends that the secondary school academic staff and administrators need to cultivate or create an environment that promotes team teaching among teachers not only to those teaching Mathematics, but also to those teaching other subjects. This is because other studies have also noted with concern that secondary schools will continue to realize very little change unless the teachers constantly practice, help, observe and interact with one another.

6.3.3. Teacher Experience

The study recommends that the secondary school academic staff and administrations should endeavour to participate in numerous activities which have the potential of giving them diverse experiences which help to enhance their teaching skills and mastery of content. This has been confirmed by this and other studies that the teachers' experience is a key ingredient towards improved achievement of students in Mathematics and other subjects.

6.3.4. ICT Integration

The study recommends that the educational policy makers and stakeholders need to fight and find solutions to the challenges or issues acting like obstacles towards the use of ICT tools in teaching. This can be done by building computer laboratories in those schools without as established by this study. This is due to the fact that we are living in an ever changing world and that research is constantly being carried out to develop new ways of doing things, use of ICT tools in teaching is almost inevitable because of its numerous benefits. Actually, the schools that are not embracing the use of technology risk being marginalized because the whole world is rapidly shifting to become digital in all areas and in the way operations are carried out.

6.4. Knowledge Gained

The knowledge gained from this study is that the administrators in the public secondary schools should invest more resources in establishing the other factors which explain the proportion of change in the students' performance in Mathematics

not explained by the four independent variables studied in this study. The government through the Ministry of Education needs to facilitate public secondary schools with limited resources in acquiring the basic tools and services necessary to enhance students' performance not only in Mathematics but also in other subjects.

6.5. Areas of Further Research

This study restricted itself to a few strategic management practices which were not exhaustive in investigating the influence of strategic management practices on the performance of Mathematics in Public Secondary Schools in Makueni Sub-County. Further research could be conducted to expose other strategic management practices which may influence students' performance in Mathematics in Makueni Sub-County. Further research is also recommended in the private secondary schools to ascertain whether the same factors influence Mathematics performance.

REFERENCES

Abell, S. K. . (2010). From professor to colleague: creating a professional identity as collaborator in elementary science, . Journal of Research in Science Teaching, 37(6), 548 – 562., 37(6), 14.

Adino, A. (2015). Factors Influencing Students Performance In Mathematics In Kenya Certificate Of Secondary Education In Public Secondary Schools In Butere Sub County, Kenya. (Master of Education in Curriculum Studies), University of Nairobi, Nairobi.

Amutabi, M. N. & Oketch, M. O. . (2013). Experimenting in distance education: the African Virtual University (AVU) and the paradox of the World Bank in Kenya. International Journal of Educational Development 23(1), 16.

Anderson, S. E. & Seashore, K. L. (2014). Review of Research; How Leadership Influences Student Learning. . USA: University of Minesota and university of Toronto.

Andrew, C. P. (2012). Venderbilt Assessment of Leadership in Education. Nashville, Tennessee.: Vanderbilt University.

Atsenga, M. (2002). Factors Affecting the Teaching of Oral Communications in English Language in Secondary School in Kakamega and Vihiga Districts of Kenya. : Oxford University Press.

Barth, R. S. . (2016). Improving schools from within. San Francisco, CA.: Jossey-Bass.

Bauwen, J. & Hourcade, J. J. (2011). Cooperative teaching: rebuilding the school house for all students Austin, TX: PROED.

Bayer, A. S. . (2012). Collaborative-apprenticeship learning: language and thinking across the curriculum, K-12 London: Mayfield.

Bennett, R. V., Ishler, M. F. & O'Loughlin, M. . (2008). Effective collaboration in teacher education, . Action in Teacher Education., 14(1), 4.

Brookover, W. (2009) Changes in Schools Characteristics: A Coincidence with Changes in Student Achievement.: Vol. 17. East Lansing Michigan Institute of research on teaching. USA: Michigan University way

Chiriswa, H. (2002). An Investigation into Probable Factors Responsible for Poor Performance in KCSE in Vihiga. .

Connolly, B. & Smith, M. . (2012). Teachers and students talk about talk: class discussion and the way it should be, . Journal of Adolescent and Adult Literacy., 46(1), 6.

Cook, L. & Friend, M. (Ed.). (2006). Coteaching: guidelines for creating effective practices. . Denver, OH,: Love.

Corcoran, T. B. . (2008). Schoolwork: perspectives on workplace reform in the public schools. Stanford, CA,: Center for Research on the Context of Secondary School Teaching.

Daniels, J.S. . (2013). "Foreword" in Information and Communication Technology in Education–A Curriculum for Schools and Programme for Teacher Development. . Paris-France: UNESCO.

Darling-Hammond, L., & McLaughlin, M. W. . (2009). Policies that support professional development in an era of reform. Phi Delta Kappan, 76, 7.

Darling-Hammond, L., & McLaughlin, M. W. . (2011). Policies that Support Professional Development in an Era of Reform. . Berkerley.: Teachers College Press. .

Delen, E. & Bulut, O. (2011). The relationship between students: exposure to technology and their achievement in Science and Math. TOJET: The Turkish Online Journal of Educational Technology, 10(3).

Ebbinghaus, H. (1885). Memory: A contribution to experimental psychology. . New York.: Dover.

Evans, C. (2008). The effects of senior management teams on teacher morale and job satisfaction. Educational Management and Administration. (26), 11.

Ferguson, R. & Ladd, H. . (2012). How And Why Money Matters: An Analysis of Alabama Schools. Holding School Accountable: Performance Based Reform in Education Washington, D.C.: Brookings Institute.

Fieldler, F. (1958). Fiedler's contingency theory. Leader Attitudes and Group Effectiveness.

Firestone, W. A. & Rosenblum, S. . (2009). Building commitment in urban high schools. Educational Evaluation and Policy Analysis, 10(4), 14.

Flecknoe, M. . (2012). How can ICT help us to improve education"? Innovations in Education & Teaching International, 39(4), 9.

Gakuu, C., & Kidombo, H. . (2010). Pedagogical Instruction of ICT in selected Kenyan secondary schools; Application of Bennett's Hierarchy. . Journal of continuing Open and Distance Education., 1(1).

GoK. (2014). A policy framework for education, training and research. Meeting the challenges of education, training and research in Kenya in the 21st century. . Nairobi.: Government printers.

Golding, N. (Ed.). (2010). "Strategic Human Resource Management". : FT Prentice Hall,.

Golner, S. & Powell, J. . (2012). Ready for teaming: ten questions to ask before you jump in. Middle School Journal,, 24(1), 4.

Greenwald, R., Hedges, L.V., & Laine, R.D (2006). The effect of school resources on student achievement. . Review of Educational Research., 66(3), 35.

Guskey, T. & Clifford, R. (2013). Evaluating professional development. . Thousand Oaks CA.: Corwin Press. .

Hanusheek, E., Kain, J. & Rivkin, S. (2011). Teachers, Schools and Academic Achievement. . National Bureau of Economic Research.

Harris, A. (2010). School Improvement – what's in it for schools. London.: Routledge Falmer, London.

Hill, H. C., Rowan, B., & Ball, D. L. (2015). Effects of Teachers' Mathematical Knowledge for Teaching on Student Achievement. . American Educational Research Journal.

Holmes, R. . (2014). Is Learning a "Contaminated Concept?" A Handbook for Schools. London.

Jackson, A. & Davis, G. (2007). Turning Points 2000: Educating Adolescents in the 21st Century. New York: Teachers College Press.

Jackson, A. & Davis, G. (2010). Turning Points 2010: Educating Adolescents in the 21st Century. . New York.: Teachers College Press.

Jang, S. J. . (2011). The inquiry for models of team teaching, . Educational Research and Information., 9(4), 26.

Jhurreev, V. (2015). Technology Integration in Education in Developing Countries: Guidelines to Policy Makers. . International Education Journal., 6(4), 16.

Jonassen, D. H., Peck, K. L., & Wilson, B. G. (2011). Learning with technology: A constructivist perspective. . Upper Saddle River, NJ.: Merrill.

Kaffash, H., Kargiban, Z., Kargiban, S. & Ramezani M. . (2011). A Close Look In To Role Of ICT in Education. International Journal of Instruction, 3(2).

Kafyulilo, A. C., Rugambuka, I. B. & Moses, I. . (2014). The implementation of competency based teaching approaches in Tanzania: The case of pre-service teachers at Morogoro teacher training college. . Dar es Salaam.: Dar es Salaam University College of Education.

Karen, S. L. & Kenneth, L. (2014). Learning from Leadership: Student Learning, . USA: University of Minesota and University of Toronto.

Keller, F.S. (1968). Good-Bye, Teacher. Journal of Applied Behaviour Analysis, 10.

Kennewell, S., Parkinson, J., & Tanner, H. (2012). Developing the ICT capable school. . London.: Routledge Falmer.

KICD. (2012). Summative Evaluation of the secondary School Education Curriculum. . Nairobi. Kenya: Kenya Institute of Curriculum Development.

Kidombo , H. (2014). Cross-Cutting Issues in ICT Usage among Male and Female teachers in Kenya and Uganda. Paper presented at the eLearning Africa Conference, Lusaka, Zambia.

Killion, J. (2009). What Works in the Middle Result Base Staff Development. . Oxford, OH.: National Staff Development Council.

Kothari, C.R. (2004). Research Methodology: Methods and Techniques. (2nd ed.). New Delhi: New Age International Publishers.

Ladd, H. & Sorensen, C. . (2014). Returns To Teacher Experience: Student Achievement And Motivation In Middle School. National Center for Analysis of Longitudinal Data in Education Research.

Lieberman, A. . (2015). Practices that support teacher development: transforming conceptions of professional learning. (Vol. 76). Phi Delta Kappan.

Little, J. W. (2013). Teachers' professional development in a climate of education reform. Educational Evaluation and Policy Analysis., 15, 22.

Lortie, D. . (2005). School teachers. Chicago.: University of Chicago Press.

Marvel, J. L. & Morton, B. A. (2006). Teacher Attrition and Mobility, 2004 – 2005 Teacher Follow up Survey (NCES 2002-307). Washington DC, U.S. : Government Printing Office.

Mazzarol, T., & Soutar, G.N. (2009). Sustainable competitive advantage for educational institutions: A suggested model. International Journal of Educational Management, 13(6), 13.

Mbodila, M. & Kikunga, M. . (2012). The Use of ICT in Education. A Comparizon of Traditional Pedagogy and Emerging Pedaogy Enabled by ICTs. Paper presented at the The 11th International Conference on Fontier in Education.

Mbugua, Z.K., Komen, K.G., Mungiria, M.G., & Nkonke, R. (2013). Factors Contributing To Students' Poor Performance in Mathematics at Kenya Certificate of Secondary Education in Kenya: A Case of Baringo County, Kenya. American International Journal of Contemporary Research., 2(6).

McKenna, B. . (2009). Whatever happened to team teaching? American Educator,, 13(2), 4.

Michael, S. K., Michael, A. C., & Bradley, S. P. (2011). Learning – Focused Leadership and Leadership Support; Meaning and Practice in Urban Systems. USA: University of Washington.

Mlozi, R. R. S. . (2013). Factors Influencing Students' Academic Performance in Community and Government Built Secondary Schools in Tanzania: A case of Mbeya Municipality. . (MBA), Chuka University, Kenya.

Morgan, E. (2010). Benefits of Professional Development. . Austin.: ACT Inc. .

Mugenda, M. & Mugenda, G. . (2003). Research Methods: Quantitative and Qualitative Approaches. . Nairobi.: ACTS Press.

Musau, S.M. (2013). An Analysis of the Utilization of Agency Banking on Performance of Selected Banks in Nairobi County. (Master), Kenyatta University Nairobi, Kenya.

Muya, M. (2015, September 2nd). Kenya Examination System., Daily Nation.

NCTAF. (2008). The National Education Goals Report: Building a nation of learners. . Washington D.C.: US department of Education Press.

Ndinza, K.L. (2015). Influence Of Head teachers' Management Practices On Students' Academic Performance In Public Secondary Schools Within Kitui Central District, Kitui County, Kenya. South Eastern Kenya University.

NSDC. (2013). National Staff Development Council Resolutions. . National Staff Development Council.

Nyangarora, L. (2006). Factors Affecting Teaching of Economics in Nyamira District of Kenya. : Oxford University Press. .

Ocham, L. A. . (2013). Effects of Head Teachers Motivational Practices on Teacher Performance in Public Secondary Schools in Koibateck District, Kenya. Electronic.

Ogwel, A. (2016, November 18-20, 2016.). Integrating ICT in Mathematics education: Curricula challenges in the Kenyan system of education. . Paper presented at the 1st Regional Conference on e-Learning: Increased access to education, diversity in applications and management strategies., Kenyatta University.

Ottevanger, W., Van-den Akker, J. J.H. & Feiter, L. (2015). Developing Science, Mathematics and ICT education in Sub-saharan Africa (SMICT): Patterns and promising practices. World Bank Working paper(101), 84.

Paauwe, J. & Guest, T. (2014). Human Resource Management and Performance. : Oxford University Press. .

Pardoe, I. (2012). Applied Regression Modeling (2nd ed.). Hoboken, New Jersey: Wiley & Sons.

Patton, M. Q. . (2010). Qualitative Evaluation and Research Methods. Newbury Park, California: Sage.

Porter, A., Birman, B., & Garet, M. . (2002). Effects of professional development on Teachers' Instruction: Results from a three-year Longitudinal study. American College Testing Inc

Rahman, S., Ghazali, M., & Ismail, Z. . (2013). Integrating ICT in Mathematics teaching methods Course: How has ICT Changed Student Teachers' Perception about Problem Solving. Paper presented at the The International Conference on Mathematics.

Rivers, J. & Sander, W. . (2013). Cumulative and residual effects of teachers on future student academic achievement. . Knoxville.: Research and Assessment Centre. .

Roth, W.M., Tobin, K., Carambo, C. & Dalland, C. . (2014). Coteaching: creating resources for learning and learning to teach chemistry in urban high schools, 41(9), 882 – 904. Journal of Research in Science Teaching., 37(6), 14.

Roth, W.M., Tobin, K., Carambo, C. & Dalland, C. . (2015). Coordination in coteaching: producing alignment in real time, . Science Education,, 89, 27.

Sandholtz, J. H. . (2013). Interdisciplinary team teaching as a form of professional development,. Teacher Education Quarterly, 27(3), 11.

Saunders, M., Lewis, P. & Thornhill, A. . (2009). Research Methods for Business Students. . New York.: Pearson.

Seashore, L. K. & Leithwood, K. (2010). Leadership; Investigating the links to improved student learning.: University of Minnesota and University of Toronto.

Suan, I. (2014). A Critical Review of Leadership Styles on the Performance of Public Secondary Schools in National Examinations in Tana River County. Kenya. Tana River County. Kenya.

Tobin, K., Zurbano, R., Ford, A. & Carambo, C. (2013). Learning to teach through co-teaching and co-generative dialogue,. Cybernetics and Human Knowing, 10(2), 22.

Wekesa, G. W. . (2003). The Impact of Head Teacher Leadership on Student Academic Achievement. Columbia University. Columbia.

Welch, M., Brownell, K. & Sheridan, S. M. (2015). What's the score and game plan on teaming in school, a review of the literature on team teaching and school-based problem-solving teams,. Remedial and Special Education,, 20, 13.

Wenglinsky, H. (2012). How Teaching Matters: Bridging the Classroom back into Discussion of Teacher Quality Education Testing Service. . Chicago Consortium Press. .

Wested, E. . (2010). Teachers Who Learn, Kids Who Achieve: A Look at Schools with Model Professional Development. . San Francisco Printing Press.

Yara, P., & Otieno, K. (2012). Teaching/Learning Resources and Academic Performance in Mathematics in Secondary Schools in Bondo District of Kenya. Asian Social Science, 6(12).

APPENDIX I: COVER LETTER

Mr. Mutuku A. Muli
Muiu Secondary School
P.O Box 2-90305
Kilala-Makueni

Dear Respondent,

RE: REQUEST TO COMPLETE THE ATTACHED QUESTIONNAIRE

My name is **Mutuku Andrew Muli**, a Masters student from South Eastern Kenya University (SEKU) of REG. NO: **D61/WTE/20704/2016**. As a requirement for the award of a MBA by the University, I am conducting an academic research entitled, "**Influence of Strategic Management Practices on the Performance of Mathematics in Public Secondary Schools in Makueni Sub-County"** whose questionnaire is attached below.

The aim of the questionnaire is to collect data to be analyzed to achieve the objectives of this study. The information given will be used for the purpose of this research only. The identity of the respondent will remain **confidential**. You are kindly requested as the school principal or a member of the Mathematics management team to participate in this study and respond to all questions in the questionnaire attached.

Yours Faithfully,

Mr. Mutuku A. Muli
Senior Master
Cell phone: 0718738370/0734960745

APPENDIX II: THE QUESTIONNAIRE

INSTRUCTIONS

- Kindly answer by either ticking or writing the answers in the spaces provided.
- Do not write your name anywhere on this questionnaire.

PART 1: RESPONDENT'S BACKGROUND INFORMATION

1. Name of your Institution: ……
2. Designation:
   Principal [ ] Deputy Principal [ ] Senior Master [ ] HOD [ ] Teacher [ ]
3. Teacher's Level of Education: Craft Certificate [ ] Diploma [ ]
   University Degree [ ] Master [ ] PhD [ ]
4. Teaching experience: Below 5 years [ ] 5-9 years [ ] 10-14 years [ ]
   15-19 years [ ] 20 years and above [ ]

PART 2: TRAINING OF MATHEMATICS TEACHERS

1. For the last five years, how many times have you attended any of the following Mathematics related activities?

Activity	2013	2014	2015	2016	2017
a) SMASSE					
b) INSET					
c) Workshops/Seminars/Conferences					
d) CEMASTEA					

2. Briefly comment on how the activities ticked in question 1 above can influence the students' performance in Mathematics in your school.

Level of influence	Tick appropriately
1. High	
2. Low	
3. Moderate	
4. No effect	
5. Don't know	

PART 3: TEAM-TEACHING IN MATHEMATICS

1. How many Mathematics teachers are there in your school?

   1-2 [ ] 3-4 [ ] 5-6 [ ] 7-8 [ ] 9 and above [ ]

2. How many departmental meetings do you hold per term?

   1 [ ] 2 [ ] 3 [ ] 4 or more [ ]

3. Do you practice team teaching in teaching Mathematics in your school?

   Yes [ ] No [ ]

4. If yes, how frequent do you practice? (tick appropriately)

   Rarely [ ] Sometimes [ ] Often [ ] Always [ ]

5. What kind of team teaching activities do you engage in?

   a) Conveyor belt marking ( )
   b) Using common schemes of work ( )
   c) Exchanging lesson plans/notes ( )
   d) Sharing teaching tools ( )
   e) Any other ( )

6. Briefly comment on the challenges faced while practicing team teaching to improve Mathematics performance in your school.

Challenge in team teaching	**Tick appropriately**
1. Lack of teacher cooperation	
2. Lack of administrative support	
3. Lack of interest in sharing knowledge	
4. Lack of team work spirit	

PART 4: TEACHING EXPERIENCE

1. Do you have any experience in the areas highlighted in the table below?

Areas of experience	YES	NO	If 'YES' how long (Years)
k. Teaching in a National School			
l. Teaching in a Extra County School			
m. Teaching in a County School			
n. Teaching in a Sub-County School			
o. Teaching pure boys' school			
p. Teaching pure girls' school			
q. Teaching Mixed school			
r. Being a KCSE setter/examiner			
s. Participation in Kenya Science & Engineering Fare as a judge			
t. Participation in Mathematics Contest as a judge			

2. Briefly comment on the level at which the experiences mentioned in (1) above influence the students' performance in Mathematics.

Level of Influence	Tick appropriately
1. High	
2. Medium	
3. Low	
4. None	
5. Don't Know	

PART 5: ICT INTEGRATION IN TEACHING MATHEMATICS

1. Is there a computer lab in your school? Yes [ ] No [ ]
2. If yes, do the Mathematics teachers use the ICT tools in teaching Mathematics?

   Yes [ ] No [ ]

a. If YES, which tools?

ICT Tool	Tick appropriately
1. Computers	
2. Projectors	
3. Smart boards	
4. Internet	
5. Mobile phones	

b. If No, why?

Reason	Tick appropriately
1. No electricity	
2. No internet	
3. Poor technology	
4. Lack of interest	
5. Tools are Unavailable	
6. Insecurity	

3. Please indicate your agreement or disagreement with each of the following statements:-

[Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A) and Strongly Agree (SA)]

Statement	SD	D	N	A	SA
a. I feel comfortable using technology with my students					
b. I think it is important to use technology in teaching Mathematics					
c. Technology does not benefit students in learning Mathematics					
d. Students are more motivated to learn Mathematics when technology is involved					

4. Comment on the challenges faced while using ICT tools to improve Mathematics performance in your school

Challenges faced	Tick appropriately
1. Inadequate computers	
2. Lack of ICT tools	
3. Inadequate knowledge on usage of ICT tools	
4. Lack of knowledge	

PART 6: KCSE PERFORMANCE IN 2013, 2014, 2015, 2016 AND 2017

1. Kindly, respond to the following by giving the correct figures or grades as recorded in the last five years.

Statement	2013	2014	2015	2016	2017
a. Mathematics KCSE Mean score					
b. Mathematics KCSE Mean Grade					
c. Overall School KCSE Mean Score					
d. Overall School KCSE Mean Grade					

2. Briefly comment on the influence of Mathematics performance on the overall performance of your school for the last five years.

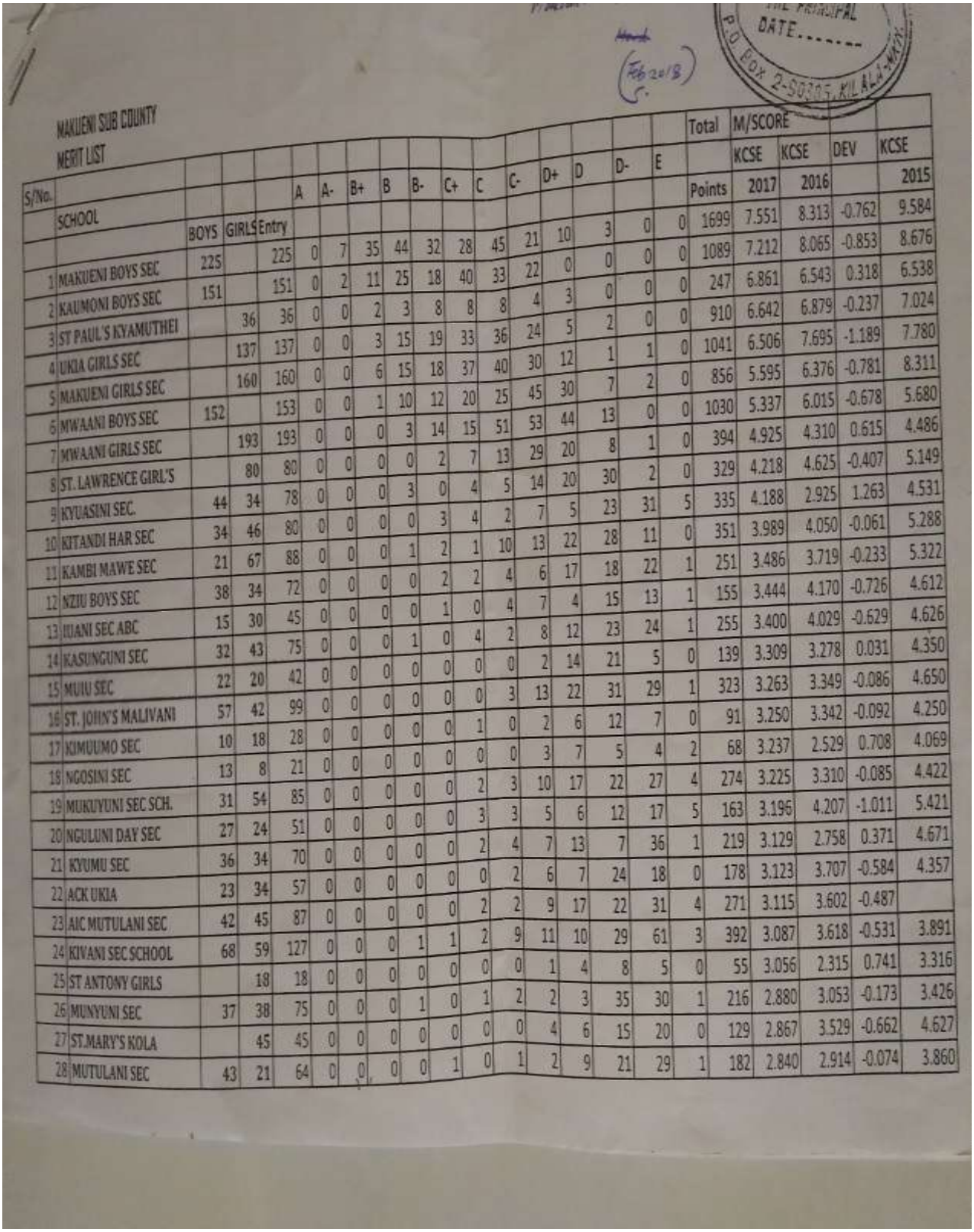
Level of Influence	**Tick appropriately**
1. High	
2. Low	
3. Moderate	
4. No effect	
5. Don't know	

End.

Thank you for your participation.

APPENDIX III: REGISTERED PSS IN MAKUENI SUB-COUNTY

Table 0.1: List of PSS in Makueni Sub-County-page1



MAKUENI SUB COUNTY
MERIT LIST

S/No.	SCHOOL	BOYS	GIRLS	Entry	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	Total Points	M/SCORE KCSE 2017	KCSE 2016	DEV	KCSE 2015
1	MAKUENI BOYS SEC	225		225	0	7	35	44	32	28	45	21	10	3	0	0	1699	7.551	8.313	-0.762	9.584
2	KAUMONI BOYS SEC	151		151	0	2	11	25	18	40	33	22	0	0	0	0	1089	7.212	8.065	-0.853	8.676
3	ST PAUL'S KYAMUTHEI		36	36	0	0	2	3	8	8	8	4	3	0	0	0	247	6.861	6.543	0.318	6.538
4	UKIA GIRLS SEC		137	137	0	0	3	15	19	33	36	24	5	2	0	0	910	6.642	6.879	-0.237	7.024
5	MAKUENI GIRLS SEC		160	160	0	0	6	15	18	37	40	30	12	1	1	0	1041	6.506	7.695	-1.189	7.780
6	MWAANI BOYS SEC	152		153	0	0	1	10	12	20	25	45	30	7	2	0	856	5.595	6.376	-0.781	8.311
7	MWAANI GIRLS SEC		193	193	0	0	0	3	14	15	51	53	44	13	0	0	1030	5.337	6.015	-0.678	5.680
8	ST. LAWRENCE GIRL'S		80	80	0	0	0	0	2	7	13	29	20	8	1	0	394	4.925	4.310	0.615	4.486
9	KYUASINI SEC.	44	34	78	0	0	0	3	0	4	5	14	20	30	2	0	329	4.218	4.625	-0.407	5.149
10	KITANDI HAR SEC	34	46	80	0	0	0	0	3	4	2	7	5	23	31	5	335	4.188	2.925	1.263	4.531
11	KAMBI MAWE SEC	21	67	88	0	0	0	1	2	1	10	13	22	28	11	0	351	3.989	4.050	-0.061	5.288
12	NZIU BOYS SEC	38	34	72	0	0	0	0	2	2	4	6	17	18	22	1	251	3.486	3.719	-0.233	5.322
13	IIJANI SEC ABC	15	30	45	0	0	0	0	1	0	4	7	4	15	13	1	155	3.444	4.170	-0.726	4.612
14	KASUNGUNI SEC	32	43	75	0	0	0	1	0	4	2	8	12	23	24	1	255	3.400	4.029	-0.629	4.626
15	MUIU SEC	22	20	42	0	0	0	0	0	0	0	2	14	21	5	0	139	3.309	3.278	0.031	4.350
16	ST. JOHN'S MALIVANI	57	42	99	0	0	0	0	0	0	3	13	22	31	29	1	323	3.263	3.349	-0.086	4.650
17	KIMUUMO SEC	10	18	28	0	0	0	0	0	1	0	2	6	12	7	0	91	3.250	3.342	-0.092	4.250
18	NGOSINI SEC	13	8	21	0	0	0	0	0	0	0	3	7	5	4	2	68	3.237	2.529	0.708	4.069
19	MUKUYUNI SEC SCH.	31	54	85	0	0	0	0	0	2	3	10	17	22	27	4	274	3.225	3.310	-0.085	4.422
20	NGULUNI DAY SEC	27	24	51	0	0	0	0	0	3	3	5	6	12	17	5	163	3.196	4.207	-1.011	5.421
21	KYUMU SEC	36	34	70	0	0	0	0	0	2	4	7	13	7	36	1	219	3.129	2.758	0.371	4.671
22	ACK UKIA	23	34	57	0	0	0	0	0	0	2	6	7	24	18	0	178	3.123	3.707	-0.584	4.357
23	AIC MUTULANI SEC	42	45	87	0	0	0	0	0	2	2	9	17	22	31	4	271	3.115	3.602	-0.487	
24	KIVANI SEC SCHOOL	68	59	127	0	0	0	1	1	2	9	11	10	29	61	3	392	3.087	3.618	-0.531	3.891
25	ST ANTONY GIRLS		18	18	0	0	0	0	0	0	0	1	4	8	5	0	55	3.056	2.315	0.741	3.316
26	MUNYUNI SEC	37	38	75	0	0	0	1	0	1	2	2	3	35	30	1	216	2.880	3.053	-0.173	3.426
27	ST.MARY'S KOLA		45	45	0	0	0	0	0	0	0	4	6	15	20	0	129	2.867	3.529	-0.662	4.627
28	MUTULANI SEC	43	21	64	0	0	0	0	1	0	1	2	9	21	29	1	182	2.840	2.914	-0.074	3.860

List of the PSS in Makueni Sub-County (Page 2)

29	KITONYONI SEC	28	13	41	0	0	0	0	0	0	1	2	5	12	21	0	114	2.780	3.028	-0.248	5.727
30	MUAMBANI SEC	14	12	26	0	0	0	0	0	0	0	1	4	9	12	0	72	2.769	2.167	0.602	4.636
31	SENDA SEC	13	20	33	0	0	0	0	0	0	1	0	6	9	14	3	88	2.670	NEW	NEW	NEW
32	AIC MUTHYOI	22	12	34	0	0	0	0	0	0	0	5	3	4	17	5	88	2.588	3.680	-1.092	3.571
33	KAMBI MAWE BOYS	22	19	41	0	0	0	0	0	0	1	2	7	5	19	7	104	2.537	3.522	-0.985	4.500
34	MANDOI SEC	23	13	36	0	0	0	0	0	1	1	0	4	9	14	7	91	2.528	2.612	-0.084	3.404
35	ST. FRANCIS KIUUKUNI	14	14	28	0	0	0	0	0	0	0	1	4	5	16	2	70	2.500	2.520	-0.020	NEW
36	NTHUKULA SEC	20	26	46	0	0		0	0	0	0	1	7	8	22	8	109	2.370	2.189	0.181	3.300
37	KEE S.A SEC. SCHOOL	12	21	33	0	0	0	0	0	0	0	2	1	5	23	2	77	2.333	3.238	-0.905	3.100
38	NTHANGU SEC	57	63	120	0	0	0	0	0	0	3	4	4	24	58	27	269	2.241	2.418	-0.177	3.652
39	MAKULI ACK SEC.	15	8	23	0	0	0	0	0	0	0	0	1	9	7	6	51	2.217	3.207	-0.990	4.750
40	UTAATI ACK	14	13	27	0	0	0	0	0	0	0	0	0	6	20	1	59	2.185	2.481	-0.296	3.464
41	AIC KINYUANI SEC	11	4	15	0	0	0	0	0	0	0	0	1	5	3	6	31	2.067	2.125	-0.058	NEW
42	KOLA SEC		45	45	0	0	0	0	0	0	0	0	0	8	30	7	91	2.022	1.844	-0.822	2.758
43	MWEA SEC.	25	26	51	0	0	0	0	1	0	0	1	3	2	28	16	103	2.020	2.548	-0.528	2.902
44	SIA SEC	17	6	23	0	0	0	0	0	0	0	0	0	3	14	6	43	1.870	NEW	NEW	NEW
45	ST. PETERS KYAU SEC	15	10	25	0	0	0	0	0	0	0	0	0	2	16	7	45	1.800	NEW	NEW	NEW
46	AIC IUANI	22	25	47	0	0	0	0	0	0	0	0	2	4	18	23	79	1.681	1.622	0.059	3.521
	KCSE 2017	1465	1670	3136	0	9	58	122	134	217	314	379	397	564	778	163	13226	4.217		-0.435	
	KCSE 2016			3111	0	31	109	165	217	269	293	330	377	546	641	132	14474	4.653			

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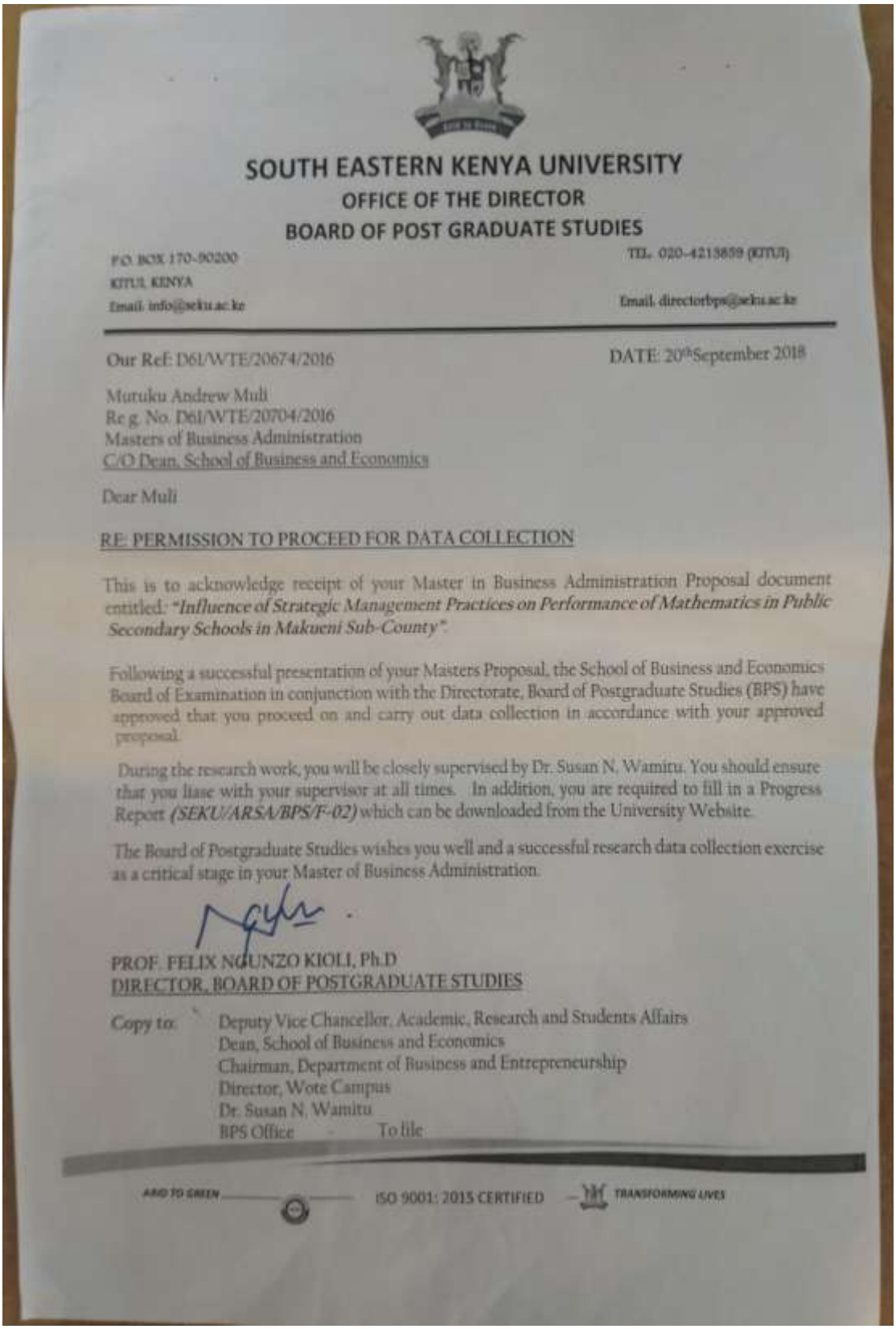
APPENDIX IV: TARGET POPULATION AND STUDY SAMPLE

SCHOOL	PRINCIPALS	MATHEMATICS TEACHERS	TOTAL	30% OF MATHEMATICS TEACHERS SAMPLED
1. MAKUENI BOYS	1	12	13	4
2. KAUMONI BOYS	1	10	11	3
3. ST.PAUL KYAMUTHEI	1	6	07	2
4. UKIA GIRLS SEC	1	8	09	2
5. MAKUENI GIRLS SEC	1	11	12	3
6. MWAANI BOYS SEC	1	10	11	3
7. MWAANI GIRLS SEC	1	11	12	3
8. ST.LAWRENCE GIRLS	1	6	07	2
9. KYAUSINI SEC	1	5	06	2
10. KITANDI NAR SEC	1	4	05	1
11. KAMBI MAWE SEC	1	6	07	2
12. NZIU BOYS SEC	1	8	09	2
13. IUANI SEC ABC	1	5	06	2
14. KASUNGUNI SEC	1	7	08	2
15. MUIU SEC	1	3	04	1
16. ST.JOHNS MALIVANI	1	7	08	2
17. KIMUUMO SEC	1	2	03	1
18. NGOSINI SEC	1	3	04	1
19. MUKUYUNI SEC SCH	1	5	06	2
20. NGULUNI DAY SEC	1	4	05	1
21. KYUMU SEC	1	6	07	2
22. ACK UKIA	1	2	03	1
23. AIC MUTULANI SEC	1	3	04	1
24. KIVANI SEC SCH	1	6	07	2
25. ST.ANTONY GIRLS	1	4	05	1
26. MUNYUNI SEC	1	3	04	1
27. ST.MARYS KOLA GIRLS	1	3	04	1
28. MUTULANI SEC	1	4	05	1
29. KITONYINI SEC	1	5	06	2
30. MUAMBANI SEC	1	4	05	1
31. SENDA GIRLS	1	4	05	1
32. AIC MUTHYOI	1	3	04	1
33. KAMBI MAWE BOYS	1	6	07	2
34. MANDOI SEC	1	5	06	2
35. ST.FRANCIS KIUUKUNI	1	3	04	1
36. NTHUKULA SEC	1	4	05	1
37. KEE S.A SEC SCH	1	5	06	2
38. NTHANGU SEC	1	7	08	2
39. MAKULI ACK SEC	1	3	04	1
40. UTAATI ACK	1	4	05	1
41. AIC KINYUANI SEC	1	3	04	1
42. KOLA SEC	1	1	02	0
43. MWEA SEC	1	3	04	1
44. SIA SEC	1	2	03	1
45. ST.PETERS KYAU SEC	1	3	04	1
46. AIC IUANI	1	1	02	0
TOTAL	**46**	**230**	**276**	**72**

APPENDIX V: PERMISSION TO COLLECT DATA



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Our Ref: D61/WTE/20674/2016

DATE: 20th September 2018

Mutuku Andrew Muli
Reg. No. D61/WTE/20704/2016
Masters of Business Administration
C/O Dean, School of Business and Economics

Dear Muli

RE: PERMISSION TO PROCEED FOR DATA COLLECTION

This is to acknowledge receipt of your Master in Business Administration Proposal document entitled: *"Influence of Strategic Management Practices on Performance of Mathematics in Public Secondary Schools in Makueni Sub-County"*.

Following a successful presentation of your Masters Proposal, the School of Business and Economics Board of Examination in conjunction with the Directorate, Board of Postgraduate Studies (BPS) have approved that you proceed on and carry out data collection in accordance with your approved proposal.

During the research work, you will be closely supervised by Dr. Susan N. Wamitu. You should ensure that you liase with your supervisor at all times. In addition, you are required to fill in a Progress Report *(SEKU/ARSA/BPS/F-02)* which can be downloaded from the University Website.

The Board of Postgraduate Studies wishes you well and a successful research data collection exercise as a critical stage in your Master of Business Administration.

PROF. FELIX NGUNZO KIOLI, Ph.D
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

Copy to: Deputy Vice Chancellor, Academic, Research and Students Affairs
Dean, School of Business and Economics
Chairman, Department of Business and Entrepreneurship
Director, Wote Campus
Dr. Susan N. Wamitu
BPS Office - To file

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