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Factors affecting science subject performance in public primary schools in Westlands sub-county, Nairobi County

Susan Nyambura Kamutu
School of Humanities and Social Sciences (SHSS)
Strathmore University

FACTORS AFFECTING SCIENCE SUBJECT PERFORMANCE IN PUBLIC PRIMARY SCHOOLS IN WESTLANDS SUB-COUNTY, NAIROBI COUNTY

KAMUTU SUSAN NYAMBURA

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Strathmore University

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Kamutu Susan Nyambura

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Approval

The thesis of Kamutu Susan Nyambura was reviewed and approved by the following:

Dr. Alfred Kitawi,

School of Humanities and Social Sciences,

Strathmore University.

Prof. Christine Gichure,

Dean, School of Humanities and Social Sciences,

Strathmore University.

Prof. Ruth Kiraka,

Dean, School of Graduate Studies,

Strathmore University.

ABSTRACT

The purpose of this study was to determine factors that influence the performance of Science subject in public primary schools, Westlands sub-county. The study used Porter's et al. (2008) approach on leadership and Dzama's (2012) approach. The approach focusses on the effect of teaching and learning materials on performance of Science, how the head teacher's professional leadership affects performance in Science, how syllabus coverage affects pupils' performance in Science, and to assess the pupils' attitude towards Science. The study was guided by the constructivist theory as postulated by Jean Piaget (1934). The target population was all the 25 public primary schools in the sub-county. The sample size was 8 head teachers 40 Science teachers and 142 pupils. Questionnaire sets were used to collect the required information. Secondary data on performance was collected from the District Education office. Data was analysed by the use of the Statistical Package for Social Sciences (SPSS) version 24. Spearman rank-order correlation was used since the data was ordinal. It was established that Science was the worst performing subject over the past six years, provision of teaching and learning resources for Science directly influenced performance, School leadership positively affected performance, and syllabus coverage did not significantly contribute to the learners' performance. Learners had a positive attitude towards Science. The study recommended that MOEST provides adequate capitation grants to schools for the procurement of teaching and learning resources for Science, particularly for the practical lessons**.** Further research was suggested on the appropriate methodologies for teaching Science at primary school level.

Key words:

Science, Syllabus Coverage, Performance, Teaching and Learning Resources, Leadership, Learners' Attitude.

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DEFINITION OF TERMS

Performance: In this research, performance refers to pupils' score at KCPE in various subjects.

Teaching and Learning Resources: This refers to Science labs, books, classrooms, desks, chairs, charts among others.

Professional leadership: In this study, professional leadership refers to the precision in planning and executing by school heads, the duties and responsibility bestowed on school administration.

Competence: This term has been used in reference to the ability of teachers to deliver in a professional and expected manner. This was measured in terms of the ability to teach to help students excel in assessments.

Syllabus: This term denotes an academic document that outlines the subjects in a course of study or teaching which will be tackled in a class in each term. It spells out learning outcomes to be accomplished by the learner and it also endorses study habits and goals.

School: A learning institution designed to provide spaces and learning environment for teaching students under the direction of teachers. It operates on certain rules and regulations and has a vision, mission, objectives and core values that guide its operations.

MOEST: Ministry of Education, Science and Technology.

NACOSTI: National Commission for Science Technology and Innovation.

K.C.P.E: Kenya Certificate of Primary Education is a certificate awarded to students after completing the approved eight-year course in primary education in Kenya. The subjects examined are Mathematics, Science, English, Kiswahili and Social Studies where each subject is worth a maximum of 100 marks. The examination is administered and supervised by Kenya National Examination Council (KNEC), an examining body in Kenya under the Ministry of Education.

K.C.S.E: Kenya Certificate of Secondary Education is an examination taken at the completion of secondary education. In Kenya, this examination is the entrance to tertiary institutions and the pass mark for universities is C+.

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DEDICATION

This work is dedicated to my late parents who greatly valued education despite their humble way of life.

To my brothers and sisters for the unconditional love and the togetherness that we share.

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CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1 Introduction

This chapter sought to address the study background, justification to the study, background to the problem, problem statement, research objectives, research questions, scope of the study, significance of the study, limitations and delimitations. The achievement of good grades after sitting for the Kenya Certificate of Primary Education examination is vital to reduce wastage (Eshiwani, 1993). A school which is endowed with physical materials that enhance teaching and learning, has more internal efficiency that translates into better Kenya Certificate of Education performance. Some subjects such as Science require practical approach that can only be done with adequacy of resources for ease of comprehension and retention.

Chapter two presents theoretical framework, review of literature on factors that affect performance of Science as well as the conceptual framework. Chapter three discusses the research methodology which was adopted in the study while chapter four deals with the presentation, analysis, discussion and interpretation of the empirical findings. Lastly, chapter five deals with the summary, conclusions and recommendations of the study.

1.2 Background to the study

Primary education is a major foundation for social-economic and political development of a nation (UNESCO, 2005). However, most pupils who go through primary education in developing countries fail to master the basic cognitive skills as shown by the poor performance in primary school examination. The main feature of an education system is academic performance. The World Bank (2006) observes that public examinations in Kenya serve the following purposes: selection of candidates for educational opportunities and employment, certificate of achievement of candidates, control of curriculum and its delivery in school, motivation of school teachers and pupils, monitoring education standards and reporting on school effectiveness including instructional resources among others.

After the attainment of independence in 1963, the government of Kenya recognised education as a tool to improve the life of Africans who had been short-changed by the colonial education policies. In essence, it also recognised education as a human right and a powerful tool to prepare and produce a human resource for the purpose of developing the nation's economic growth and

laying the foundation of the newly independent country. To succeed, the government had to make policies in education to act as a bridge and tool for economic development. Therefore, a big investment in education would ensure production of human resource both for personal growth and as a contribution to economic growth (Sessional Paper 1, 2005).

Over the recent decades there has been a huge effort by developing countries to place their children in school. This can be attested from the number of developing countries that have implemented free primary education. Educational achievement, especially primary education, is regarded as one of the main features for stirring economic growth and improving the standards of living in developing countries. In Kenya, Wakori (2014) notes that the Kenya Certificate of Primary Education Examination (KCPE) has recently turned into a country wide gauge of academic performance every year. The author further argues that the trend has persisted every year impelling a cutthroat competition among candidates so as to acquire a place in the most coveted secondary schools. Passing of this national examination has constituted a strain to parents, pupils and educational instructors who constantly look for solutions for smooth transition from primary to secondary schools by reducing wastage and increasing internal efficiency of schools.

According to Jones, J. et al (2006) teacher effectiveness has attracted close scrutiny as part of government's drive to raise the quality of teaching and learning and therefore school standards. Attempts to define the skills, knowledge and attributes required by effective teachers to help them review their performance are signs of government's strategy to manage the teaching force. In Kenya, Teachers' Service Commission in circular No: 6 /2017 introduced Teacher Performance Appraisal and Development tool (TPAD) to enhance the quality of teaching and ultimately improve learning outcomes in primary, secondary and tertiary institutions. In TPAD, teachers are evaluated on pedagogy, particularly preparation and use of schemes of work, lesson plans, lesson notes and maintenance of learners' assessment and progress records. Remarkable achievements have been realized including improved school and lesson attendance by teachers as well as overall improved curriculum delivery.

1.3 Justification to the study

Science can have different multi-pronged aims like utilitarian benefits, individual development, advancement of economies and transmission of cultural values. Students' performance (academic attainment) therefore, plays an important role in producing best quality graduates

who will eventually turn into great leaders for the country thus responsible for the country's economic and social growth (Ali et.al., 2009). Ungar (2010) notes that the future of a society is dictated by inhabitants who are able to comprehend and help shape the impact of Science and Technology on our world. The most addressed issue at the basic education level is academic performance. There are plenty of comprehensive works that offer explanations for good and poor student academic performance, yet controversy still persists among scholars as to what contributes towards students' poor accomplishment.

Several factors have been raised pointing to the poor performance of pupils in examinations (Setati & Adler, 2000). These include: insufficient subject knowledge of teachers, deficient communication ability of pupils and teachers in the language of instruction, scanty instructional materials, difficulties experienced by teachers to handle activities in classrooms, inadequate professional leadership, pressure to complete examination driven curriculum, heavy teaching loads, overcrowded classrooms, poor communication between policy-makers and implementers.

Oketch et al, (2011) alludes to many elements at the school, class and student level that have a positive and negative effect on students' achievements. These are socio-economic status, text books and reference materials accessibility, parental education, occupation of parents or guardians, parental aspirations, pressure from parents and guardians, parent's self-concept, attitude of students, peer group influence and pupils' self- concept. As pertains to the classroom, factors found in literature that influence classroom environment include learning environment, teachers' characteristics, teachers' competence, teacher confidence, teachers' education qualifications, teaching methods adopted, class size, time taken on tasks, disruptive activities in class, syllabus coverage and assessments (Howie, 2003).

Orodho (1996) also provides an insight into the rationale why learners perform badly in Science subjects. He suggests the following reasons: inadequate time allocated for learning Science satisfactorily, insufficient instructional materials, inadequate training of teachers, and the nature of the Science curriculum which is highly abstract and seems inapplicable to the learners' immediate environment. The Koech Commission (TIQET, 1999) noted in its report that for good performance to be realized there must be the implementation of the curriculum which includes the provision of adequate and appropriate facilities, equipment, learning and teaching materials; which are some of the factors affecting academic performance.

As a result of this, the Government of Kenya has particularly felt the need to enhance the Science education it offers so as to build up a knowledgeable human resource base required for its industrial and technological transformation The Japanese International Cooperation Agency (JICA) has been supporting the Kenyan Government in the area of In-service Education Training (INSET) also known as Continuing Professional Development (CPD).This is done in order to raise the quality of teaching Mathematics and Science in primary and secondary schools as teachers lacked opportunities for capacity building (SMASSE Project, 2000).

The City Council of Nairobi Education Department K.C.P.E analysis for the period 2011 to 2013 revealed performance in Science subject in public primary schools in Westlands Sub County as 48.16%, 48.74% and 49.53% respectively which was a below average mark. The national results for the same period demonstrated a totally different scenario altogether. In 2011, the candidates attained a national average of 66.40%, 62.76% in 2012, 61.82% in 2013, and 66.00 in 2014 (KNEC, 2011-2014) revealing that Science performance was above average nationally. There has been no substantive research to investigate this performance gap in the context of Westlands, Nairobi County. This study therefore seeks to assess the factors that influence the performance of Science in public primary schools located in Westlands, Nairobi County.

1.4 Background to the problem

Science plays an important role not only in technological advancement but also economic development. As a result, educators, trainers, and researchers have put their research and policy agenda on looking into factors influencing the performance of learners in Science. The national examinations have shown poor performance in this subject and specifically in public primary schools. This is despite the fact that the Government of Kenya has laboriously invested in education, given its function in propelling national development. This can be attested by the introduction of Free and compulsory Primary Education (FPE) in 2002 and more recently, Free Day Secondary Education (FDSE) (Sessional paper, 1 2005).

Odhiambo (2008) ascertained that the problem of poor performance is deeply entrenched in management practices which will have to change if the goals in education sector are to be achieved. Absenteeism and lateness to school by pupils are reported as most assuredly related to poor performance in school. Etsey (2005) established that the effect of lateness and absenteeism is that content taught will be difficult to understand when studied on one's own.

Changeiywo (2000) cited the following reasons why learners perform poorly in Science: less time allowed for learning Science satisfactorily, inadequate instructional materials, and inadequate training of teachers and the nature of Science curriculum which is highly abstract and seems extraneous to the learners' immediate environment. Subject performance plays a major role in subject choices later in the education system. According to Maltese and Tai (2011), students' choices are influenced by students' motivation and interests in Science subjects. At the same time, students' motivation and interest is affected by many factors ranging from internal classroom factors such as the teaching and learning environment, instructional methods and strategies and the nature of Science curriculum to more external factors such as students' social-economic status, gender and ethnic groups (Maltese &Tai, 2011). It is well known that interest can be created among students by manipulating these factors. Teachers' intervention in the classroom is frequently highlighted as most important for sparking and maintaining students' interests (Hulleman & Harackiwiez, 2009). Other studies have found a relationship between age and gender on student interests. According to Maltese and Tai (2011), students develop interests in Science before and during early school age.

A Study carried out by Mulwa (2004) on factors influencing pupils' academic performance in Mutongoi division, Kitui district found that parents' poverty, poor academic achievement, and ignorance affected pupils K.C.P.E performance. Heavy work assignment on teachers affected adequate teacher preparation and revision for examination. In essence, poor time management as a result of pupils' absenteeism and lack of support from parents, influence K.C.P.E performance

A similar study by Orodho (2009) was conducted in six districts namely; Embu, Murang'a, Nairobi, Garrissa, Gucha and Baringo. The research purpose was to improve quality teaching in primary schools in Kenya. The study concentrated on Mathematics, English and Science. The respondents here were teachers, head teachers and students. The study found that availability or lack of teaching aids, head teachers' supervision of lessons and social relations within school contribute to learners' achievement. Low performing schools continue to add less value to students' achievement throughout the year. Majority of the studies reviewed were conducted in public schools in rural areas. This presents a research gap in public primary schools in urban areas in order to shed light on what areas need attention and to compare if the factors highlighted as contributory factors of poor performance in Science in rural settings are

the same and to what extent. This study therefore sought to fill the gap of assessing the determinants of performance of Science subjects in public primary schools within Westlands sub-county.

1.5 Problem statement

Over the years, disparities have been observed in the performance of examinations by pupils at different levels of the education system, with some students performing well and others performing poorly. According to the Kenya National Examination Council's K.C.P.E 2011, 2012 and 2013 analysis report, Science subject registered an above average mark nationally. However, in Westlands Sub-county, a below average mark was registered in the same period. Gender disparities are also depicted on the results with boys scoring higher marks than their counterparts. (KNEC, 2011-2014)

Nationally, in 2011, the candidates attained an average of 66.40%, 62.76% in 2012, 61.82% in 2013, and 66.00 in 2014 in the Science subject. Westlands Sub-county candidates attained an average of 48.16% in 2011, 48.74% in 2012 and 49.86% in 2013.This trend showed that there had been consistent poor performance in the Science subject in Westlands sub-county. Given the previous information, the performance in Science in the past few years in Westlands sub-county has been poor. There has been no substantive research within Westlands to assess the cause of this. The purpose of the study was therefore to investigate factors which affect performance of Science subject in public primary schools in Westlands sub-county, Nairobi County. By providing a positivist view on how to improve the performance, the study sought to infer factors that will improve performance in public primary schools in Westlands. In addition, the Ministry of Education Science and Technology (MOEST) officials, the head teachers, Quality Assurance and Standards Officers, (QASOs) Curriculum Support Officers (CSOs), Parents Associations (PAs) and the entire school leadership including the Board of Management (BOM) will gain knowledge on factors that affect the performance of Science in Westlands sub-county and therefore be able to remedy the poor performance.

1.6 Research objectives

The overall objective of the study was to assess the factors that influence the performance of Science in Westlands sub-county. The specific objectives were guided by Porter's et al. (2008) approach on leadership and Dzama's (2012) approach on teaching and learning resources, syllabus coverage and pupils attitude.

i. To identify the effect of teaching and learning resources on pupils' performance in Science.

ii. To determine how the head teacher's professional leadership affects pupils' performance in Science.

iii. To examine how syllabus coverage affects pupils' performance in Science.

iv. To assess the pupils' attitude towards Science.

1.7 Research questions

This study was guided by the following research questions.

i. What is the effect of teaching and learning resources on pupils' performance in Science?

ii. How does the head teacher's professional leadership affect pupils' performance in Science?

iii. How does syllabus coverage affect pupils' performance in Science?

iv. What is the pupils' attitude towards Science?

1.8 Scope of the study

The study population comprised of 25 public primary schools located in Westlands Sub-county, with a population of approximately 28,000 pupils and 25 head teachers. Science subject teacher population was estimated to be 442. According to Mugenda and Mugenda (2009) 10-30% forms a sufficient sample size. A simple random sampling was applied to select the 30% of the total population which was 8 schools, 8 head teachers, and 30% of approximately 50 standard eight pupils in each school which made a total of 142 pupils. 40 Science subject teachers from the sampled schools were also involved.

1.9 Significance of the study

Since most of the Public Primary schools had not been posting good Science results in Kenya Certificate of Primary Education upon the inception of free primary school, it was of importance to study this phenomenon, in order to identify factors that have contributed to the academic decline. By doing this, stakeholders such as the D.E.O, head teachers, Science subject teachers, and parents, Curriculum Support Officers, Quality Assurance and Standards Officers,

the Board of Management, as well as pupils would be able to address anomalies, and then improve on education standards in this area.

The study would also contribute to the advancement of knowledge about Science education. The study may lead to improved strategies in teaching and learning of Science subjects not only in Kenya but also in other parts of the world. The study may also be of immediate benefit to the Ministry of Education (MOEST) and the National Commission for Science and Technological Innovations (NACOSTI) in the formulation of future Science education policies aimed at enhancing students' achievement in the Science subjects. This study would assist teachers develop positive attitudes towards the teaching and learning of Science.

1.9.1 Limitations

According to Best and Khan (1993) limitations are conditions beyond the control of the researcher that may place restriction on the conclusion of the study and their application to other situations. Factors that influence pupils' performance are diverse. The study was limited to factors in a classroom set up which had been pre-determined by the researcher, thus leaving out equally important variables like teacher competency, time on the task, self-concept and intelligence due to limited time for the study. The researcher did not study the whole concept of attitude because of its complex and multi-dimensional nature and suggests a whole study topic focus on this aspect and in Westlands, sub-county. The researcher also limited herself to a particular theory adapted from Porter's et al. (2008) approach on leadership and Dzama's (2012) approach on teaching and learning resources, syllabus coverage and pupils attitude because of the content being similar. Other limitations were that the study findings could not be generalized to the whole county since it was restricted to public primary schools in Westlands sub-county. The time available limited the researcher to a specific sample of schools. Secondary K.C.P.E data for Nairobi County was not available for schools since 2014 owing to the abolition of ranking of schools.

1.9.2 Delimitations of the study

The study targeted only three categories of respondents namely head teachers, teachers and pupils. Other stakeholders such as parents and school sponsors were not included in the sample due to the fact that most of them might not be conversant with the syllabus content as well as pedagogy and therefore might not adequately participate in the study. Factors considered for this study were limited to teaching and learning resources, teaching and learning process and

leadership factors. Any other factor affecting pupils' performance was not investigated by the study due to the limiting theory.

Even though teachers' level and subject competency had been identified as a factor affecting Science subject performance, the researcher focused on those aspects where it was easier to collect data due to time and cost constraints. Teachers' level and competency needed more time and authority from the Teachers' Service Commission and other education bodies to yield accurate results.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The researcher in this chapter presented a review of literature on factors that affect performance of Science subject. The chapter outlined an overview of Kenya's education system, theories on Science subject performance, empirical and conceptual sections as well as research gap.

2.2 Overview of Education

Kenya by its patent nature has many ethnicities (Dei, 2000). In pre-colonial times, relevant and localized indigenous knowledge as well as the transmission of the same was very important. Consequently, when formal education was introduced in Kenya during the British colonial eon, ideological conflicts arose because this was a western-style education, provided mainly by the missionaries in conjunction with the colonial government (Ntarangwi, 2003).

In 1963, the country attained independence and a commission was put in place to make changes in the formal education system. The aim of the commission was to build a national identity and to bring together the different ethnicities through subjects in school such as History and Civics and also Civic Education for the masses. Between 1964 and 1985, the 7-4-2-3 education structure modelled after the British education system was adopted. The system was designed to provide seven years of primary education, four years of lower secondary education, two years of upper secondary education, and three years of university education (Buchmann, 1999). The country was in urgent need for skilled workers to take up positions previously held by the British. Hence, the government set out to quickly expand educational opportunities to its citizens, many of whom had been previously denied educational and economic opportunities (Ntarangwi, 2003). To further improve education in Kenya, the Mackay Commission of 1981 was put in place with an aim to restructure the entire education system. This led to the establishment of the current 8-4-4 model of eight years of primary schooling, four years of secondary and a minimum of four years at the university. The report recommended discarding of A-level and simultaneously added an extra year each to primary and university education.

Kenya has always prioritized education at all levels, promoting it as a key indicator for social and economic development. Free primary education (F.P.E) in Kenya was introduced in 2003 with the main aim of meeting vision 2030 goals. Currently there is also Free Day Secondary Education (F.D.S.E)

2.3 Theoretical Framework.

2.3.1 Theories on educational efficiency and performance

There are several theories on educational efficiency and performance. The theories on educational efficiency and performance include education production function, constructivist theory and efficiency theory to minimize wastage.

The study was guided by the Constructivist theory as formulated by Jean Piaget (1934). The theory postulates that children do not plainly imitate all that comprises the external surroundings. Expansion and acquisition of knowledge as well as skills through study is a continuing undertaking and an interchange between human beings and their surroundings, an exercise through which individuals develop increasingly multiplex schemas. Kegan (1982) argues that Constructivist psychology when used in learning emphasizes that students are always involved in a process of knowledge; pupils are the key form of learning activity and they construct knowledge on their individual inventiveness; educators are collaborators and the driving force for the learners' building of knowledge. In essence, this makes pupils, educators, the environs, anyone or anything else in which the learner interacts with of vigorously creating meaning. In that case, the teacher can only enable, but not himself invent knowledge. In regard to this, knowledge is uncertain due to the fact that the learning process of information is also the structuring process. Twomey Fosnot (1989) recommends that a constructivist method could be initiated to develop learners who are independent, inquisitive intellectuals who probe, examine, and reason. A constructivist approach liberates teachers to make decisions that will augment and enrich pupils' progress in these expanses.

Lorsbach (1992) sheds light on constructivism which has lately been used increasingly as a theoretical referent for Science teaching. Some learning institutions have adopted a constructivist-based curriculum whereby students are given opportunities to make sense of what is learned by negotiating meaning using their prior knowledge and senses in making connections to the new concepts introduced, comparing what is known to new experiences, and resolving discrepancies between what is known to new experiences. The resolution of discrepancies enables the learner to reach equilibrium in the sense that there should be no remaining curiosity regarding an experience in relation to what is known. Through this approach, classrooms shift from being teacher-centred to student centred and more activity based. Teachers are therefore encouraged to begin to construct a new vision of their Science

classrooms by moving away from the traditional Science classrooms whereby students are mostly provided with new knowledge to be memorized and repeated on a test without providing an opportunity for them to make sense of it as well as reflect on their experiences in relation to what they already know.

In support of constructivism, the education production function assumes that inputs determine the output of an education system. Monk (1992) termed production function analysis as the relating of an input measure to an output measure using correlation of multivariate analysis. Education production function encompasses the learning of relationships between procured instructional inputs and education outputs. Education is looked at as an industry where the inputs spontaneously lead to outputs. This study looked at school factors such as availability of teaching and learning resources (obtainability of competent teachers, appropriate text books, syllabus implementation and proper use of resources including Science laboratories) among other inputs. Outputs comprised transition and in this case, into secondary education. Therefore, the performance at the basic school level, national examination was seen as the basis of advancement in the educational arena.

Eshiwani (1993) argues that the realization of quality grades after sitting for the Kenya Certificate of Primary Education examination is integral to minimize wastage. Furthermore, schools which are equipped with physical materials that enhance teaching and learning, have more internal efficiency that translates into better Kenya Certificate of Education performance. Teaching and learning materials also help in ease of comprehension and eventual retention of knowledge. Coverage of the syllabus has to go hand in hand with the teaching and learning resources. Some subjects such as Science require practical approach that can only be done with adequate provision of such resources.

2.3.2 Empirical review of factors affecting performance of Science subjects

A research on examination of various aspects affecting pupils' performance in Science (Fabio & Laura 2010) in Italy, surveyed the connection between contextual matters at the school level and pupil level in relation to marks in Science accomplishment. In their findings, 34% of the studied variance accounted for among schools found out that school and teacher influences analysed do not considerably affect pupils' achievement in Science. In the Italian context, being a non-native student and having less cultural resources negatively and substantially affected Science performance and was consistent with several studies pointing out the advantages

deriving from home and parental features. The researchers also found that schoolchildren's self-sureness in learning Science evidenced to be the most significant forecaster of their performance. Research into educational psychology indicates that educators can develop students' self-confidence and self-worth by means of specific teaching approaches such as involving students in a creative ways and by means of collaborative learning or inquiry-based activities (Fencl & Scheel, 2005).

In the United Kingdom (Sutton, 2011) in a research titled "improving the impact of teachers on pupil achievement in the UK" recommended that, enhancing the effectiveness of teachers would have a paramount effect on the performance of the country's schools, consequently increasing the attainment of children across the education system. Teachers are the largest resource in schools and the most crucial factor within schools that policy makers can directly use to improve student achievement.

Research by Porter et al. (2008) explores why some students realise great academic excellence than their counterparts. It revealed four supposedly imperative determinants. These comprise the head teacher's professional leadership styles, teacher characteristics and student conduct. A study carried out in Malawi found that poor performance in Science subjects is ascribed to lack of Science apparatus, lack of enough and quality text books, (Teaching and learning resources) students' perception that Science subjects are hard, (student' attitude towards Science subjects) and too little time allocated to practical lessons (syllabus coverage) (Dzama, 2012). An indistinguishable study carried out in Nigeria by Akiknola (2006) attributed poor performance to insufficient learning, shortage of qualified and committed teachers (Teachers' competency level), learners' inability to perform well in practical as well as the teaching techniques used by the Science instructors.

Students' instructional performance depends on a number of socio-economic constituents including students' attendance in class, family remuneration, mother's and father's level of education, teacher-student ratio, number of trained teachers in school, students' gender issues, and the distance of school from home. Other study findings have attracted attention to the relevance of emotional and motivational elements as well as contextual variables in predicting academic achievement in Science oriented subjects (Chang, Singh & Mo, 2007).

Gender has also been tackled in the literature as a causal element of performance in Science subjects. Research outcomes at the international level have explained the low participation of females in Science. The studies reveal that secondary school students perceive some subjects to be strenuous and gendered, with girls tending towards subjects which involve clearly identifiable personal interactions (Bystidzienski & Bird, 2006).

Ngaroga (2007) explains teaching and learning materials as those that are obtained in the school surroundings, collected and brought for learning. Since the year 2003, The Government of Kenya (GoK) has formulated measures aimed at equipping schools with teaching and learning materials through the Kenya Education Support Program and School Infrastructure and Material program where an annual monetary allocation is made for each and every pupil in primary School for purchases of these materials. Teaching and learning materials have many advantages since they generate a focal point of attention, stir interest, stimulate the learners' imagination, save time and promote retention and memory. However, in Kenya, most of the resources are not equally distributed as schools are located in different environments all over the country. Schools in arid and semi-arid areas have few environmental resources as compared to those in wetlands.

From the research done by Porter's et al. (2008) and by Dzama (2012) the key factors affecting performance in Science subjects are: professional leadership style of the head teacher; teacher characteristics (teacher quality and competence); students' attitude towards Science subjects; syllabus coverage; teaching and learning resources.

2.3.3 Teaching and Learning Resources in Kenya

Teaching and learning resources play a salient role in the teaching and learning of Science subjects and inevitably the learners' pedagogical attainment in other subjects as well. Despite the fact that there is a demand for meaningful Science teaching, a lot of hurdles still hinder the effective teaching and learning of the Science subjects. The researcher asserted that no meaningful Science education programme can occur without laboratory facilities. Laboratory amenities are indispensable to good Science teaching and learning. Impecunious financial allocation in terms of provision of Science learning resources contribute to students' low level of academic achievement. Students and their tutors believe that the performance can improve if the necessary resources are provided in their schools (Aguisibo, 1998).

Ezema (1999) argues that children are highly motivated to learn when they see the concepts that are being presented to them. Use of audio-visual aids relaxes the classroom atmosphere, stimulates the students imagination, leading to teaching and learning creatively as well as interactively. He goes further to assert that they arouse the learners interest, kindle active participation in a lesson, help recall and connect the experiences to real life. Audio-visual aids focus attention on meaning and help to make the classroom instruction more real and alive. Having something to look at sustains the pupils' attention and makes the classroom more interesting. Instructional materials should be made available in all the schools because they play a vital role in the teaching and learning process. The objectives of basic Science may not be attained without the availability and use of adequate instructional materials.

Availability of text books including reference materials affects pupil performance. Ngaroga (2007) talks of teaching and learning materials as those that are accessed in the school environment, collected and brought. Teaching and learning resources have many advantages as they form a focal point of attention, arouse interest; stimulate the learners' imagination save time, promote retention and memory. However, in Kenya, most of the resources are not evenly distributed as learning institutions are located in different environments all over the country. Schools in marginalized areas have fewer environmental resources as compared to those in wet places.

2.3.4 Head teacher's professional leadership

Seashore and Leithwood (2010) believe that the heads of institutions visualise academic accomplishment for every learner, creating an atmosphere conducive to education, nurturing leadership in others, handling employees through supervision of instruction to foster school improvement. Today, upgrading school leadership ranks high on the list of priorities for school reforms. School Principals' leadership is among the most pressing matters on the list of issues in public school education. Even though, a variety of leadership diversity exists amongst principals, deputy principals, tutors and parents, the principal is mostly the dominant source of leadership influence in the learning institution (Porter et al., 2008).

"Leadership can be viewed as a personality gift. It may also be seen as a shared relationship, whereby duties and responsibilities are distributed through delegation and guidance. The social process of consideration is cited by as fourth view of leadership" (Mbiti 1984). Ngaroga (2007) concurs with Mbiti that educational leadership is a social process which involves the

arrangement of the human and material resources in education programme and using these resources carefully to achieve educational objectives. These are to provide the learners with proper atmosphere and desirable conditions to enable them develop socially, intellectually, morally and physically. Also to provide in-service training for teachers so that they may develop professionally and be worthy of tasks entrusted to them. Leadership should enable them to keep pace with advances in knowledge in their respective fields; to develop abilities and skills in teachers, by providing links between ideas and tested scientific knowledge on one hand and practical problems; gear up all school programmes and activities to achieve the purpose of the school. Moreover, the school leadership is seen as the implementer of educational programmes among other functions such as planning school programmes, procurement of funds and other materials. Leaders also recruit and develop workforce and maintain operative inter-connections with the community.

Porter et al. (2008) argues that effective principals are responsible for establishing a school wide vision of commitment to high standards and success of all students. Previously, public school principal's role was assumed to be that of a manager but as recently as two decades ago, high standards were thought to be the province of the collegial bound success.

The most successful head teachers aim at structuring a sense of a school community with related features which embrace respect for all participants of school community, welcoming, solution-oriented, no blame, effort to include colleagues and learners in diverse school-wide activities. Principals who garner high marks from their teachers as a result of creating an ambient atmosphere for instruction in their institutions also achieve higher marks than their counterparts for spurring leadership in the department (Seashore & Leithwood, 2010).

Lawrence (2001) in his findings came up with seven associates of operative schools-strong instructional leadership, concise and focused mission, safe and orderly schools, climate of high expectations for excellence, regular supervision of pupils' progress, optimistic home-school relations, opportunity to learn and time on tasks. Academic success is solely a matter of what takes place in schools. Although schools make a significant transformation, he acknowledged copious factors that affect pupils' success. They include the learning institution, the family background and the individual, social encouragements and socio-economic circumstances. In his research, he identified those learners from less privileged families as less likely to triumph in their studies.

2.3.5 Syllabus coverage

Mwikya (2013) contends that, timely syllabus coverage in schools is one of the performance measures for it has a direct influence on performance in both formative and summative exams. Timely coverage of syllabus affords both students and teachers enough revision time for term end, year-end, and course end exams set by KNEC. When syllabuses are covered in a timely manner, ability of students to understand both theoretical and practical concepts is boosted and hence prospects of good performance especially in final or national exams.

In his study, Ngando (2011) on time management behaviour regarding syllabus coverage, he found that 56% of teachers made their professional documents including schemes of work when learners resumed from their vacation while majority of the tutors went to teach without lesson plans. This negatively influenced syllabus coverage. He recommended that stakeholders inclusive of school management, teachers, learners, guardians and the community at large be involved in time management practices like teachers preparing schemes of work during vacation for this would enable achievement of meaningful performance. Amadalo, Shikuku and Wasike (2012) found that tutors who do not use learner-oriented methods of knowledge acquisition, absence of experiments and practical demonstration of learning activities contributed to late coverage of syllabus in Science.

Ryan (2003) asserts that to meet the challenges associated with the delivery of the Science subject and syllabus coverage, there will have to be changes in the teachers' pedagogical strategies in order to improve the way students learn Science in school. The European Commission (2007) established that Science teaching was mostly associated with learning information as opposed to comprehending concepts and inquiring into them. They maintain that inquiry-based education, gives rise to heightened student and teacher motivation for Science. This contributes to including a wide range of learners through their success in Science.

Hopkins (2002) sheds more light into what such an inquiry-based approach entails. The connection between theory based argument and evidence is vital yet it is fundamentally invisible for learners. Separating links between theory and practice will endeavour to enhance and develop student understanding. Furthermore, being able to distinguish evidence, to develop theory and to infer are imperative life skills to which Science makes a fundamental input.

Another approach that addresses approvals for Science education by extensive use of student-centred scientific inquiry supported by collaboration and technology where necessary is project-based method. According to Krajcik et al. (1999a) "learners need to look for answers to real problems by enquiring and refining questions, designing and conducting inquiries, collecting and analysing material and data, interpreting, drawing conclusions, and giving feedback. As learners get involved in different activities, teamwork and dialogue which is considered crucial while learning Science is enriched. Project-based Science methodology results in learners increasing a number of artefacts, that address the question and each of these objects support students in constructing understanding of essential Science concepts as they make inquiries into everyday real-life problems".

Science teachers in primary schools are using talk and chalk, memorization, expository method and less inquiry methods of teaching Science activities despite the curriculum emphasis on use of more inquiry based learning approaches. Science should be taught by doing or carrying out activities rather than giving facts to children. Plenty of activities with relevant, adequate and appropriate materials to manipulate must be provided (KIE, 2008). This would make children develop scientific skills and knowledge which are important in developing strong scientific foundation. Inquiry method of teaching should be mostly employed in teaching Science in primary schools as this would encourage investigative attitude on the side of the learners (Uwezo, 2011). Consequently, Strengthening of Mathematics and Science Education project (SMASE) has come up with a programme for training primary school Science teachers as an intervention measure to help them with inquiry based approach while handling Science.

To test students' level of grasp in the Science syllabus content O'Sullivan, Reese and Mazzeo (1997) take account of three types of questions used by teachers: Multiple choice questions that assess students' knowledge of important facts and concepts and that probe their analytical reasoning skills; Constructed response questions (structured questions) that explore students' abilities to explain, interpret, apply, reason, plan, design, evaluate, as well as communicate scientific information; Performance of tasks (experiments) that probe students' abilities to use materials to make observation, perform investigations, evaluate experimental results, and apply problem-solving skills. These questions are distributed among constituents of knowing and doing Science. Shikuku (2009) established that non-coverage or late syllabus coverage in Science was the greatest contributor to poor performance in the subject.

2.3.6 Students' attitude towards Science subjects

A study in Apartheid South Africa on factors affecting secondary school students' low achievement by Andile and Moses (2011) identified underdevelopment of blacks' human potential as a strong component. The researchers categorised the factors that contributed to low academic attainment into: direct influences which comprise teaching pedagogy, content cognition and comprehension, laboratory utilization and non-coverage of the Science syllabus; indirect influences revolve around motivation and interest. Bandura's theory postulates that "people with high self-efficacy, believe they can perform well and are more likely to envision challenging tasks as something to be got to grips with rather than something to be evaded" (Bandura, 1977).

Language used in Science has explicit demands because of the wide-ranging terminology to be learnt. Language used in Science tends to be dissimilar from ordinary language use (Halliday & Webster 2006). The stress here on basic Science education, is on understanding rather than mere reproduction of knowledge which means that learners ought to be expressing themselves using the language in which they feel most at ease, especially when learning fresh concepts. They should therefore be developing understanding prior to technical vocabulary.

Jabor, Machtmes, Kungu, Buntat and Safarin (2011) echoed that the tendency of suspending pupils' school admission with the notion of giving an upper hand to those pupils or holding them in a certain grade to guarantee them an achievement of certain level of performance could be a futile undertaking. They determined that when learners are chronologically older than their fellow counterparts, their average school performance regress and continue to deteriorate the older they become.

In a study done by Wabuke (2012) in secondary schools in Eldoret municipality and specifically in Biology, she established that factors affecting performance were: level of grasp of basic school Science which acted as the foundation for learning Biology at high school level; inquisitiveness in the theoretical and practical aspects of the subject; students' ambition and attitude towards the subject. Further learner related factors based on knowledge acquisition included availability of reading materials, students using personal study timetables to help organize their time, formation of revision discussion groups and attendance of Science symposiums, field trips and exhibitions which are Science oriented. Additionally, the study established that absenteeism, indiscipline and truancy in students post pitiable results.

2.3.7 Teacher quality and competency

Teachers are essential in any school considerations. Widely held education policy deliberations emphasize directly or indirectly on the role that teachers play. There is a prima facie case for the concentration on teachers because they are the major single budgetary component in the learning institutions. Furthermore, parents and administrators continually emphasize on the central role that teachers fulfil in the determination of school excellence. This notwithstanding, there is little consensus among researchers on the qualities of a good teacher, let alone on the importance of teachers in comparison to other determinants of academic performance. Teacher quality is the concept that exemplifies what the teachers do in terms of their assigned roles in the learning institution. Connected to the notion of teacher excellence is teaching quality. It has been established that one way of defining the quality of teaching in schools is by looking at the intermediate outcome of learner performance (Sanders, 1999). Teachers who offer clear expectations, opportunities for remedial and study support reduced anxiety towards Science in students. Anxiety about Science teaching tends to be reduced after teacher involvement with Science content and its pedagogy. Consequently, nervousness towards teaching Science was significantly dropped after going through a Science methodology course. Anxiety in teaching Science has been established to be a contributing factor on both the teaching and the learning of Science (Nyongesa, 2011).

2.4 Research gap

The gap that this research intended to address was lack of an investigation into factors affecting Science subject performance at the public primary school level in Westlands sub-county though other research exists in rural secondary school settings.

2.5 Conceptual framework

The study was guided by the conceptual framework summarized in Figure 2.1

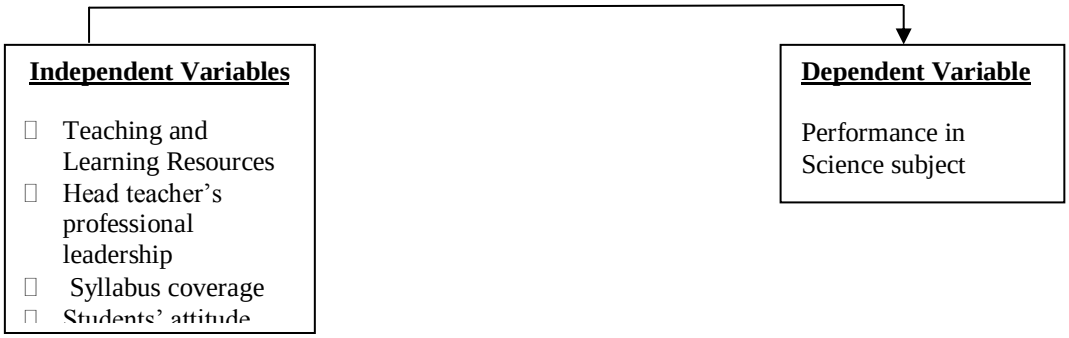

Figure 2.1: A Model for Explaining Students' Performance in Science Subjects, adapted from Porter et al. (2008) and Dzama (2012)

The conceptual framework was derived from the work of Porter's et al. (2008) on leadership and by Dzama's (2012) on teaching and learning resources, syllabus coverage and pupils attitude. Dzama's study was done in Malawi, a developing country, and the attributes listed would be suitable for Kenya, given that it is also a developing country and having similar issues of concern. These attributes are: teaching and learning resources; head teacher's professional leadership; students' attitude towards Science subject; teacher quality and competency; syllabus coverage. The quality of teaching and learning resources was measured through the school infrastructure including the presence of a Science room; quality and the quantity of the text books; as well as stationery. Professional Leadership of the head teacher was measured in terms of how approachable and open to discussion he or she was. Students' attitude was measured in terms of their general interest towards the subject. Syllabus coverage was measured in regard to how well the learners grasped the content taught and to what extent. Teacher quality and competency would have been measured in terms of how confident he or she was in delivering content to the learners as well as the grades obtained by the teacher at K.C.S.E level. However, this attribute needed a longer period to assess due to accessibility of the teachers' personal information which could only be done through the employer's consent. This factor was quite broad and needed an individual research to interrogate the aspects mentioned.

The study postulated that these factors determined the performance of Science subject. The performance was computed average and was obtained from the sampled schools' K.C.P.E analysis reports for the last six years. The variables were measured using Likert scale questionnaire items.

2.6 Chapter summary

This chapter presented theoretical review as well as review of literature on factors that affect performance of Science subject. It was used to develop the objectives, research questions and the conceptual framework important for the methodology section.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology which was adopted in the study. A discussion on research design, population of study, data collection methods, measurement and analytical models are presented. Subsequently a chapter summary is presented.

3.2 Research design

The term positivism was coined by Auguste Compte, premised on the assumption that reality is out there and can be known if studied. Thus, the only source of actual knowledge is Science and evidence is reliably based on experience and investigation (Chilisa & Kawulich 2014). The significance of data being gathered objectively is fundamental in this paradigm so that there will be no distortion in the phenomenon being studied as observed (Polit & Beck, 2012). There are prominent strengths in this paradigm. Saunders, Lewis, and Thomshull (2007) maintain that the reductionist method allows for large samples of data to be studied and seeks to increase results generalisability (Neuman 2011). On the other hand, once the research process or research direction has been taken, it is irreversible (Saunders et al. 2007). Moreover, Wahyun, (2012) argues that positivism does not pay attention to the primary expressive reasoning behind empirical actions. However, by studying associations between variables, Saunders, Lewis, and Thornhill, (2007) state that reductionist offers insights to constructivists to investigate further and establish the reasons behind study relationships. The study adopted the positivistic approach since the researcher was more concerned with what is there and while focussing on large samples of data for generalizability purposes.

A research design provides a blue print on which a study is anchored on. Borg and Gall (1989) report that a research design is the stage at which to formulate conceptual models, to determine the research problems and hypotheses, to establish research instruments, technique, measurements and scales for collecting data and testing the research questions. Research designs are generally classified into three major categories: exploratory research, descriptive research, and causal research.

Burns and Bush (2000) argue that in exploratory research the emphasis is to gather new or additional information to establish research priorities by clarifying problems for hypotheses development. There are four different approaches to conduct exploratory research: expert

surveys, focus group, case analysis and secondary data analysis. Descriptive research, essentially focuses on describing specific views or opinions, and also examines the relationships and variations in the relevant variables by studying a large sample of the population. Cross-sectional studies and longitudinal studies are two basic descriptive methods.

On the other hand, Causal design can be grouped into experimental or relational design (McNabb, 2008). The principal task of relational studies is to test and identify the relationships between two or more sets of variables. The first involves the studies of cause and effect relationship of variables. This type of research design is hard to carry out as it encompasses ethical issues of human subjects as well as the experiment setting may not reflect the real-world condition (Bryman & Bell, 2007).

Based on this review of various research designs, the study adopted a cross-sectional research design since the researcher was to examine matters at a specific point in time specifically between January 2017 and March 2017. As is the norm with cross sectional survey designs, self-reporting data for the study were collected from the respondents using a questionnaire that was administered by the researcher. According to Mugenda and Mugenda (1999) and Kombo and Tromp (2009), a survey collects data from members of a population in order to determine the status of that population with respect to one or more variables. The survey design is also suitable for collecting original data for the purpose of describing a population which is too large to observe directly. It was not longitudinal because this pre-supposes observations over long periods.

3.3 Target population

This study sought to analyse the factors that affected the performance of Science subject. The study focused on 25 public primary schools located in Westlands in Nairobi County whose population is approximately 28,000 pupils. The 25 head teachers were to be a part of this study. The teachers who taught the Science subject were estimated to be 884 in number.

3.4 Sample size and Sampling techniques

McNabb (2008) defines the sample size as a segment of the population being investigated for a study. He further refers sampling technique to the process of selecting representative samples from the entire population. The Main objectives of administering sampling techniques in

research studies are mostly related to time and cost as well as generalization of a sample to the study population (Bryman & Bell, 2007).

The method of selecting the sample may be centred on a probability or a non-probability approach (Bryman & Bell, 2007). In probability sampling, the sample units are randomly selected whereby all have an equal chance of being selected (McNabb, 2008). The four types of probability samples include: systematic sample, simple random sample, cluster sample and stratified random sample, (Burns & Bush, 2000). In non-probability sampling, sample units are not randomly selected but based on judgment or experience. Under this technique, the sample may be selected based on convenience sampling, snowball sampling and quota sampling (McNabb, 2008).

According to Mugenda and Mugenda (2009) 10-30% of the populations form a sufficient sample size. This study therefore adopted 30% of 25 schools which gave rise to a sample size of 8 schools. A simple random sampling technique as advocated by Borg and Gall (1989) was applied to select the 8 schools to be surveyed. In each school selected the following were the study respondents: 1 head teachers, 5 Science teachers in each school and 30% of pupils in each of the sampled schools in class eight. They were selected by the use of proportional stratified sampling. The final sample was therefore comprised of 8 Head teachers, 40 Science teachers and 142 pupils, making a total of 190 respondents.

3.5 Data collection approaches

Both primary and secondary data was collected for the study.

Primary data

Questionnaire instruments that contained a mixture of open and closed (semi-structured) items were used to collect the data from the head teachers, Science subject teachers and pupils. The questionnaire instruments were outlined in four sections. The first section sought the demographic characteristics of the respondents while the second section enquired on teaching and learning resources and their influence on pupils' performance. The third section sought information regarding the head teachers, their professional leadership and how it related to pupils' performance. The fourth section enquired on syllabus coverage and its effects on pupils' performance. The fifth section enquired on the pupils' attitude towards Science.

The questionnaire tools were administered while the schools were in session. The head teachers were interviewed in their respective offices while the teachers filled out the questionnaires in the staff room. The researcher was present to clarify any issues or questions that the respondents raised. The tools were collected back the same day. As for the pupils, arrangements were made with the respective class teachers to have the tools administered at the end of the last lesson of the appointed day, just before the pupils are released to go home for the day.

According to Dempsey (2003) questionnaires were ideal because they are effective data collection instruments that consent respondents to provide much of their opinions pertaining to the researched problem. Kothari (2008) concurs that the data collected from questionnaires is free from bias as well as the researcher's influence. It is therefore accurate and valid.

Secondary data

Secondary data on K.C.P.E performance for Westlands sub-county was sought from the sub-county Director of Education Office as well as the sampled schools. The data covered a period of 6 years. The data was used to establish the trends in performance for the past six-year period. The data was also used to establish correlation between performance and the study variables.

3.6 Reliability and Validity test

Reliability refers to the consistency of the instruments in gathering information from more than one respondent (Orodho, 2009). Sekeran (2003) asserts that the aim of any research is to establish truthful and accurate conclusions. The findings of any study can only be as good as its measures and therefore it is imperative to evaluate the goodness of those measures. It is also essential to pay particular attention to validity and reliability. These two factors ensure the scientific value of the research by emphasizing that findings are valuable and suitable. Proper design of data collection instruments is essential for reaching reliable and valid conclusions. Information should be gathered on a comparable basis across individuals if the intention is to make aggregate or general statements on the basis of survey information.

3.7 Instrument reliability

For the researcher to measure the reliability of the scale, the alpha value of the reliability coefficient was used. The value of the coefficient alpha varies from zero, which signifies no internal consistency, to one representing perfect internal consistency. The measurement scales were tested for reliability using the Cronbach's alpha coefficient. It indicated the extent to

which a set of test items could be treated as measuring a single latent variable. According to George and Mallery (2003) the alpha value of greater than 0.50 is suggested as being satisfactory and acceptable to test for the reliability of constructs. Whereas, Nunnally (1978) recommended that the modest reliability of a construct should be 0.7. The Statistical Package for Social Scientists (SPSS version 22) was used to generate the reliability statistics and the results were as summarised in Table 3.1

Table 3.1 Reliability Statistics

Instrument	Cronbach's Alpha	No of questionnaire Items
Head teachers' questionnaire	.748	29
Teachers' questionnaire	.784	52
Pupils' questionnaire	.731	18

According to table 3.1, the head teachers', teachers' and pupils' questionnaire returned a Cronbach's Alpha of 0.748, 0.784, and 0.731 respectively confirming that the tolls were reliable based on the criteria provided by George and Mallery (2003) and Nunnally (1978).

3.8 Instrument validity

The survey instrument was pilot tested by using a sample of 5 Science teachers, 1 head teacher and 30% of pupils in one of the schools which was not involved in the final survey. Adjustments and further explanations were made on the questionnaires where it was necessary. Dempsey (2003) contends that content validity is judgmental. In this respect, the study determined validity through a careful definition of the topic of concern, the themes and the scales to be used, ensuring that the instruments contained were a representative sample of the whole population on the subject matter of concern. Effort was made to ensure that the criterion applied was appropriate, free from bias, reliable and that the information specified by the criterion was available. The researcher also presented the questionnaire to some lecturers to ensure face validity.

3.9 Data analysis and presentation

Once the questionnaires were collected, data from the questionnaire was coded and entered into the SPSS computer program version 24. Both descriptive and inferential statistics were used to analyse data and test research hypothesis. Descriptive statistics in the form of

frequencies, means and standard deviations were utilized to profile the characteristics of the respondents. Correlation statistics were used to make conclusions.

Various authors (Aron et al., 2011; Jackson, 2006) agree that the type of correlation coefficient utilized in a study depends on the type of data collected (nominal, ordinal, interval, or ratio). The four common correlation coefficients are: Pearson's Product-Moment Correlation (both variables must be interval or ratio), Spearman rank-order correlation (ordinal non-parametric test), Point-Biserial Correlation Coefficient (one variable interval or ratio and the other is nominal and dichotomous), and Kendall rank correlation - Phi Coefficient (both variables are nominal and dichotomous). Correlation coefficients range from -1.00 to 1.00, with the weaker the relationship the closer the coefficient is to zero. Aron et al (2011) provide the following rule of the thumb for interpreting the strength of the correlation: > 0.7 is strong, > 0.3 is moderate, and < 0.3 is weak. The Spearman rank-order correlation was therefore used to analyse all the four research objectives because the data collected was ordinal in nature and therefore a suitable non-parametric test would have been the most useful. The test was done at 95% confidence level.

3.10 Logistical and Ethical considerations

The principal ethical requirements during any kind of study are upheld strictly without any intrusions. The research only picked after the university had issued ethical clearance permit regarding the study topic and permission to carry out the research was granted from the School of Humanities and Social Sciences. Permission was also sought from the National Commission for Science and Technological Innovations (NACOSTI). Once authorisation was granted, the researcher sought audience with the Westlands sub-county Education Office to seek permission to visit the schools and to discuss the modalities of accessing secondary data on the schools' performance in Science for the last six years. Thereafter, the researcher proceeded to the schools to brief and seek consent from the head teachers on the intended study and to book appointments for interviews with teachers and pupils. Once consent and approval was granted at the school level, the teachers were contacted and briefed about the intended purpose of the study so that they could make an informed decision about their participation in the study. All information given was kept anonymous. Before any participation in the study, participants were duly informed that the study was sorely for academic purpose and that it was not compulsory

for them to respond to the questionnaires. They were later given a chance to participate in the study after giving their consent through the informed consent form.

Regarding the class eight pupils the respective class teachers accompanied the researcher for the data collection exercise. The class teacher made the introduction and explained about the presence of the researcher in order to reduce stranger anxiety. The researcher then proceeded to explain the purpose of the study to the pupils and that their choice to participate was purely voluntary and that no form of coercion, intimidation, penalisation or victimisation would befall those who choose not to participate in the exercise. For those who chose to participate, the class teacher signed the consent form on their behalf. Anonymity and confidentiality were also assured by the fact that they were not required to write their names on the questionnaires. Having satisfied the study supervisors with the analysis of the data the results were presented to a final defence panel for grading and thereafter questionnaires were destroyed using a shredding machine and recycled.

The study also involved review of secondary data, particularly from books, academic journals and articles and therefore, authors of such literature were acknowledged through in text citation and referencing for compliance with plagiarism policy.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter deals with the presentation, analysis, discussion and interpretation of the empirical findings on the factors affecting Science subject performance in public primary schools in Westlands sub-county, Nairobi County, Kenya. The chapter starts with background information then determines the effect of teaching and learning materials on performance in Science subject. It further assesses how school leadership affects performance in Science. The chapter then examines how syllabus coverage affects pupils' performance in Science and thereafter assesses the pupils' attitude towards the subject.

4.2 Response rate

Three questionnaire tools were used to collect data among 8 head teachers and 40 teachers and 30% of the class 8 learners (142 learners) in the district. The response rate was as shown in Table 4.1

Table 4.1 Instrument return rate

Respondents	Questionnaires distributed	Questionnaires returned	Response rate
Head teachers	8	7	88 %
Teachers	40	37	93%
Pupils	142	139	98 %
Total	**190**	**183**	**96 %**

The response rate of 88 percent for head teachers' 93 percent for teachers and 100%pupils was realized which was deemed to be sufficient for data analysis. Mulusa (1998) says that 50 percent return rate is adequate, 60 percent good and 70 percent very good.

4.3 Demography

The study sought to find out the demographic information of the respondents respective of their gender, age, their roles within the organizations, the duration they have stayed within the organization. The purpose of this information was to determine the head teachers' and teachers' characteristics in relation to their teaching experiences and supervision of instruction in their respective schools.

4.3.1 Distribution of respondents by gender

The study sought to find out the gender of the respondents. The purpose of this information was to find out if teaching and supervision of instruction in the sub-county were being implemented by either males or females and the composition of the learners in those schools. To determine the distribution, head teachers, teachers and the pupils were asked to indicate their gender. Their responses were as shown in Figure 4.1

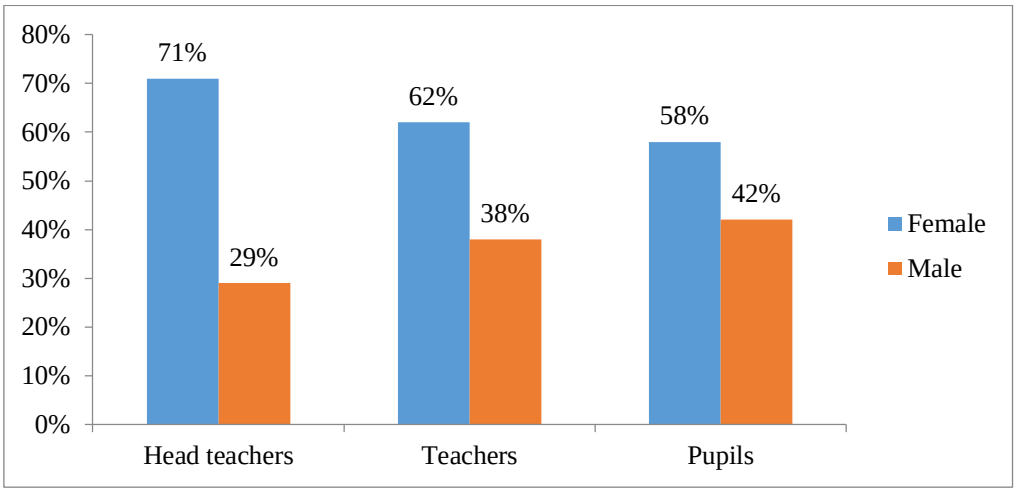

Figure 4.1 Distribution of respondents by gender

As shown in Table 4.2, it was observed that the majority (71%) of the school heads were females and only 29% were males. This suggested that administrative experience positions within the sub-county were dominated by females. It was also observed that the majority (62%) of the teachers were females and only 38% were males. Again.it was concluded that, primary school teaching career in the sub-county was dominated by females. It was further observed that the majority (58%) of the pupils were girls and only 42% were boys. It was therefore concluded that there were more girls accessing, primary school education in the sub-county than boys. Information sought from the Curriculum Support Officers on the enrolment status in the sample schools confirmed that there were 3011 (49%) boys and 3196 (51%) girls confirming that indeed there were more girls accessing, primary school education in the sub-county than boys. The pupil's statistics suggest that there could be issues of access, participation and retention of boys within the sub-county.

4.3.2 Distribution of respondents by age

Information on the age of head teachers and teachers was sought and the results were as shown in Figure 4.2

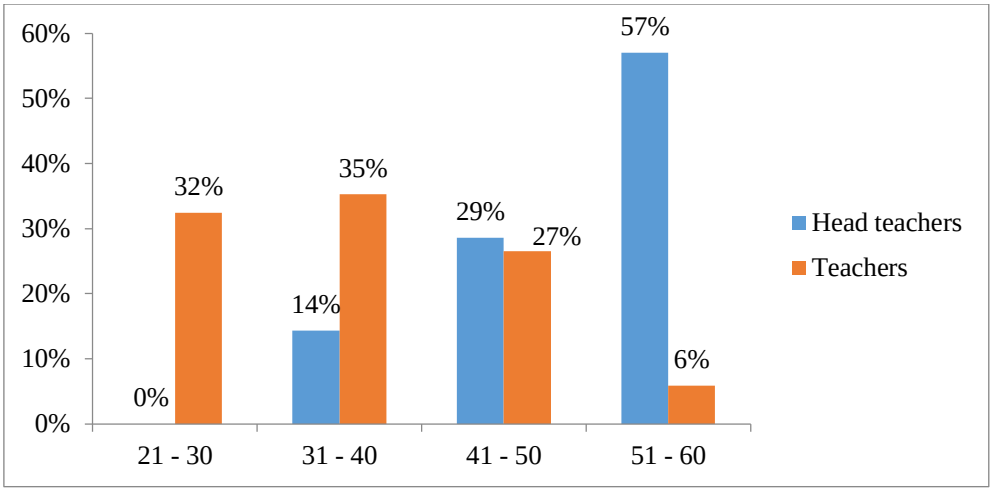

Figure 4. 2 Distribution of respondents by age

Findings in figure 4.2 show that indicate that all the head teachers were at least 30 years of age where the majority 57% were between 51 and 60 Years old. The advancement in age on the part of the head teachers could be as a result of the fact that for one to be appointed a head teacher, he must have served for some period of time as a classroom teacher, a senior teacher, and a deputy head teacher before qualifying for promotion to headship positions. For the teachers, it was observed that none of them was below 30 years of age suggesting that most of the teachers had to wait for some time after training and only got hired as they attained the age of 30 years.

4.3.3 Distribution of respondents by academic qualification

The study sought to find out the highest academic qualification of the respondents. The purpose of this information was to find out if the head teachers and teachers had attained the requisite academic qualifications expected to equip them with adequate knowledge on academic matters.

The head teachers and the teachers were therefore asked to indicate their respective academic qualifications and the findings were as shown in Figure 4.3

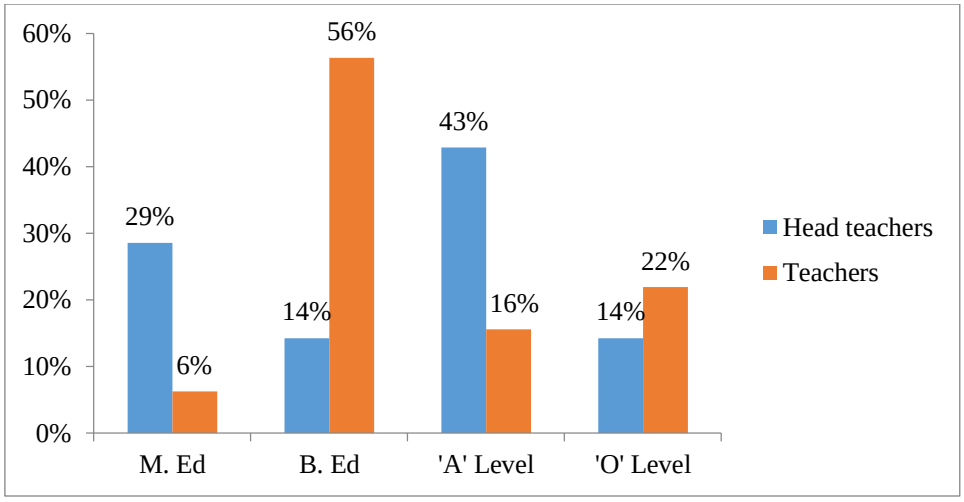

Figure 4. 3 Distribution of respondents by educational qualification

The academic qualifications revealed that all the teachers and head teachers had acquired "O" Level education, a pre-requisite for enrolment in professional courses for teachers. The majority (43%) of the head teachers held 'A'-Level education while the majority (56%) of the teachers were graduates.

4.3.4 Distribution of respondents by professional qualification

The professional qualifications of the respondents were as summarised in Figure 4.4

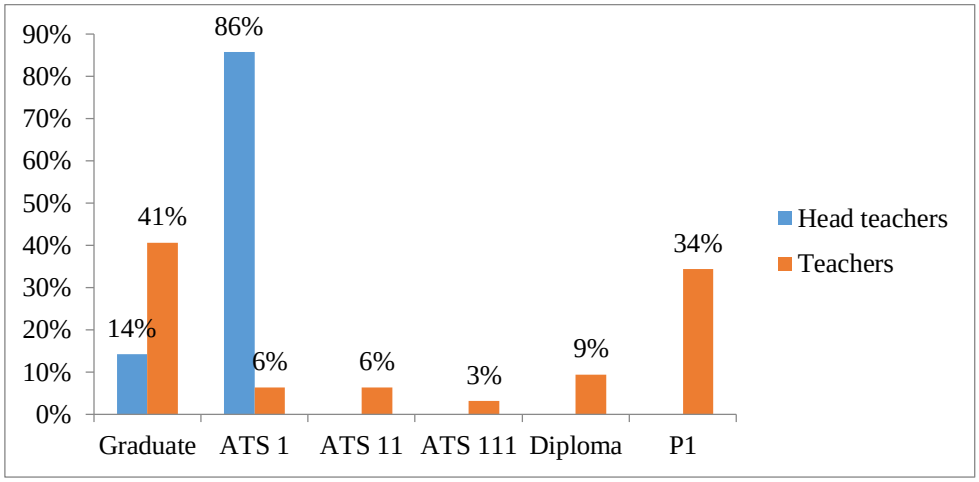

Figure 4. 4 Distribution of respondents by educational qualification

Whereas the minimum educational qualification requirement for teachers is P1 certificate, it was observed that majority of the head teachers and teachers had upgraded their education. Majority of the head teachers were ATS1, while 41% of the teachers had acquired Bachelor's degrees in education. Heyneman (1976) argues that the teacher's academic and professional qualifications have significant influence on pupils' achievement. This confirms that the head

teachers and teachers in the sub-county are highly qualified and thus able to translate and implement MOEST policies and guidelines.

4.3.5 Distribution of respondents by teaching experience

Information was also sought on the teaching experience of the head teachers and teachers. The purpose of seeking the information was to ascertain if the teachers were exposed to activities of instructional supervision long enough to enable them appreciate supervision, leadership , performance and attitude of leaners so as to provide the critical information sought by the study alongside these themes. The results were as shown in Figure 4.5

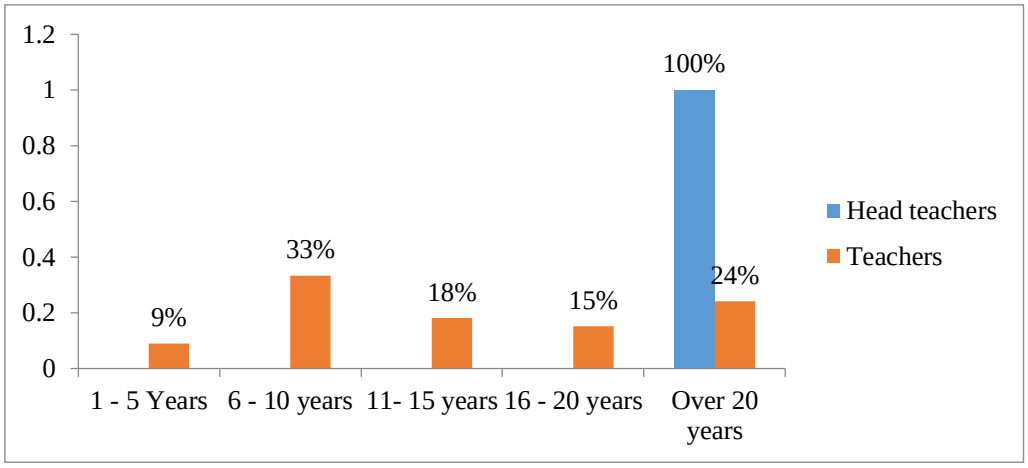

Figure 4. 5 Distribution of respondents by teaching experience

Figure 4.5 revealed that all the head teachers had taught for over 20 years, and that only 9 percent of the teachers had less than 5 years of experience. The findings therefore suggest that the respondents clearly understood the school environment and the activities of instructional supervision and therefore, were in a position to report on supervision of instruction, school leadership, teaching resources, school performance and attitude of leaners professionally.

4.3.6 Teacher's stay at current station

Information was also sought on the length of time that the teachers had stayed at their current stations and the results were as shown in Figure 4.6

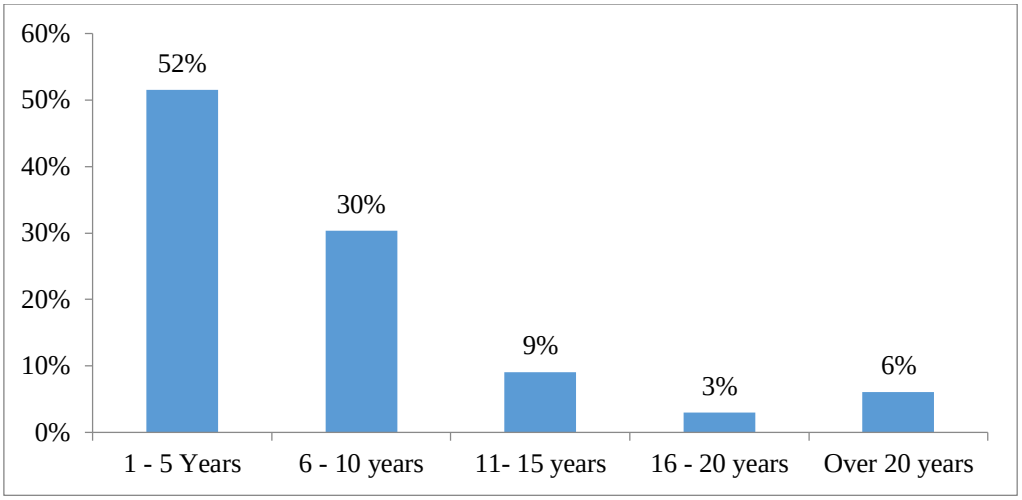

Figure 4. 6 Distribution of teachers by stay in the current location

Findings in Figure 4.6 show that 52 percent of the teachers had been at their current working station for less than five years. The rest had varied stay at their current stations ranging from 6 to 20 years. This finding confirms that indeed the teachers were in a position to respond on the issues that existed in their respective schools.

4.3.7 Head teacher's administrative experience at the current station

Information was sought from the head teachers on the duration they had been in headship position at the current station. The aim of this information was to find out if head teachers were acquainted with their respective schools long enough to enable them carry out their role of supervising instruction. The results were as shown in Figure 4.7

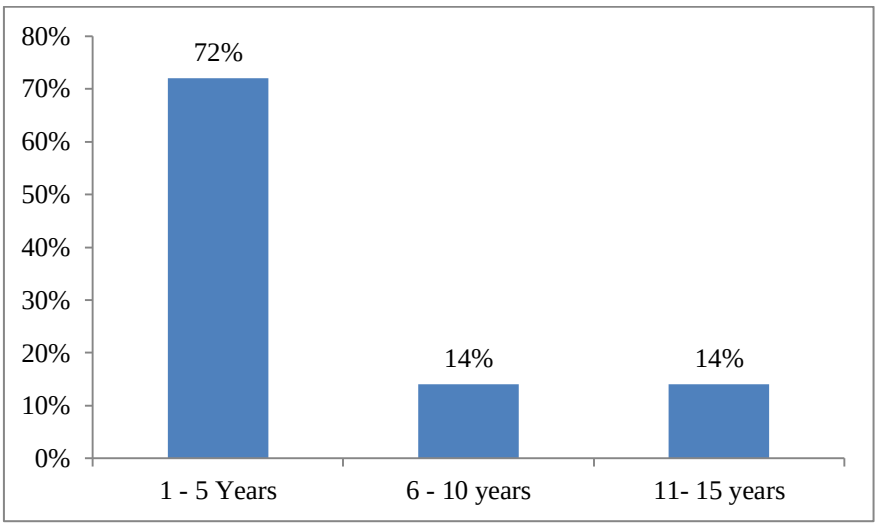

Figure 4. 7 Head teachers' administrative experience at the current station

Figure 4.7 shows that 72 percent of the head teachers had served in administrative experience position for between 1 and 5 years which suggests that the head teachers in public primary schools in the district were pretty new to their work stations. Nevertheless, their long teaching experience suggest that they were acquainted with education activities in schools long enough and would therefore report effectively on matters of instructional supervision, school leadership, teaching resources, school performance and attitude of leaners professionally.

4.4 Effect of teaching and learning materials on performance in Science

The first objective of the study was to determine the effect of teaching and learning resources on performance in Science. To achieve this, information was sought on the availability of teaching and learning resources in the primary schools and on the pupils' performance respectively. A correlation analysis was then conducted to determine the nature of the relationship between the learning resources and performance.

4.4.1 Pupils' performance in Science

Information was sought from the Ministry of Education Science and Technology (MOEST) on the pupils' performance in the Kenya Certificate of Primary Education (KCPE) for the immediate past 6 years (2011 to 2016) for the sampled schools (Appendix 5). Averages for the various subjects over the period were generated and performance trends developed as shown in Figure 4.8.

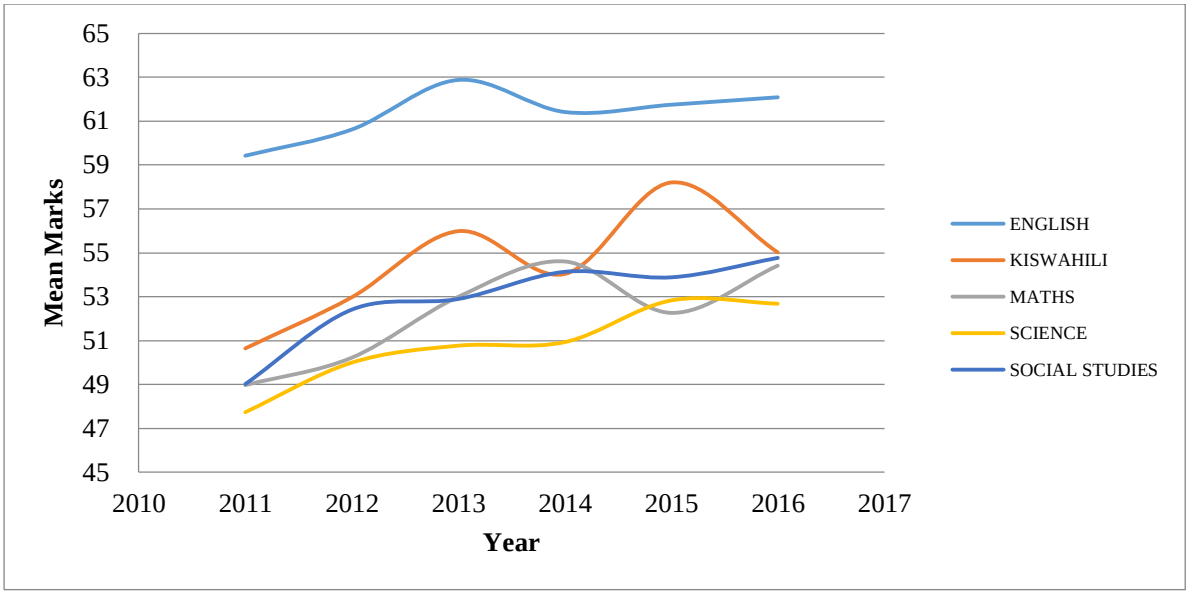

Figure 4. 8 Performance trends for the various subjects

From Figure 4.8, it was established that Languages (English and Kiswahili) outperformed Mathematics, Science and Social Studies for the past six years. English recorded the best performance when compared to the other subjects. It was also observed that there were fluctuations in the performance of Kiswahili and Mathematics in 2014 and 2015 respectively, suggesting that there were some underlying issues responsible for the erratic performance in the two subjects. Science was observed to be the worst performing subject over the period suggesting that there were underlying issues that were responsible for the perennial poor performance leading to difficulties in the teaching and learning of the subject. When the data was analysed on a school by school case, the results were as summarised in Table 4.2.

Table 4. 2 Subjects mean performance by school

School Name	English	Kiswahili	Mathematics	Science	Social studies	Total score	Subject mean score	Deviation of Science from the subject mean
School 1	58.7	52.5	46.6	48.6	48.2	254.6	50.9	-2.3
School 2	60.9	55.9	54.3	52.2	52.5	276.4	55.3	-3.1
School 3	53.2	49.8	45.0	44.5	49.0	240.9	48.2	-3.7
School 4	61.5	51.5	52.3	49.6	52.8	269.3	53.9	-4.2
School 5	71.8	60.7	63.7	59.4	58.8	314.3	62.9	-3.4
School 6	73.4	61.6	63.3	59.1	61.1	318.5	63.7	-4.6
School 7	51.7	48.1	42.4	43.2	46.6	232.1	46.4	-3.2
School 8	59.7	55.6	50.3	49.8	53.7	269.2	53.8	-4.0

Data in Table 4.2 indicated that Science performed poorly when compared to the other subjects over the period. For instance in school 1, the subject average mean was 50.9 while the Science mean score was 48.6 suggesting a deficit of 2.3 marks from the mean. It was established that this deficit trend was found to have persisted in all the schools in the six years and as a result Science had a mean score that was lower than all the other subjects in all the sampled schools. To test whether there was a significant difference between the Science mean score and the other subjects, the students'-test was employed and the results were as shown in Table 4.3

Table 4.3 Significant difference between performance in Science and other subjects

Paired Samples Test	Mean	Std. Deviation	Std. Error Mean	T	Sig. (2-tailed)
Science_Mean_Score Subjects_Average_Score	-3.53147	.72011	.12350	-28.595	.000

Findings in Table 4.3 confirmed that the difference in performance between Science and other subjects was significant ($p<0.05$). This finding implies that the means score for Science was significantly below the average means score of all the subjects.

To determine whether there was significant difference between Science mean score and the other subjects across the schools, the analysis of variance (ANOVA) technique was employed and the results were as shown in Table 4.4

Table 4.4 Significance of difference in performance between Science and other subjects across the schools

ANOVA					
Science_Mean_Score	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1160.061	7	165.723	1.138E +32	.000

Findings in Table 4.4 confirmed that the difference in performance between Science and other subjects was significantly different across all the schools ($p<0.05$). The findings in Table 4.3 and Table 4.4 confirm beyond doubt that indeed, Science subject was the poorest performing subject in the sub-county. The finding implied that there were underlying issues and challenges in the teaching and learning of Science across all the primary schools in the sub-county.

Kenya aspires to be industrialized by the year 2030 and banks on the Science oriented courses to realise the dream. This dream risks being a mirage if the issues related to the performance

of Science at the primary school level are never addressed as a matter of urgency. Vision 2030 proposes intensified devotion to scientific research and in raising the quality of teaching Mathematics, Science and Technology in schools, polytechnics, and university. Sessional paper No. 10 (2012)

4.4.2 Availability of teaching and learning resources for Science

Information was sought from the teachers in the schools on the availability of teaching and learning materials for Science. A list of the commonly used resources for the teaching of Science was presented to the teachers. They were required to indicate the adequacy of those materials in their respective schools on a Likert scale where "very inadequate" was coded as 1, "inadequate" was coded as 2, "adequate" as 3 and "very adequate" as 4. Descriptive statistics were used to analyse the data and the results were as shown in Table 4.5.

Table 4.5 Teachers' responses on the availability of teaching/ learning materials for Science

Teaching and learning materials for Science	Mean	Std. Dev	Proportion confirming resources are adequate	Proportion confirming resources are inadequate
Science syllabus	3.4857	0.507	95%	5%
Pupils' exercise books for Science	3.4706	0.563	97%	3%
Science textbooks	3.2857	0.518	92%	8%
Science teacher's guides	3.2353	0.740	82%	18%
Teacher's note books	3.0909	0.804	85%	15%
Audio Visual equipment like computer or T.V	2.8857	0.866	80%	20%
Science instructional materials	2.6765	0.806	71%	29%
Science lab/room	2.4286	0.948	51%	49%

Findings in Table 4.5 show that Science teacher's guides (mean =3.235 [adequate 82%]), Teacher's note books (mean =3.091 [adequate 85%]), Audio Visual equipment like computer or T.V (mean =2.886) and Science instructional materials (mean =2.677[adequate 71%]) were "adequate" in a number of schools. Their absolute percentage confirming resources are adequate is above 70%. It was observed from Table 4.5 that Science lab/room was missing out in half of the schools with a mean of 2.43[adequate 51%]. This fact was confirmed by nearly half of the teachers who rated the resource as "inadequate" in their respective schools.

Information sought from the head teachers and the pupils in the respective schools was as summarised in Table 4.6

Table 4.6 Head teachers' and pupils' responses on teaching and learning resources for Science

	Head teachers		Pupils	
	Adequate	Inadequate	Adequate	Inadequate
Science course books	71.4%	28.6%	76.1%	23.9%
Pupils exercise books for Science	85.7%	14.3%	58.1%	41.9%
Science room or laboratory	28.6%	71.4%	34.7%	65.3%
Science equipment and materials	71.4%	28.6%	54.6%	45.4%
Audio Visual equipment such as computer or T.V	71.4%	28.6%	78.2%	21.8%

According to the findings in Table 4.6 the majority of the head teachers indicated that Science course books (71.4%), Pupils exercise books for Science (85.7%), Science equipment and materials (71.4%) and Audio Visual equipment such as computer or T.V (71.4%) were adequately provided for in the schools. These results largely agreed with the teachers' responses.

The pupils, however, were indifferent on the adequacy of the Science equipment and materials and Pupils exercise books for Science where only 54.6% and 58.1% of the pupils agreed respectively. This could be attributed to the fact that inasmuch as the pupils were supplied with exercise books for Science subject MOEST's school equipment programme, there was a limitation of only one exercise book in a term. This implied that if the exercise book got filled up, the pupils' parents were required to supplement, a situation that disadvantaged the pupils from needy households. Additionally, the Science equipment and materials provided in the schools were being shared among the pupils, and at times the ratio proved to be in adequate.

Information was then sought from the teachers on whether learners participated in searching for teaching and learning materials for Science. The results were as shown in Table 4.7

Table 4.7 Learners' participation in in searching for teaching and learning materials

Do the learners participate in collecting and bringing teaching and learning materials to the Science room/lab?	**Frequency**	**Percent**
Yes	34	91.9

No	1	2.7
Non response	2	5.4
Total	**37**	**100**

Findings in Table 4.7 show that the teachers engaged their learners in the collection of teaching and learning materials for Science as confirmed by 91.9% of the teachers. The teachers explained that at times, pupils carry materials from home to school. The pupils are also taken out for nature walk to collect materials as guided by the teacher. The materials are then preserved in nature corners for use in either the laboratory or class room for use during practical lessons.

Information was also sought on whether the schools made any efforts in the provision of the learning resources and the results were as summarised in Table 4.8

Table 4.8 Provision of Science and learning resources by schools

Does the school invest in provision of Science and learning resources in your school?	**Frequency**	**Percent**
Yes	25	67.6
No	9	24.3
Non Response	3	8.1
Total	**37**	**100.0**

From Table 4.8, it is established that schools had invested in the provision of Science and learning resources for their learners. The teachers explained that some of the schools had bought Science kits, computers and Visual Aids (T.V), while others had developed nature gardens and small agricultural projects for enhancing teaching and learning of Science. Most of the schools had bought text books to support the teaching of Science. In most of the cases, the teachers had to improvise because the resources provided by the school were either inadequate or are not up to date.

4.4.3 Effect of teaching and learning materials on performance in Science

In order to determine the effect of the provision of learning resources in the schools and performance over the six year period, a correlation analysis was conducted for the respective variables and the test was conducted at 95% confidence level. The level of significance was set at $p<0.05$. Items with a significance (p-value) of less than 0.05 would be singled out as having significance whole those with values of more than 0.05 would have no significance. The results were as shown in Table 4.9

Table 4.9 Correlation between provision of learning resources and performance

Teaching & learning resources	Spearman rank Correlation Science_Mean_Score	Sig. (2-tailed)
Science syllabus	0.017	0.935
Science textbooks	0.089	0.638
Science teacher's guides	0.012	0.957
Teacher's note books	0.449	0.012
Pupils' exercise books for Science	0.482	0.006
Science room or laboratory	0.481	0.004
Science instructional materials	0.430	0.015
Audio Visual equipment like computer or T.V	0.079	0.676

From the correlation results in Table 4.9, it was established that the provision of teacher's note books, pupils' exercise books for Science, Science room (or laboratory) and Science instructional materials(in that order) were significantly correlated to performance ($p<0.05$). The four resources had a strong positive correlation to performance which was statistically significant. This implied that an increase in the provision of each these resources by 0.4 of a unit would independently lead to an increase in performance by a full unit.

It is also observed form Table 4.9 that the provision of Science syllabus, Science textbooks, and Science teacher's guides did not yield a significant correlation to performance ($p>0.05$). This could be explained by the fact that the provision of these resources was standardised by MOEST and was available to all the school in a near equal measure.

These findings led to the conclusion that the provision of resources for the teaching and learning of Science is directly correlated to performance. The provision of Teacher's note

books, Pupils' exercise books for Science, Science room (or laboratory) and Science instructional materials to the schools in the sub-county would lead to significant increase in performance.

When the teachers were asked to indicate the most critical teaching and learning resources that they thought could positively influence pupils' performance in Science, they suggested: Pupils' participation in lessons, Provision of Audio Visual Resources (computer, TV sets and Videos), Educational tours and field visits for pupils to see theoretical concepts practically, provision of equipment for Science experiments, emphasising on practical lessons and provision of adequate text books and realia.(objects and materials from everyday life, especially when used as teaching aids.)

4.5 Head teacher's professional Leadership affects performance in Science.

The second objective of the study was to determine how school leadership affects performance in Science subject. To achieve this, information was sought from the head teachers and teachers on the teachers' work load, supervision of instruction and on school leadership. A correlation analysis was then conducted to determine the effect of teachers work load, supervision of instruction and school leadership on performance.

4.5.1 Teachers' workload

In order to establish the level of the teachers work load, the teachers were asked to indicate the number of lessons they taught in a week and the results were as shown in Table 4.10

Table 4.10 Number of lessons teachers taught in a week

Statistic	No of lessons per week
Mean	32.5
Median	33
Mode	35
Range	18
Minimum	22
Maximum	40

Findings in Table 4.10 show that the teachers in the sub-county taught for an average of 32 lessons in a week. The majority however taught for 35 lessons as indicated by the mode. It was also observed that some teachers had 22 lessons which was far below the ministry's

recommended workload (of between 30 and 35 lessons) while some other teachers had 40 lessons in a week. A typical teaching week has eight lessons in a day and translates to 40 lessons in a week. The findings in table 4.10 therefore suggest that the teachers allocated 40 lessons do not have any preparation time because they are engaged throughout the week which could have implication on performance. The phenomenon could be an indicator of understaffing in their school. Teachers with administrative responsibilities alongside their teaching roles are usually allocated less teaching load, which is usually less than 30 lessons in a week. Such administrative roles are held by head teachers, deputy head teachers and senior teachers. The average teaching load ranges between 30 and 35 lessons to accord teachers preparation time.

When the learners were asked the number of Science lessons they attended per week, the results were as shown in Table 4.11.

Table 4.11 Allocation of Science lessons in schools

No of Science lessons in a week	Frequency	Percent
5 lessons	122	88%
7 Lessons	17	12%
Total	**139**	**100%**

It was found out that Science was allocated five lessons in a week in most of the schools as confirmed by 88 percent of the pupils. This translates to at least one Science lesson in a day. To determine the effect of teaching load on performance a correlation analysis was conducted between the two variables and the results were as shown in Table 4.12

Table 4.12 Correlation between teaching load and performance

Work load	Spearman rank Correlation Science_mean_score	Sig. (2-tailed)
No of lessons allocated in a week	-0.349	0.073

The correlation coefficients in Table 4.12 suggest that teaching load was negatively correlated to performance such that an increase in teaching load by one unit would lead to a decrease in performance by up to 0.3 of a unit. However, this relationship was found to be statistically insignificant ($p>0.05$). It was therefore concluded that the teaching load assigned to the teachers in the sub-county did not significantly affect performance.

4.5.2 Supervision of instruction

Information was sought from the teachers on the performance of the head teachers regarding their supervision of instruction. The teachers were required to indicate how regular their respective school head supervised professional records from the teachers. They were required to rank the head teachers' performance on a scale where "never" was coded as 1, "once a term" was coded as 2, "twice a term" as 3 and "once a week" as 4. Descriptive statistics were used to analyse the data and the results were as shown in Table 4.13.

Table 4. 13 Teachers' responses on head teachers' supervision of professional records

Professional record	Mean	Std. Deviation	Once a week	Twice a term	Once a term
Class register	3.6471	3.76493	80%	21%	-
Schemes of work	3.4176	5.25135	21%	41%	38%
Lesson plans	3.3031	3.60975	76%	24%	-
Records of work covered	3.0909	1.89347	73%	27%	-
Lesson notes	3.0606	1.90295	73%	24%	3%

Findings in Table 4.13 show that class registers had a mean of 3.618 (rounding off to 4) suggesting that they were supervised on a "weekly" basis across the sub-county. This fact was confirmed by 80 percent of the teachers. On the other hand, Schemes of work, Lesson plans, records of work covered and Lesson notes had their means rounding off to 3 suggesting that they were supervised "at least two times in a term" by the head teachers.

Information was sought from the head teachers on their execution of instructional supervision and was summarised in Table 4.14.

Table 4. 14 Head teachers' responses on supervision of professional records

Professional record	**Supervision**	**Once a week**	**Twice a term**	**Once a term**
Scheme of work	Frequency	2	1	4
	Percent	28.6%	14.3%	57.1%
Lesson notes	Frequency	5	2	-
	Percent	71.4%	28.6%	-
Lesson plans	Frequency	6	1	-
	Percent	85.7%	14.3%	-

Class register	Frequency	6	1	-
	Percent	85.7%	14.3%	-
Records of work covered	Frequency	6	1	-
	Percent	85.7%	14.3%	-

According to the MOEST standard for supervision of instruction, Lesson notes, Lesson plans, Class registers, and Records of work covered are supposed to be monitored by the head teacher on a weekly basis while the schemes of work must be prepared on termly basis but supervised every week to find out if the teachers are teaching all the topics in the syllabus. This is because the schemes of work are derived from the syllabus. Findings in Table 4.14 show that while the majority of the head teachers complied with the standard, a small proportion was non-compliant. This observation is expected to impact on the educational outcomes of the learners. When the teachers' opinion was sought on whether the frequent supervision of professional documents contributed to improved performance in Science, the results were as shown in Figure 4.9

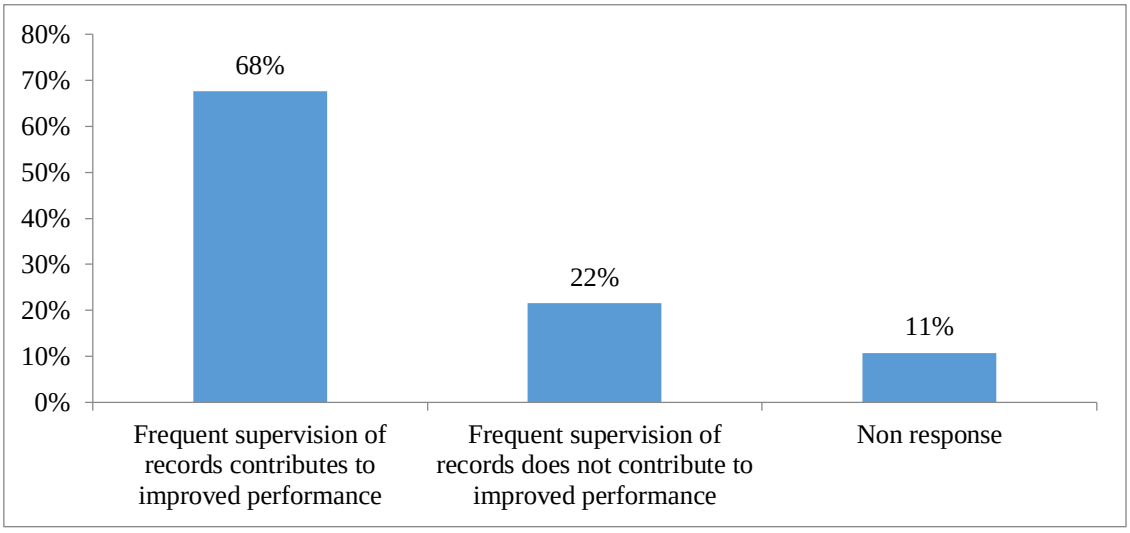

Figure 4. 9 Teachers' opinion on instructional supervision

Findings in Figure 4.9 show that the majority (68%) of the teachers believed that supervision of records contributed to improved performance. In their opinion, supervision of the professional records enable the teachers to follow the syllabus, ensure timely coverage of the syllabus, avoid wastage of teaching time, confirm the teacher is teaching relevant things to the syllabus, and to keep track of work covered and objectives achieved.

On the other hand, 22 percent of the teachers believed that supervision of records did not contribute to improved performance. In their opinion, a teacher could make excellent records but be very poor in lesson delivery, it takes much time at the expense of sourcing for teaching and learning materials, that more time is wasted on paperwork than in the preparation for the lesson and that one may have the professional records and fail to deliver the content.

To determine the effect of instruction supervision on performance, Spearman rank Correlation coefficients were generated as shown in Table 4.15

Table 4. 15 Correlation between Instructional supervision and performance

Instructional supervision activity	Science Mean Score	
	Spearman rank Correlation	Sig. (2-tailed)
Schemes of work	0.441	0.010
Lesson notes	0.218	0.225
Lesson plan	0.193	0.283
Class register	0.258	0.143
Records of work covered	0.106	0.561

Findings in Table 4.15 show that supervision of lesson notes, lesson plans, class register and records of work covered had a positive correlation to performance. However, the correlation was not statistically significant ($p>0.05$). This led to the conclusion that these instructional supervision practices in the sub-county did not significantly contribute to the learners outcomes in Science.

On the other hand, supervision of the schemes of work had a strong positive correlation to performance which was statistically significant ($p<0.05$) leading to the conclusion that supervision practices for schemes of work significantly contributed to the learners' performance in Science. It was therefore concluded that the head teachers' supervision of instruction will influence performance outcomes in the sub-county.

4.5.3 School leadership

Information was also sought from the teachers on the school leadership as demonstrated by their respective head teachers. Several statements on school leadership were posed to the teachers. They were required to indicate the extent to which they agreed with the statements as regards their respective head teachers. The ranking was on a scale of four where "strongly

disagree" was coded as 1, "disagree" was coded as 2, "agree" as 3 and "strongly agree" as 4. Descriptive statistics were used to analyse the data and the results were as shown in Table 4.16

Table 4. 16 Head teachers' execution of leadership tasks

Statements on school leadership tasks	Mean	Std_Dev	Agree	Disagree
Does your head teacher create a safe and orderly school environment?	3.9688	0.50399	100%	0%
Does the head teacher shape the vision of academic success for all students?	3.9412	3.23748	94%	7%
Does your head teacher involve the staff in school activities?	3.4848	0.56575	97%	3%
Does your head teacher create a conducive environment for learning?	3.4118	0.55692	97%	3%
Does the head teacher distribute duties and responsibilities through delegation and guidance?	3.3529	0.54397	94%	6%
Does your head teacher create an atmosphere for respecting your fellow teachers and learners?	3.3031	0.63663	91%	9%
Does the head teacher allow you to give solutions to challenges facing the school?	3.2941	0.62906	94%	6%
Does your head teacher communicate clearly his or her expectations from the learners?	3.2727	0.6742	94%	6%
Does the head teacher organize sessions to improve teachers' knowledge?	3.1515	0.83371	85%	15%
Does the head teacher provide in-service training for teachers so that may develop their careers?	2.8529	0.85749	73%	27%

Teachers strongly agreed that their head teachers had created safe and orderly school environments, shaped the vision of academic success for all students and had involved the staff in school activities. The mean for each of these leadership tasks rounds off to "strongly agree" and at least 97% of the teachers agreed.

The teachers further agreed that the head teachers had created conducive environments for learning, distributed duties and responsibilities through delegation and guidance, created an atmosphere for respecting fellow teachers and learners, allowed teachers to give solutions to challenges facing the school, communicated clearly on his or her expectations from the learners, organized sessions to improve teachers' knowledge and provided in-service training

for teachers so that they may develop their careers. The frequency of each of these leadership tasks rounds off to "agree" and at least 73% of the teachers agreed.

To determine the effect of school leadership on performance, Pearson Correlation coefficients were generated as shown in Table 4.17

Table 4. 17 Correlation between Instructional supervision and performance

Statements on school leadership	Science mean	
	Spearman rank Correlation	Sig. (2-tailed)
Does the head teacher shape the vision of academic success for all students?	-0.094	0.597
Does the head teacher distribute duties and responsibilities through delegation and guidance?	0.192	0.281
Does the head teacher provide in-service training for teachers so that may develop their careers?	0.053	0.765
Does your head teacher communicate clearly his or her expectations from the learners?	0.384	0.028
Does the head teacher allow you to give solutions to challenges facing the school?	0.614	0.000
Does your head teacher create an atmosphere for respecting your fellow teachers and learners?	0.068	0.706
Does your head teacher involve the staff in school activities?	0.252	0.158
Does your head teacher create a safe and orderly school environment?	0.479	0.004
Does your head teacher create a conducive environment for learning?	0.362	0.036
Does the head teacher organize session to improve teachers' knowledge?	0.441	0.012

Findings in Table 4.17 show that head teacher's clear communication of his or her expectations from the learners, gesture to staff to give solutions to challenges facing the school, creation of a safe and orderly school environment, creation of a conducive environment for learning and sessions to improve teachers' knowledge had a strong positive correlation to performance which was statistically significant ($p<0.05$). This leading to the conclusion that these school leadership practices significantly contributed to the learners' performance in Science. It was

therefore concluded that head teachers' school leadership influenced performance outcomes in the sub-county.

When the teachers were asked to make suggestions for leadership improvement in their respective schools to ensure improved performance in Science, the following proposals were made.

Allocation of fewer lessons to Science teachers so that they get enough time for research and preparation; Allow Science teachers to participate in seminars and workshops on the teaching of Science; Ensuring that Science experiments are carried out with available resources; Formulate ways in which Science materials can be made readily available; organising frequent panel meetings to address the issues affecting the school in the teaching of Science; Regular in-servicing and workshops on teaching of Science, Creation of a Science laboratory (or room) in schools that don't have one, Organising schools to compete in Science quizzes; Organising sub-countywide workshops on emerging issues in the teaching of Science and curriculum development

4.6 Syllabus coverage and pupils' performance in Science

The third objective of the study was to determine how syllabus coverage affected pupils' performance in Science. To achieve this, information was sought from the head teachers, teachers and pupils on syllabus coverage, revision time and on the approaches of teaching of Science in their respective schools. Spearman rank-order correlation coefficients were then generated for syllabus coverage and performance so as to determine the nature of the relationship between the two variables.

When the head teachers and teachers were asked to report on the rate of syllabus coverage in their respective schools in regard to Science, the results were as shown in Figure 4.10

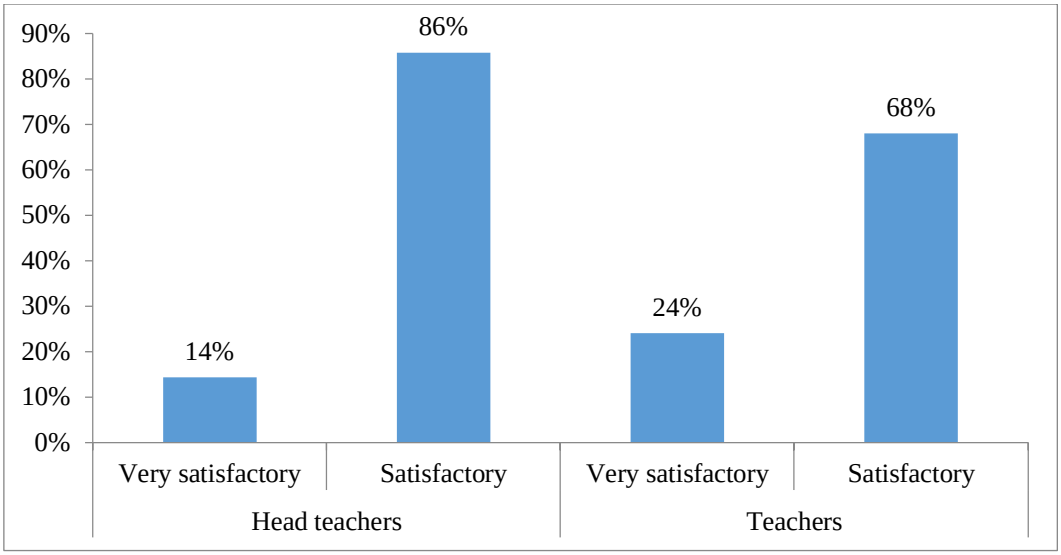

Figure 4.10 Syllabus coverage in relation to Science

Findings in Table 4.10 show that the head teachers and teachers were satisfied with the coverage of the Science syllabus in the sub-county. The fact that schools were able to cover the syllabus satisfactorily while posting poor results at the same time suggests that there were critical underlying issues in the overall process of curriculum implementation for Science including teaching, testing and grading of the subject. The teachers were asked to confirm whether they get enough time for revision for end of term and year exams, the results were as shown in Figure 4.11

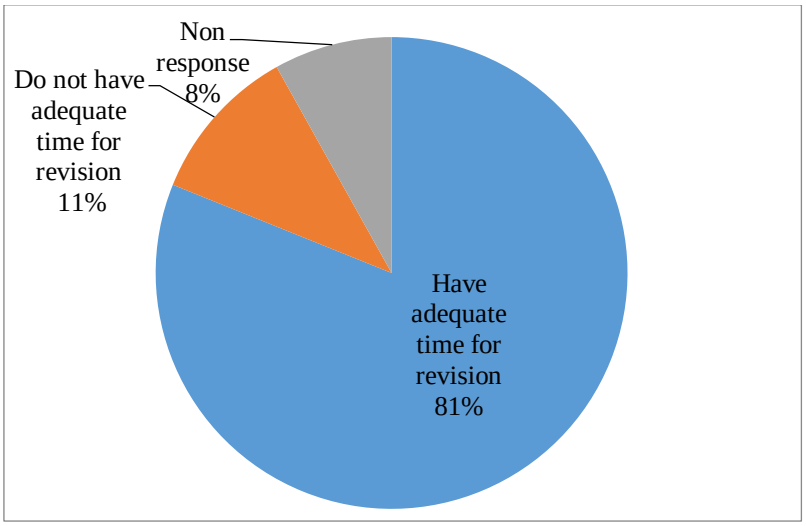

Figure 4.11 Adequacy of time for revision for end of the term and year exams

The teachers explained that with proper monitoring of syllabus coverage there was always enough time for revision spanning between one and two weeks. This was at times supplemented

by creating extra time for revision. The teachers however admitted that it is sometimes difficult to offer adequately individual attention to each of the learners.

On whether the learners got to understand the theoretical concepts taught in the lessons, the results were as shown in Figure 4.12

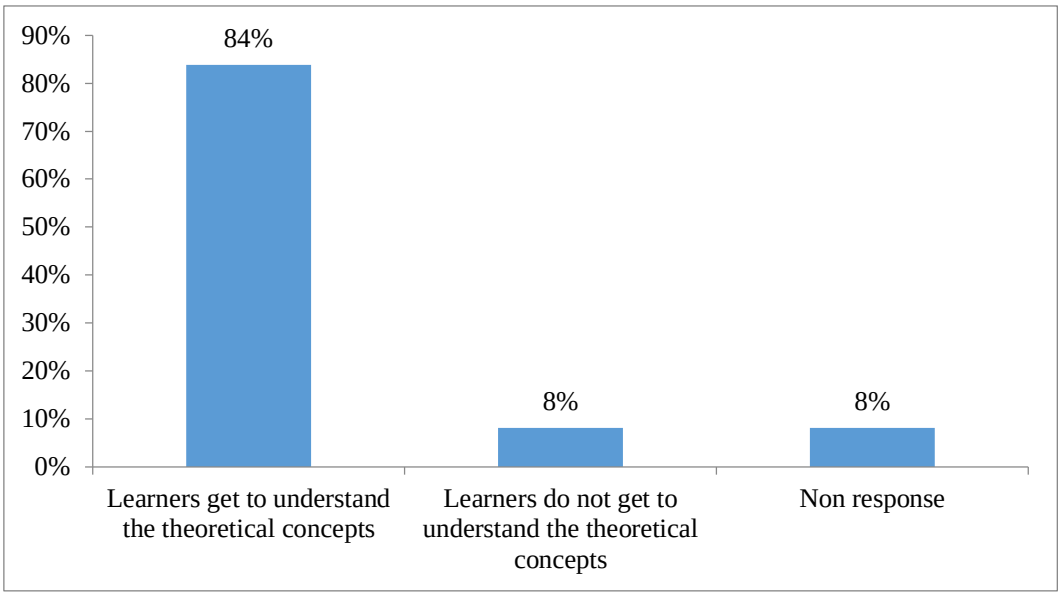

Figure 4.12 Learners understanding of theoretical concepts

Majority of the teachers indicated that their learners get to understand the theoretical concepts as shown in Figure 4.12. This was attested by the fact that the leaners get to answer questions correctly after the lessons. However, some concepts are hard for some classes due to age and topic mismatch. The teachers further explained that Science is a subject of discovery so in most cases theory is not the best method for teaching and learning. Instead, practical experiments would be preferred for better grasping of concepts. As a result, the percentage of knowledge retention by learners is much lower when theoretical approaches are used as opposed to practical.

Information was sought from the learners on the mode of learning Science that was employed in their respective schools, and especially on the use of practical experiments during Science lessons. The results were as shown in Figure 4.13

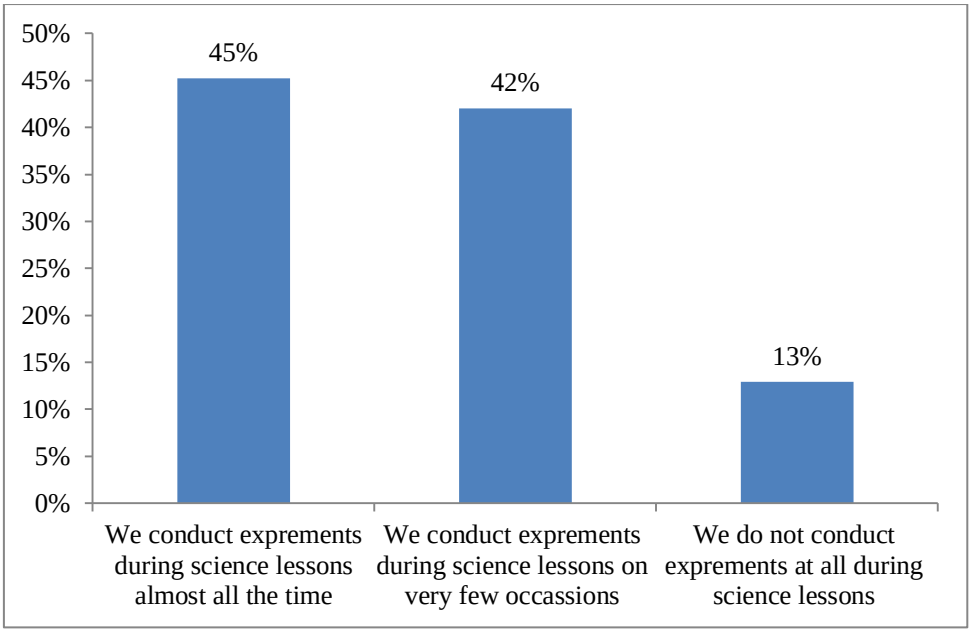

Figure 4.13 Use of practical experiments during Science lessons

Findings in Figure 4.13 show that only 45 percent of the learners had access to regular experiments and practical lessons in the sub-county. The larger proportion of the learners either used experiments occasionally (42%) or never used them at all (13%) this finding implied that there were gaps in the teaching methodologies employed in the teaching of Science and it would therefore be necessary to investigate the amount of time spent by the teachers in each of the methodologies in future research.

Information was therefore sought from the teachers on when they prepared their schemes of work and the results were as shown in Figure 4.13

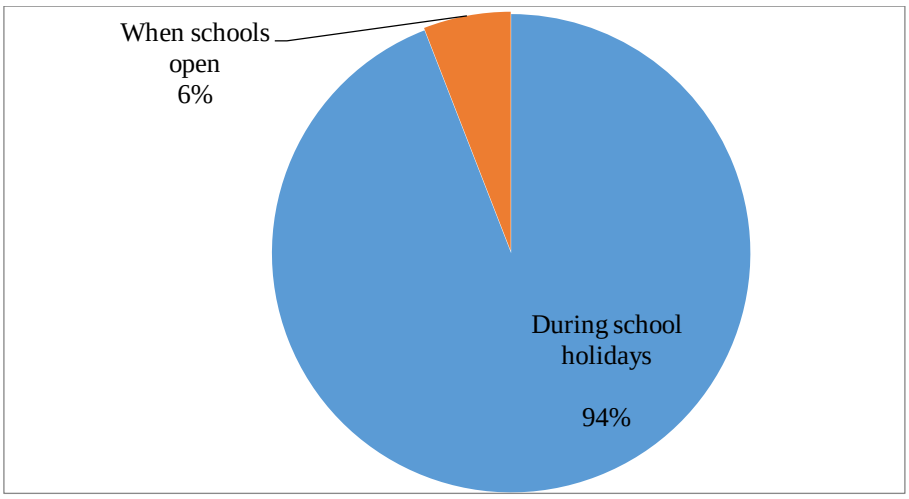

Figure 4.14 Teachers' preparation of schemes of work

The majority (94%) of the teachers prepared their schemes of work during the holidays as shown in figure 4.13. The teachers explained that holidays provide ample and conducive time to scheme and refer to previous remarks on classes taught. This in turn provides ample time to concentrate on teaching when schools open. In some of the schools, teachers come back to school for a week after closing the school to prepare the schemes. This is because teaching starts on the first day of the opening in those schools. This noticeable rise in terms of teacher preparedness could be as a result of the emergence of Teachers' Performance Appraisal and Development (TPAD) monitoring tool which has recently been introduced by the Teachers' Service Commission.

A small proportion (6%) of the teachers indicated that they prepared their schemes when schools open. this could be attributed to the fact that subject allocation and changes are done when the schools open in the first term and as such, it was not possible to scheme over the holidays. Scheming over the holidays is therefore only possible during the second and third terms.

On the methods used to assess the learners understanding of Science concepts, the teachers reported the use of multiple choice questions, structured questions, performance of tasks, group assignments, oral questions, oral presentations and use of topical questions provided in the text books.

4.6.1 Effect of syllabus coverage and revision on performance

In order to determine if syllabus coverage and revision affected performance, Spearman rank-order correlation coefficients were generated as shown in Table 4.18

Table 4.18 Correlation between syllabus coverage and revision and performance

Statements on syllabus coverage and revision	Science_Mean_Score	
	Spearman rank Correlation	Sig. (2-tailed)
How would you rate syllabus coverage in your school in regard to Science?	0.277	0.115
Do you get enough time for revision for the end of term or year exam?	0.018	0.924

Findings in Table 4.18 show that syllabus coverage and revision for end of term or year exams had a weak positive correlation to performance which was statistically insignificant ($p>0.05$)

leading to the conclusion that syllabus coverage and revision for end of term and year exams did not significantly contribute to the learners performance in Science.

4.6.2 Effect of teaching methodologies employed on performance

To determine if the teaching methodologies employed in schools in the sub-county affected performance, Spearman rank-order correlation coefficients were generated as shown in Table 4.19.

Table 4.19 Correlation between teaching methodologies employed and performance

teaching methodologies employed in teaching of Science	Spearman rank Correlation	Sig. (2-tailed)
Inquiry based approach (learners gathering knowledge through questioning)	-0.173	0.326
Project based approach(group work)	-0.039	0.831
Lecture method	-0.270	0.130
Students reading on their own	-0.130	0.470

Findings in Table 4.19 show that teaching methodologies employed in teaching of Science in the schools had a weak negative correlation to performance which was statistically insignificant ($p>0.05$) this led to the conclusion that teaching methodologies employed in teaching of Science did not significantly contribute to the learners performance in Science.

4.7 Pupils' attitude towards the Science

The fourth objective of the study was to assess the pupils' attitude towards Science subjects in respect to their understanding of the scientific language used in the subject, preference to other subjects, performance by age, adequacy of teaching and learning materials attendance to Science symposiums and fields trips. To achieve this, information was sought from the teachers and pupils in their respective schools. Firstly, the teachers were required to rate the pupils attitude towards Science in their respective schools in relation to the other subjects. The results were as shown in Figure 4.15

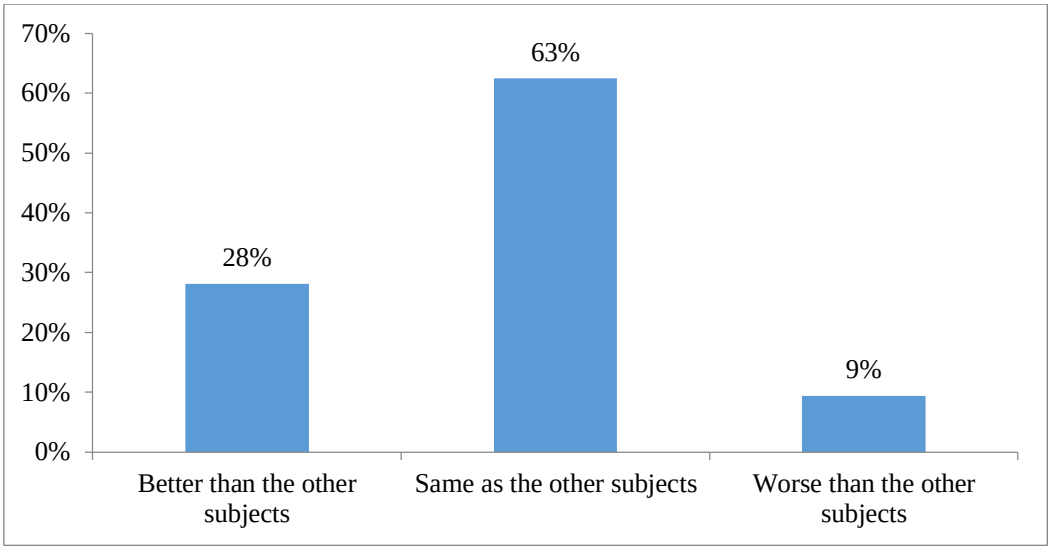

Figure 4.15 Pupils attitude towards Science

The majority (63 percent) of the teachers indicated that their learners regarded Science in the same manner as the other subjects as shown in Figure 4.15. This finding suggests that the poor performance in Science experienced in the sub-county as determined in the first objective of this study was not as a result of pupils' attitude towards the subject.

Several statements on pupils' attitude towards Science were further posed to the teachers. They were required to indicate the extent to which they agreed with those statements. A Likert scale of four possible options was provided where "strongly disagree" was coded as 1, "disagree" was coded as 2, "agree" as 3 and "strongly disagree" as 4. Descriptive statistics were used to analyse the data and the results were as shown in Table 4.20

Table 4.20 Pupils' attitude towards Science

Statements on pupils attitude towards Science	Mean	Std_Dev	Agree	Disagree
Most of student are able to understand the scientific language use in subject	3.852	5.18	85%	15%
My students prefer Science to other subjects	3.818	5.28	79%	21%
Older students perform better than younger students in Science	2.121	0.73	21%	79%
I have enough materials for the teaching of Science	2.405	0.76	59%	41%
My students attend Science symposiums and conferences	2.137	6.50	22%	78%
My students go for Science fields trips	2.355	1.03	58%	42%

Findings in Table 4.20 show that the teachers strongly agreed that most of pupils preferred Science to other subjects (mean =3.85) and that most of the learners were able to understand the scientific language used in the subject (mean = 3.82). This was confirmed by 85% and 79% of the teachers respectively. This finding implied that the students had a positive attitude towards Science. To triangulate this information, the pupils were asked to state whether learners in their respective schools liked the subject and 96 percent of them responded in affirmation. This further confirmed that indeed the leaners had a positive attitude towards Science.

The teachers were almost indifferent on whether they had enough materials for the teaching of Science (mean = 2.405). This was confirmed by 59% of the teachers who "agreed" and the 41% of them who "disagreed". This finding implied that the schools were experiencing challenged with the availability and adequacy of teaching and learning resources for the subject. On the same note, the teachers "disagreed" that their students attend Science symposiums and fields trips suggesting that there was no coordinated effort to have all learners in Science visit the sites that were critical to their learning of particular concepts of the subject as required in the syllabus.

Table 4.21 Correlation between performance and students' attitude

	Correlation Coefficient	My students prefer science to other subjects
In your opinion, how do you compare the performance of science your school for the last 5 years in relation to other subjects?	Spearman's rho	-.167
	Sig. (2-tailed)	.369

From the teachers' perspective, there was a weak negative correlation between students' attitude and their performance which was not statistically significant ($r=-0.167$, $p>0.05$) as shown in Table 4.21.

4.8 Suggestions for enhancement of pupils' performance in Science

The respondents were required to propose suggestions that would enhance pupils' performance in Science in the sub-county.

The head teachers suggested that:

"*Schools should buy enough textbooks for Science. Teachers should make Science lessons more practical as opposed to theory. Schools should provide learning equipment and materials for Science and equip schools with modern Science kits. Learners should be encouraged to start carrying out Science experiments at an early age. Science teachers are supposed to go for in-servicing and also encouragement of more nature walks and Science based educational trips, more innovative teaching aids*".

Suggestions made by the pupils were as follows:

"*We need textbooks for revision, provision of materials and resources for doing experiments, build a Science lab, buy more equipment for the Science experiments, give pupils more experiment exercises to help them revise when exams are near, conduct Science based educational trips, counsel the pupils to have a positive mind towards Science, employ more Science competent teachers, start Science competition with other schools , make use of the Science laboratory and allow pupils to conduct a lot of experiments, Provide audio-visual equipment and lessons so that pupils can understand better*."

Suggestions made by the teachers were as follows:

"*We should allow all leaners to participate in Science practicals and experiments through the provision of more practical teaching and learning resources for Science, benchmarking with other schools who register better results, regular formative testing of Science for both theory and practical lessons, encourage nature walks, symposiums, and Science based educational field trips, encourage use of experiments to enhance practical in the teaching of Science, encourage positive attitude towards the subject as well as provision of Science laboratories and equipment to schools, in-servicing of Science teachers on practical oriented teaching and Science pedagogy*."

4.9 Chapter summary

The chapter has presented the data and findings made in respect to the factors affecting performance in Science in public primary schools, Westlands sub-county. Consequently, the effect of teaching and learning materials on performance of Science subject has been

determined, and the effect of the head teacher's professional leadership on performance of Science was established. Syllabus coverage has been examined and its effect on pupils' performance of Science. Lastly, the pupils' attitude toward Science was assessed and established. The summary of findings, conclusion, recommendations and suggestion for further research were presented in chapter five.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter deals with the summary, conclusions and recommendations of the study. The general objective of the study was to assess the factors affecting performance in Science in public primary schools in Westlands sub-county, Nairobi County.

5.2 Summary of the study

The purpose of this study was to determine the factors that influence the performance of Science in Westlands sub-county. The researcher developed four research objectives from which research questions were drawn to be answered by the study. Specifically the study sought to determine the effect of teaching and learning resources on performance of Science, determine how the head teacher's leadership style affects performance in Science, examine how syllabus coverage affects pupils' performance in Science, and to assess the pupils' attitude towards Science. Related literature to school factors that influence the performance was reviewed. A theoretical and conceptual framework was provided.

The study targeted all the 25 public primary schools in the sub-county. The study employed simple random sampling method to get 8 head teachers and proportional sampling to get 40 teachers and 142 pupils as the respondents. Three questionnaire sets were used to collect the required information. The return rate was 88 percent for head teachers and 93 percent for teachers and 98 percent for pupils, which was found adequate. Data was analyzed using the Statistical Package for Social Sciences (SPSS) to process the frequencies, percentages, descriptive and Correlation statistics which were used to discuss the findings. The following were the findings of the study.

5.3 Summary of findings

5.3.1 Effect of teaching and learning resources on performance in Science

The first objective of the study was to determine the effect of teaching and learning resources on performance of Science. It was established that schools had invested in the provision of Science and learning resources for their learners. Some 80 Percent of the schools had bought Science kits, computers and Visual Aids (T.V), while others had developed nature gardens and small agricultural projects for enhancing teaching and learning of Science. Most of the schools had bought text books to support the teaching of Science and teachers had improvised because

the resources provided by the school were either inadequate or are not up to date. It was also established that Science was the worst performing subject over the past six years suggesting that there were underlying issues responsible for the perennial poor performance which persisted in all the schools in the sub-county over the period.

It was established that the provision of teacher's note books, pupils' exercise books for Science, Science room (or laboratory) and Science instructional materials were positively correlated to performance which was statistically significant. On the other hand, the provision of Science syllabus, Science textbooks, and Science teacher's guides was not significantly correlated to performance. It was concluded that the provision of resources for the teaching and learning of Science directly influenced performance. This research finding agrees with Aguisibo (1998) who asserted that no meaningful Science education programme can exist without laboratory facilities. Laboratory facilities are indispensable to good Science teaching and learning. Poor capital investment in terms of provision of Science learning resources contribute to students' low level of academic achievement. Availability of text books including reference materials affects pupils' performance. Ngaroga (2007) also talked of teaching and learning materials as those that are accessed in the school environment, collected and brought to the Science room or laboratory. Teaching and learning resources have many advantages as they form a focal point of attention, arouse interest; stimulate the learners' imagination, save time and promote-retention and memory.

5.3.2 Leadership affects performance in Science

The second objective of the study was to determine how the head teacher's professional leadership affects performance in Science subject. It was established that the teaching load assigned to the teachers in the sub-county did not significantly affect performance. The head teachers supervised teachers' professional records on a regular basis. It was established that managing people through supervision of instruction, especially the schemes of work significantly contributed to the learners' performance in Science. Although this aspect of the supervision of teacher's schemes of work does not appear in literature cited by Seashore and Leithwood (2010) the findings generally agree that the head teacher's keen supervision of instruction especially the schemes of work was paramount.

It was also established that head teacher's clear communication of his or her expectations from the learners, gesture to staff to give solutions to challenges facing the school, creation of a safe

and orderly school environment, creation of a conducive environment for learning and sessions to improve teachers' knowledge significantly influenced the learners performance in Science.

The research findings therefore show a strong correlation between teacher observation of some leadership behaviours in principals and performance an aspect agreed by Lawrence (2001). The findings also agree with Porter et al. (2008) that the most effective principals focus on building a sense of school community with attendant characteristics which include solution-oriented activities.

5.3.3 Syllabus coverage and pupils' performance in Science

The third objective of the study was to determine how syllabus coverage affected pupils' performance in Science. The head teachers as well as the subject teachers were satisfied with the coverage of the Science syllabus because all the schools were able to cover the syllabus satisfactorily. It was however established that there wasn't a significant correlation between satisfaction with the coverage of the syllabus and performance, and frequency of use of particular teaching approaches and performance.

These findings therefore, disagree with Mwikya (2013) who established that, timely syllabus coverage in schools is one of the performance measures for it has a direct influence on performance in both formative and summative exams. When syllabuses are covered in a timely manner, ability of students to understand both theoretical and practical concepts is boosted and hence prospects of good performance in especially final or national exams. This aspect does not apply in teaching of Science in Westlands sub-county public primary schools where the performance of the subject is still poor despite the teachers claiming to have covered the syllabus.

These findings also disagree with Ngando (2011) who asserted that the majority of the teachers 56%, prepared schemes of work when schools open and that most of the teachers taught without lesson plans and this negatively influenced syllabus coverage .The outcomes of this research, however established that the majority (94%) of the teachers prepared their schemes of work during the school holidays.

5.3.4 Pupils' attitude towards the Science

The fourth objective of the study was to assess the pupils' attitude towards Science subject. It was established that the correlation between students' attitude and their performance was not statistically significant. As such, the poor performance in Science experienced in the sub-county as determined in the fourth objective of this study was not as a result of pupils' negative attitude towards the subject.

5.4 Conclusion

Languages (English and Kiswahili) outperformed Mathematics, Science and Social Studies for the past six years. Science was the worst performing subject in all the schools over the entire period. The underlying issues responsible for the perennial poor performance need to be addressed as a matter of urgency in order to reverse the trend. In as much as the provision of resources for the teaching and learning of Science was found to be directly correlated to performance, there was need to determine the exact nature of the teaching and learning resources necessary to support the effective implementation of the curriculum as far as Science is concerned. Science teachers therefore need to be highly involved to help give solutions to some of these persistent challenges in Westlands sub-county. Whereas schools were able to satisfactorily complete the syllabus coverage, it did not translate to positive results. Additionally, the teaching methodologies employed in teaching of Science did not significantly contribute to the learners' performance.

5.5 Recommendations

Based on the findings of the study, the following recommendations were made:

5.5.1 Recommendations for Policy (MOEST)

MOEST needs to conduct an intensive evaluation of the overall process of the implementation of Science syllabus including teaching methodologies necessary to deliver the content; teaching and learning resources necessary to support content delivery; assessment, testing and grading of the subject; capacity of the teachers to deliver the content.

5.5.2 Recommendations for Head Teachers and Quality Assurance Officers

The head teachers need to ensure adequate provision of teaching and learning resources for the teaching of Science, particularly for the practical sessions. Each of the schools needs to convene Science subject panel consultative sessions to address the underlying short comings;

propose corrective measures and follow up actions through action plans as well as action research; supervision of instructional and professional records for Science be prioritised and emphasised to ensure that teachers' prepared adequately and delivered the practical lessons effectively. The schemes of work like the other professional documents for teachers need to be checked on a weekly basis to ensure that the Science teachers are teaching all the topics according to the syllabus.

5.5.3 Recommendations for Teachers

Science teachers need to prepare the professional records for teaching Science and commit to follow through to ensure that the lessons were delivered effectively; Science teachers need to identify appropriate teaching aids for the respective topics in the syllabus for the school's procurement and where possible for local improvisation; A well-equipped Science room or a laboratory needs to be made available to enhance teaching of practical lessons. Science teachers need to attend in-service courses and symposiums for the teaching of Science pedagogy. The head teachers need to involve teachers in solution-oriented activities in order to help raise the standards of Science in the schools. A safe and orderly school environment needs to be created by the head teachers.

5.6 Suggestions for further research

Based on the finding of the study, the following suggestions are made for further research:

The appropriate methodologies for the teaching of Science at primary school level need to be evaluated. Teacher competency which was prevalent in the literature review but could not be investigated due to time constraints and ethical issues from the Teachers' Service Commission also needs to be assessed. The effectiveness of the Teachers' Performance Appraisal and Development (TPAD) on learners' achievement in Science also needs to be assessed. Further research is also suggested in private primary schools in the sub-county to determine the performance trends in Science and the determinants of that performance. An exploratory study on factors affecting Science subject performance in the other sub-counties within Nairobi County is also commended.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE FOR THE HEAD TEACHERS

INSTRUCTION

This questionnaire is designed to gather information on factors affecting Science subject performance in public primary schools in Westlands Sub-county. You have been selected to participate in the research. You are requested to respond to each question thoughtfully and honestly. Your independent view is required and your cooperation is highly appreciated. You are not required to write your name unless you choose to. Your responses will be treated confidentially.

Part I: Background Information

1. Please tick off your Gender: Male [ ] Female [ ]
2. Please tick off your age bracket:
   [ ] 21-30 [ ] 31-40 [ ] 41- 50yrs [ ] 51-60 [ ] over 60
3. What is your highest academic qualification?
   [ ] M. Ed [ ] B. Ed [ ] 'A' level [ ] 'O' level
4. What is your level of professional qualification?
   [ ] Graduate [ ] ATS I [ ] ATS II [ ] ATS III [ ] P I
5. For how long have you been in the teaching profession?
   [ ] 1-5yrs [ ] 6-10yrs [ ] 11-15yrs [ ] 15-20yrs [ ] Over 20yrs
6. For how long have you been a head teacher?
   [ ] 1-5yrs [ ] 6-10yrs [ ] 11-15yrs [ ] 15-20yrs [ ] Over 20yrs
7. For how long have you been a head teacher at your current station?
   [ ] 1-5yrs [ ] 6-10yrs [ ] 11-15yrs [ ] 15-20yrs [ ] Over 20yrs
8. How many in-service courses have you attended since you became a head teacher?
   [ ] None [ ] 1-3 [ ] 4-6 [ ] 7-10 [ ] Over 10
9. What is the size of your school?
   [ ] Single stream [ ] Double stream [ ] Three streams [ ] Four streams
10. Please indicate the current enrolment at your school
    Boys_____ Girls_____ Total_____

Part II: Teaching and Learning Materials

11. Does the school provide teachers with the following resources?

Teaching and learning resource item	**Very Inadequate**	**Inadequate**	**Adequate**	**Very Adequate**
Science course books				
Teacher's guides for Science				
Science reference materials				
Teacher's lesson plan books				
Teacher's lesson notes books				
Pupils exercise books for Science				
Science room / lab				
Science equipment and materials				
The current syllabus				

12. In your opinion, what are the **two** most critical teaching and learning resources that influence pupils' performance in **Science** in your school?

    a. _____ b._____

    Please explain_____

Part III: School Leadership

The following questions relate to instructional supervision.

13. How often do you check teachers' professional documents listed in the table below?

professional documents	**Once a week**	**Twice a term**	**Once a term**	**Never**
I) Schemes of work				
ii) Lesson notes				
iii) Lesson plans				
iv) Class register				
v) Records of work covered				

14. In your opinion, do you think frequent supervision of the professional documents contributes to improved performance in **Science?**

    [ ] Yes [ ] No

Explain _____

Part IV: Syllabus Coverage

15. How would you rate the syllabus coverage in your school in regard to **Science**?

[ ] very satisfactory [ ] satisfactory [ ] unsatisfactory [ ] very unsatisfactory

16. In your opinion, do you think this time allocation is adequate for covering the **Science** syllabus?

[ ] Yes [ ] No Explain _____

17. What suggestions do you think could help improve schools' performance in **Science** in the school?

_____

_____

Part V: Students' Attitude

18. Are there **Science** teachers reporting cases of pupils who do not complete their assignments?

[ ] Yes [ ] No

If yes, what are the reasons given for not completing the assignments? _____

_____

_____

19. In your opinion, how do you compare the performance of **Science** to other subjects in your school for the last 5 years? _____

_____

20. In your opinion, what are the general comments of pupils in your school about **Science**?

_____

_____

Thank you.

APPENDIX 2: QUESTIONNAIRE FOR THE TEACHERS

INSTRUCTION

This questionnaire is designed to gather information on factors affecting Science subject performance in public primary schools in Westlands Sub-county. You have been selected to participate in the research. You are requested to respond to each question thoughtfully and honestly. Your independent view is required and your cooperation is highly appreciated. You are not required to write your name unless you choose to. Your responses will be treated confidentially.

Part I: Background Information

1. Please tick off your Gender Male [ ] Female [ ]
2. Please tick off your age bracket?
   [ ] 21-30 [ ] 31-40 [ ] 41- 50yrs [ ] 51-60 [ ] over 60
3. What is your highest academic qualification?
   M. Ed [ ] B. Ed [ ] 'A' level [ ] 'O' level [ ]
4. What is your level of professional qualification?
   Graduate [ ] ATS I [ ] ATS II [ ] ATS III [ ] P I [ ]
5. For how long have you been in the teaching profession?
   [ ] 1-5yrs [ ] 6-10yrs [ ] 11-15yrs [ ] 15-20yrs [ ] Over 20yrs
6. For how long have you been a teacher at your current station?
   [ ] 1-5yrs [ ] 6-10yrs [ ] 11-15yrs [ ] 15-20yrs [ ] Over 20yrs
7. How many lessons in total have you been allocated in a week? _____

   [ ] Yes [ ] No

   If yes which class (es) _____

Part II: Teaching and Learning Materials

8. How adequately does the school provide teachers with the following resources?

Teaching and learning resource item	**Very adequately**	**Adequately**	**Rarely**	**Never**
Science syllabus				
Science Text books				

Teaching and learning resource item	Very adequately	Adequately	Rarely	Never
Science syllabus				
Science Teacher's guides				
Teacher's Note books				
Pupils' exercise books for Science				
Science labs/ room				
Science instructional materials				
Audio visual equipment				

9. Do the learners participate in collecting and bringing teaching and learning materials to the **Science** room / lab?

   [ ] Yes [ ] No

   Please explain_____

10. Does the school invest in provision of **Science** and learning resources in your school?

    [ ] Yes [ ] No

    Please explain_____

11. In your opinion, list the **two** most critical teaching and learning resources that influence pupils' performance in **Science**.

    a. _____

    b. _____

Part III: School Leadership

The following questions relate to instructional supervision.

12. How often does the head teacher check your professional documents listed in the table below?

Professional Documents	Once a week	Twice a term	Once a term	Never
i) Schemes of work				
ii) Lesson notes				
iii) Lesson plans				
iv) Class register				
v) Records of work covered				

13. In your opinion, do you think frequent supervision of the professional documents contributes to improved performance in **Science**?

[ ] Yes [ ] No

Explain _____

14. How would you rate the following duties of the head teacher in relation to the following?

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. Does the head teacher shape the vision of academic success for all students?				
ii. Does the head teacher distribute duties and responsibilities through delegation and guidance?				
iii. Does the head teacher provide Science in-service training for teachers so that may develop their careers?				
iv. Does your head teacher communicate clearly his/her expectations from teachers?				
v. Does your head teacher communicate clearly his/her expectations from the learners?				
vi. Does your head teacher allow you to give solutions to challenges facing the school?				
vii. Does your head teacher create the atmosphere for respecting your fellow teachers and learners?				
viii. Does your head teacher involve the staff in school activities?				
ix. Does your head teacher create a safe and orderly school environment?				
x. Does your head teacher create a conducive environment for learning?				
xi. Does your head teacher organise sessions to improve teachers' knowledge?				

15. How many times since January 2017 have you been observed by your head teacher while teaching?

[ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 and above [ ] None

16. What suggestions do you think can improve head teachers' leadership in public primary schools in the district to ensure improved performance in **Science?** Explain

_____

_____

_____

Part IV: Time Utilization and Syllabus Coverage

17. How would you rate the syllabus coverage in your school in regard to **Science**?

[ ] very satisfactory [ ] satisfactory [ ] unsatisfactory [ ] very unsatisfactory

18. Do you get enough time for revision for the end of term/year exam? Please explain.

_____

_____

20. Do your students get to understand the theoretical concepts you teach?

[ ] yes [ ] no

Explain _____

21. When do you prepare your **Science** schemes of work?

[ ] During school holidays

[ ] When school opens

22. Explain the reason for your choice above.

_____

_____

_____

23. please indicate how often you employ the following approaches in the teaching of **Science**

Teaching approach	**Never**	**Rarely**	**Sometimes**	**Always**
Inquiry based approach (experiments)				
Project based approach (group work)				
Lecture method				
Students reading on their own				

24. Do you have teaching aids for **Science** subject?

25. What method or methods do you use to assess the learners' understanding of the **Science** concepts?

[ ] Multiple choice questions

[ ] Structured questions

[ ] performance of experiments

Other_____

Part V: Students' Attitude

	Strongly Disagree	Disagree	Agree	Strongly Agree
I have adequate knowledge for teaching Science				
I would rather have someone else teach Science				
Most of my students are able to understand the scientific language used in the subject				
My students prefer Science to other subjects				
Older students perform better than younger students in Science				
I have enough materials for the teaching of Science				
My students attend Science symposiums				
My students go for Science field trips				

26. Are there cases of pupils who do not complete their **Science** assignments?

[ ] Yes [ ] No

If yes, what are the reasons they give for not completing the assignments? _____

_____

27. In your opinion, how do you compare the performance of **Science** in your school for the last 5 years in relation to other subjects?

[ ] Better than the other subjects [ ] Same as the other subjects

[ ] Worse than the other subjects

28. In your opinion, what is the general attitude of pupils in your school towards **Science?**

_____

_____

29. What do you think should be done to enhance pupils' performance in **Science**?

_____

_____

Thank you

APPENDIX 3: QUESTIONNAIRE FOR THE PUPILS

INSTRUCTION

You have been selected to participate in a research in **Science** subject. You are requested to respond to each question honestly. There are no right or wrong answers. You are not required to write your name on the questionnaire. Your responses will be treated confidentially.

Part I: Background Information

1. Please tick off your Gender: Male [ ] Female [ ]
2. Please state your age: _____
3. Please state your class: _____
4. State your two most favourite subjects 1. _____ 2._____
5. Why do you like those subjects? _____
   _____
   _____
   __

Part II: Teaching and Learning Materials

6. Does the school provide pupils with the following learning resources?

Teaching and learning resource item	**Yes**	**No**
Science Text books		
Use of computer or T.V to learn Science		
Science Materials		
Pupils Science exercise books		
Science Room or Lab		
Class timetables		
Desks for pupils		
Teacher's table in every classroom		
Teacher's chair in every classroom		

Part III: Time Utilization and Syllabus Coverage

7. Does your class have a time table? [ ] Yes [ ] No

8. How many **Science** lessons are there in a week? _____

9. What do you think the school should do to help pupils to perform well in **Science**?

_____

_____

10. Do you do experiments in the **Science** lessons? [ ] Yes [ ] No

a) If yes, does it happen in most of the **Science** lessons or a few of the lessons? [ ] Most [ ] A few

b) If your answer is No, what are the reasons that prevent you to learn **Science** using experiments? Please explain

_____

_____

11. Do you sometimes learn **Science** in groups? [ ] Yes [ ] No

12. Which of these questions do you mostly use in answering **Science** questions at the end of the topic, and at the end of the term exams? Please answer by ticking off the answer or the answers you choose.

a) Multiple Choice questions. [ ]

b) Fill-in- the- gaps questions. [ ]

c) Experiment –based questions. [ ]

Thank you.

APPENDIX 4: CONSENT FORM

STRATHMORE UNIVERSITY

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

TITLE OF THE RESEARCH PROPOSAL: FACTORS AFFECTING SCIENCE SUBJECT PERFORMANCE IN WESTLANDS SUB-COUNTY, NAIROBI COUNTY.

NAME OF RESEARCHER: KAMUTU SUSAN NYAMBURA.

Please Initial Box

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason. ☐
3. I agree to take part in the above study. ☐

Name of Participant	Date	Signature
_____	_____	_____

Name of Researcher	Date	Signature
_____	_____	_____

APPENDIX 5: LIST OF SAMPLED SCHOOLS

1. Karura Forest Primary School
2. Loresho Primary School
3. New Kihumbu-ini Primary School
4. Lavington Primary School
5. Aga Khan Primary School
6. Visa Oshwal Primary School
7. North Highridge Primary School
8. Muguga Green Primary School

APPENDIX 6: RESEARCH AUTHORIZATION – STATHMORE UNIVERSITY

Strathmore UNIVERSITY

13th February 2017

To whom it may concern

RE: REQUEST TO CONDUCT RESEARCH

This is to certify that Susan Nyambura Kamutu (Admission No. 088919) is a Master of Science in Education Management student at Strathmore University. To complete her Master's degree, she is required to write a dissertation applying the knowledge and skills she has acquired.

Her dissertation is entitled **"Factors affecting Science subject performance in public primary schools in Westlands Sub-County, Nairobi County"**.

She is also required to collect data from schools and other respondents in Westlands Sub-County.

We shall appreciate any assistance given to her.

Yours sincerely,

M.A. Ngala

Dr. Magdalene Dimba
Director of Research
School of Humanities and Social Sciences

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu