INFLUENCE OF CLASSROOM PHYSICAL ENVIRONMENT ON STUDENTS' PERFORMANCE IN ENGLISH IN PUBLIC SECONDARY SCHOOLS IN MAKINDU SUB-COUNTY, MAKUENI COUNTY, KENYA.

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

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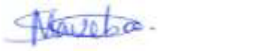
DECLARATION

This research project is my original work and has not been presented for an award in any university



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DEDICATION

To God Almighty, this far has been your favor and grace. I dedicate this work to my lovely children Salama, Jamal and Leo. I hope you can follow in my footsteps as an inspiration and soar farther. To my beloved mother Mrs. Julia Nafula Nyapera and dad Mr. Dishon Nyapera I thank you for moral, financial, spiritual and parental support. And to all my siblings I thank you for your support. God bless you.

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LIST OF ABBREVIATIONS AND ACRONYMS

CEFR	Common European Framework of Reference for Languages
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examination Council
MOE	Ministry of Education
NACOSTI	National Commission for Science Technology and Innovation
PACE	Physical Aspect of Classroom Environment
SCDE	Sub County Director of Education
SFS	Sound Field systems
SPSS	Statistical Package for Social Science
STEM	Science, Technology, Engineering and Mathematics
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization

ABSTRACT

This study's goal was to find out how English performance in public secondary schools in Kenya's Makindu Sub-County was impacted by the physical environment of the classroom. The following goals served as the study's guiding principles: to determine the degree to which visual and acoustic factors affect students' performance in English language in public secondary schools in Makindu sub-county; to ascertain the degree to which spatial factors affect students' performance in English language in public secondary schools in Makindu sub-county and to ascertain the ways in which these factors interact. The research design used in the study was descriptive. The study's explanation of the relationship between the independent and dependent variables was based on environmentalist learning theory. 60 English professors and 2260 pupils made up the study's target group of 2320 respondents. A sample size of 286 was employed in the proportionate random sampling procedure to choose the respondents. The primary data was gathered using self-administered questionnaires that included both closed-ended and open-ended questions. The study discovered that when learning takes place in a well-lit classroom with pertinent charts, flashcards, and photos, pupils are more engaged. Additionally, during English sessions, outside noise interferes with the teachers' ability to communicate the lesson's topic. It was further shown that hot weather makes students less attentive when learning English in the afternoon. The study concluded that using learning aids in public secondary schools in Makindu Sub County helps students' grammar and vocabulary. It also came to the conclusion that classroom noise, both internal and external, hinders students' performance in English reading, comprehension, and writing assessments. Improving the classroom environment, including the desks and chairs, will increase English performance, and conversely. Furthermore, it concluded that hot classrooms significantly hinder students' ability to perform well in English. The study recommends that school boards of administration make sure that classrooms are illuminated and that English teachers are incentivized to use a variety of teaching tools, charts, and other displays to help pupils with their grammar and vocabulary during lessons. Around the classroom spaces, internal and exterior noise should be kept to a minimum. According to the study, classrooms might as well have adequate area for teachers and students to walk around freely during lessons, form groups, and engage in other educational activities. It was suggested that all classrooms have big, glass-covered windows, good ventilation, and fresh air circulation.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

English is one of the most spoken languages both locally and globally. Thus, it is studied in most countries in the world. English is so important because it is used to communicate and interact with others. It is a communication tool in banking, commerce, technology, sports, transport and international relations, Afriani (2017). Thus, it is known as lingua Franca as stated by Mauranen (2009) that it is one key pillar for globalization, networking, economic integrations and internet.

Considering the importance of English, many commonwealth countries have ensured English is a compulsory subject in basic education, UNESCO, (2018). In United States, English is among the compulsory subject up to senior secondary school and the official language of instruction at university level Mark, (2003). In Indonesia, English is taught from pre-primary level to university, Afriani (2017). In Nigeria, English is the official language of instruction and is taught at all levels of education, Oladebinu, (2018).

In Kenya, English is a compulsory subject in both primary and secondary schools, KNEC, (2019). In Kenya today, English language has become a Lingua Franca for communication, business and opportunity in general because it is spoken by several communities and individuals, Mekonge (2017) and Kenya law (2015). Most students in Kenya like studying English and it is their favorite subject, Kotut (2016). Performance in English in secondary

schools is significant for students to prepare for future careers. There are many factors that may influence the academic performance of a student in English; however, this study will be restricted to investigating how classroom physical environment influence students' academic performance.

The physical elements of a classroom are referred to as the physical environment. It covers a variety of items, such as the classroom's size, lighting, temperature, ventilation system, floor, walls, desks, chairs, carpets, whiteboards, as well as other amenities. Aslam, Hussain, and Suleman (2014). The physical atmosphere of the classroom is crucial to students' academic progress Ziegler (2014). The visual, auditory, temperature, spatial, and time variables, among others, all contribute to the physical environment of a classroom. Falsario (2014).

The quality of illumination in various areas of the classroom is referred to as the visual factor. The amount of accessible natural and artificial light in the classroom will determine it. In order to foster a positive environment, it also refers to how the classroom setting is visually interestingly set up. Falsario (2014).

The acoustic element is crucial because verbal communication dominates in the classroom. The arrangement of the classroom, the design of the school, and the methods used to deliver a lesson all have an impact on the noise level. Aslam, Hussain, and Suleman (2014). Numerous students' learning environments can be negatively impacted by poor classroom acoustics, which can also harm cognitive performance and functioning. Dewi (2019) found that

the lack of sound and noise control mechanisms in classrooms, loud noise in the surrounding area, inadequate communication devices, and students' low performance in listening tasks in English are all directly related to these factors.

The term "thermal factor" describes how the classroom is heated and ventilated. It can be overly humid or hot in the room. Hannah (2013). According to Neubauer (2019), there is a link between temperature, airflow, and academic success. The correlation between classroom ventilation and English comprehension test scores was demonstrated by Twardosz in 2017. According to Maslow (1943), it is difficult to accomplish higher level requirements, such learning and self-actualization, when the temperature in the learning environment is too high or too low. Through physiological effects on both students and teachers, hot classrooms lessen the value of instructional time by making it more difficult for everyone to concentrate and complete a particular set of learning tasks.

The management of space is a spatial aspect that greatly affects behavior, particularly communication. According to research done at Capistrano United School in California, kids who had access to large classrooms outperformed those who had smaller ones by 19 to 26%. (2018). According to the researchers, students also demonstrated higher levels of effort and perseverance in classrooms, displayed superior fluency, flexibility, and creativity in more spacious classrooms, and performed better on English

listening, speaking, writing, and dramatization tests as well as in those activities.

Lewinski (2015), in his study on effects of classrooms architecture on students' performance in English established that societal seating arrangement allows for a greater social interaction amongst students and teachers. He further posits that comfortable learning environment is correlated with stronger students' academic performance. Harik, (2018) posits that use of role play, dramatization and group discussion is anchored upon classroom arrangement, space and class size greatly. Proper arrangement of classroom environment plays a remarkable role in making instructional process more effective and establishes an atmosphere favourable and encouraging to learning, Clark, (2010).

According to Negiloni, Ramani, and Sudhir (2017), visual factors refers the quality of lighting in different parts of the classroom. The key visual factors in a classroom environment include the legibility, illumination, charts, flashcards, pictures, contrast, and colour of the visual task. The poor quality of these characteristics in a classroom can be an environmental stressor increasing strain and subsequently can reduce the academic performance of students (Barrett, Davies, Zhang, and Barrett, 2015). Poor lighting reduces visibility and can cause visual discomfort leading to disinterest and lack of concentration. In English, poor lighting has common exhibit on students during reading activities. According to Johnson, (2011) high lighting quality

enhances visual clarity, reading clarity and understanding mood in role play in English.

Regionally and locally, several researchers have examined the relationship between the school environment and student performance especially in English language. These include language in public secondary schools (Njuguna, 2012); influence of school physical environment on teachers performance (Kiptum, 2018); effects of English language on students' performance in English (Peter, 2016); the influence of school climate on secondary schools academic performance (Nkuba, 2015); the effects of school location on learner's academic performance (Mhiliwa, ***2015) ;and factors affecting students 'achievement in English in secondary schools ,Omari , (2016) among others. All these studies assert the crucial role the learning environment plays in determining students' per***formance. However, these studies seem not to give insights on classroom physical environment as will be specifically dealt with in the present study. It was this gap in knowledge that the present study sought to fill. As shown in the Table 1.1, performance in English in KCSE public secondary schools in Makindu sub-county for the past five years had been dismal with a continuous decline from 2018 to 2020 as compared to other sub -counties in Makueni which have shown consistent trend of improvement

Table 1. 1 Mean-scores of KCSE English Performance in Public Secondary Schools in Makueni County (2016- 2020)

Sub County	2016	2017	2018	2019	2020
Makueni	3.62	3.74	3.96	4.22	4.61
Kaiti	3.64	3.89	3.82	4.32	4.42
Kilome	3.45	3.53	3.68	3.75	4.01
Makindu	3.14	3.65	3.21	3.12	3.03
Kibwezi West	3.44	3.71	3.94	3.82	4.28
Nzaui	3.16	3.56	3.81	3.92	3.96
Kathonzweni	3.47	3.82	3.95	4.18	4.33
Mbooni East	3.42	3.90	3.94	4.33	4.54
Mbooni West	3.50	3.78	3.95	4.27	4.46

Source: CDE Makueni County (2020).

For the last five years since 2016, public secondary schools in Makindu sub-county had recorded a trend of dismal academic performance in English. On the contrary, Makueni, Kaiti, Kilome, Kibwezi West, Nzaui, Kathonzweni, Mbooni East and Mbooni West sub-counties had shown significant improvement in academic performance in English at KCSE. Unlike other sub counties that had shown consistent improvement in English mean score, Makindu Sub County had recorded a continuous trend of declining mean score for the last three years since 2018. Based on that observation, there was a need to establish the influence of classroom physical environment on students' performance in English in public secondary schools in Makindu Sub-County, Makueni County.

1.2 Statement of the Problem

English is the language of instruction and examination in Kenya. Hence, student aptitude, as measured in the KCSE examination results, becomes of great concern to educators and guardians. A review of student performance in English in Makindu Sub-County as shown in the Table 1.1 has shown a desperate situation. The mean score had been declining from 3.65 in 2017 to (3.03) in 2020 ranging. On the contrary, other neighbouring sub-counties had consistently improved in English performance all scoring a mean score above (4.00) in the year 2020. Performance of English in Makindu sub-county had been dismal in comparison to mathematics, chemistry and Kiswahili which are other compulsory subjects in secondary school (KNEC, 2018, 2019, & 2020). This decline is performance fixed English subject and Makindu Sub County at the center of this study. Moreover, a departmental report from ministry of education quality assurance and standards for the academic years 2018 and 2019 showed that English mean score had been on decline as compared to other subjects in Makindu sub county, MoEST, (2019).

According to Umar (2017), learning English is significantly hindered when the classroom setting is unfavorable, just like learning other languages that require hearing, speaking, writing, grammar, and understanding. Few research have looked into how the physical environment of the classroom affected students' English performance. Therefore, the purpose of this study was to determine how much English language performance in secondary schools in Makueni County is influenced by the physical environment of the classroom.

1.3 Purpose of the Study

This study's goal was to find out how English performance in public secondary schools in Makindu Sub-County, Makueni County, was impacted by classroom physical environment characteristics.

1.4 Research Objectives

The study was be guided by the following specific objectives;

i) To establish the extent to which visual factors influence students' performance in English language in public secondary schools in Makindu sub-county.

ii) To determine the extent to which acoustic factors influence performance of English language in public secondary schools in Makindu sub-county.

iii) To examine ways in which spatial factors influence student's performance in English language in public secondary schools in Makindu sub-county.

iv) To examine how thermal factors, influence performance of English language in public secondary school in Makindu sub-county.

1.5 Research Questions

The research questions of the study were:

i) In which ways do visual factors influence students' performance in English in Makindu sub-county?

ii) How do acoustic factors influence students' performance in English in public secondary schools in Makindu sub-county?

iii) In which ways do spatial factors influence the students' performance in English in Makindu sub-county?

iv) To what extent do thermal factors influence the performance of students in English in Makindu sub-county?

1.6 Significance of Study

Research findings may be important to school board of managements, Ministry of Education Directorate of Quality Assurance and teachers. School managers may adopt the findings of this study during the construction of classrooms to ensure that classrooms are spacious, well lit, have appropriate sound control devices and are well ventilated to create a conducive learning environment. The Ministry of Education through the Director of Quality Assurance may find the findings of this study useful in determining the suitability of school classrooms and other infrastructure. The findings of this study may act as a term of reference by school principals in ensuring that noise within and without classroom areas is minimized at all times. The research findings could also help the teachers identify and use the most suitable teaching methods taking into consideration the prevailing classroom physical environment. Lastly, the academic researchers may utilize the findings of this study in their literature review.

1.7 Delimitations of the Study

This study specifically considered the influence of the classroom physical environment on students' performance in English in public secondary schools in Makindu Sub- County, Makueni County. The study focused on public

secondary schools because they function under the same operational standard as opposed to private schools that would vary in this regard. The study specifically targeted the English language as it had the highest number of lessons. Both the teachers and students in the sample population participated in the study. The researcher assessed teachers' manipulation of the classroom physical environment and its influence on students' performance in English achievement test.

1.8 Limitations of Study

There are other factors such as understaffing of teachers, inadequate instructional materials and lack of academic facilities such as libraries which influence students' performance in English language, which the researcher was not in control of. Only teachers of English were selected as respondents in this study. The study was also limited by the selection of respondents to include only teachers of English in their specific classes. This was done notwithstanding the presence of other teachers whose classroom experiences were informative to the study. Moreover, the study was limited to teachers of English in Makindu Sub County and so its findings may not be applicable to private schools and other established schools which do not share the same infrastructural challenges as those in the study area.

1.9 Basic Assumptions of the Study

The study made the following assumptions:

i) It is assumed that classroom environment in the target schools influence students' performance in English

ii) That the school principals would allow the study to be conducted in their schools.

iii) That the respondents would cooperate to give factual information on the influence of physical classroom environment on students' performance in English in Makindu sub-county.

1.10 Definition of Significant Terms

Acoustic factors: Refer to the sound effects, noise and the manner in which the classroom enhances or reflects sound to the advantage or disadvantage of learning. It may also refer to the use of voice and other sound effects to enhance learning of English language.

Classroom Physical Environment: Refers to the lighting, noise, and temperature, and ventilation system, size of the room, colours, walls, desks arrangement and whiteboards, among others in the classroom.

Thermal factor: Refers to the heating, temperatures in classroom and ventilation of the classroom.

Performance in English: Refers to the overall student academic performance in written and spoken English as measured in planned activities or tests in the classroom.

Spatial Factors: Refer to the learning space in the classroom that can be adapted to individual learning, group, discussion, collaboration activities and demonstrations.

Visual Factors: Refers to teaching materials, can refer to several teacher resources; however, the term usually refers to concrete examples, such as

worksheets or manipulative learning tools or games help students develop new knowledge.

1.11 Organization of the Study

This study is organized in five chapters. Chapter one is introduction comprising of the background of the study, the statement of the problem and the purpose of the study, research objectives, research questions, significance of the study and the limitations of the study, delimitations of study, the basic assumptions of the study, and the definitions of terms. Chapter two covers review of literature which was related to this area of study. It also captured summary of the literature review, theoretical and conceptual framework. Chapter three features the research methodology; the research design, the target population, sample size and sampling procedures, research instruments, validity and reliability of research instruments. It also focused on the data collection procedures; data analysis as well as ethical considerations. Chapter four covers data presentation, interpretation and discussion of findings guided by the research objectives. Chapter five gives a summary of the study, conclusion and offer recommendations based on the findings. Suggestions for further study was also are presented.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviews literature related to the study. The review examines studies related to visual, acoustic, spatial factors and thermal factors in the classroom physical environment influence student's performance in English language in public secondary schools in Makindu sub-county. The review has also captured the summary of the knowledge gaps that the study intended to fill. Finally, the theoretical framework and the conceptual framework have been presented.

2.2 Performance of English Language in Secondary Schools

The importance of English language for enhancing educational attainment through improved communicative skills and ability can never be over emphasized. This was also reflected in the curriculum where English language is used in the instructional textbooks and as language of instructions in schools (Nkiba, 2018). Locally and globally, scholars have demonstrated that performance of learners in English is determined by the method used in instructing them, (Kotut, 2016). Erkan, (2015) evaluated primary school students' achievement in English lessons in Turkey. The study found that there is no significant difference between boys and girls in terms of achievement level of the specific objectives in English courses. Though relevant to the context of the present study, the study does not examine classroom physical environment factors and determine how they influence the performance of students of English.

In the African context, Akowuah, Patnaik and Kyei, (2018) examined the influence of mother tongue on Students' performance in English language in Senior High School Certificate Examination in Adu Gyamfi Senior High School. The results revealed that even though mother tongue interference is the core factor of the students' poor performance in English language in the Senior High School Certificate examination, there are other factors contributing to students' poor performance in English language. These factors include poor teaching methods, lack of textbooks, language background and lack of professional growth and development of teachers. Evidently missing from these studies is the aspect of the classroom physical environment and its effect on student performance in English.

In Kenya, Ochieng, (2016) argues that Sheng cannot be the cause of poor performance in English language. Otieno, (2014) asserts that the integration of English language may have affected the subject's performance. In a more related study, Wambua, (2018) and Murungi, (2019) investigated the influence of classroom learning environment on lower primary school pupils' performance in social studies in lower primary schools in Kibwezi zone, showed availability and use of physical facilities in social studies was below average and pupils scrambled to use the little available resources. Though pertinent to the present study, this study lacks in depth assessment of the nexus between physical classroom environment and pupil academic outcomes.

2.3 Visual Factors and Student Performance in English Language

Visual factor, according to Negiloni, Ramani, and Sudhir (2017), is the standard of illumination in various areas of the classroom. The amount of accessible natural and artificial light in the classroom will determine it. It also describes how the setting of the classroom is set up. The lighting, side displays, color of the visual task, and wall color are the main visual elements in a classroom setting. Inadequate lighting, according to Winter Bottom and Wilkins (2009), hinders students' ability to concentrate in class and has a negative impact on their academic performance. Poor lighting makes it harder to see and can make you uncomfortable, which makes you lose interest and focus. Better visibility requires that the chalkboard's contrast levels remain high.

Negiloni, Ramani, and Sudhir (2017), carried out a cross-sectional study in Indian schools established that classroom visual environment factors such as illuminance levels on the chalkboard and at student's desk, chalkboard contrast and influenced students achievements in English reading tests. Ghulam, Khuram, Naqvi, Nadeem Iqbal, (2015) posits that using visuals displays in English lessons stimulates thinking and improves academic achievement of students in grammar, writing and vocabulary building.

Students who study in schools with favourable classroom lighting, well-arranged desks, and with appropriate visual aids performed better on the English test than the students in the Control group, according to a study by Abdul-Majeed, (2017) to investigate the effect of classroom environment on

the achievement of first-year secondary school students in English. The study was conducted in Gezira State in Sudan. The Experimental group scored 73% on the reading skill, compared to 53% for the Control group. Students in the Experimental group scored 76% in vocabulary, compared to 50% in the Control group. Students in the Experimental group performed better than those in the Control group in writing, scoring 60% as opposed to 49%. However, the two groups typically received similar grammar scores.

Visual displays and classrooms with colourful walls and explanations on them influence students' performance by bringing life to the learning environment (Fentiman et al, 2013). On the same topic, Makewa et al. (2012) found that the visual displays helped students recall information more readily in their study of Adventist secondary schools in the Shinyanga, Mwanza, Mara, Arusha, and Kilimanjaro regions. The study looked at the influence of classroom lighting and visual displays in teaching English. Students' interest was reportedly raised by teachers' creative use of visual aids in lessons since it gave them something useful to see, do, and consider.

Locally, Njuguna (2012) looked on what factors affected how well English language students performed in Kenya's Bomet district's public secondary schools. According to the report, poor English performance is a result of the teachers' increased workload, excessively large class sizes, a lack of suitable teaching and learning tools, and the students' unsupportive home environments. At a 2018 study, Kiptum looked at how the physical environment affected teachers' happiness in public primary schools in Kenya's

Elgeyo Marakwet County. The study discovered that instructors' happiness was significantly impacted by the school's physical amenities, workplace, and classroom layout. The topic of English performance in connection to the visual elements in the classroom physical environment is not addressed by this research, despite the fact that they include the classroom physical environment as a variable. This knowledge void is what the current study aims to close.

2.4 Acoustic Factors and Students' Performance in English Language

The name "acoustics" refers to the study of how sound propagates in a space (Canteroll, Mira, and López-Chao, 2015). Many pupils' ability to learn might be negatively impacted by poor classroom acoustics. Continuous noise exposure can impair cognitive function and performance (Higgins et al, 2004). The learning process depends on hearing and understanding. These exercises may be challenging in a noisy classroom. More than just students chatting creates noise in the classroom. According to Flagg-Williams, Rubin, and Aquino-Russell (2011), classrooms are noisy environments, and how well students learn depends primarily on how well the pertinent messages can be heard among the background noise. The message is received and absorbed in the ideal classroom with little to no effort. When teachers have to shout to be heard, the listener might not receive a clear signal throughout the entire spectrum of speech sounds. An essential component of learning the phonology of speech, which forms the basis of learning to read, write, use grammar, and comprehend vocabulary in English, is the capacity to concentrate on pertinent sounds. The acoustic environment in the classroom is influenced by reverberation, noise, and the separation between the speaker and the audience.

In schools, speaking and listening is employed to establish a large portion of teaching and learning. Learning and achievement are compromised by students' inability to pay attention and comprehend pertinent components of the acoustical signals in classrooms in poor listening conditions (McSporran, 1997; Picard & Bradley, 2001). English language tasks with greater cognitive processing demands, such reading and vocabulary, writing, and tasks requiring attention, problem-solving, and memory, seem to be especially susceptible to noise exposure. Dockrell and Shield (2008).

In china, Yang, Jiang and Zhao, (2017) in their study on effect of noise on English listening comprehension test among students with different learning styles established that noise had different effects on participants with different learning styles where the assimilators and diverges performed better while converges and accommodators performed poorly in the English reading and comprehension test taken in a noisy environment.

Julie,(2018) established that sound field systems (SFS) use in classrooms increased students' listening and attention to vocal instructions during English and arithmetic sessions in the United Kingdom. The number of accurate answers on the nonverbal measures of processing speed and listening comprehension improved dramatically after SFS use in the classes. Analysis that took into account the acoustics of the classroom revealed that students' listening comprehension scores considerably increased in amplified classrooms and decreased in classrooms with worse acoustics.

A study by Nzilano, (2018) on effect of noise pollution on students learning in Dar es salaam city secondary schools found out noise from external environment near classrooms affected students learning inside classrooms. It established that motor vehicles, construction and wielding machines and other activities related to music sounds, promotional adverts and people's movement around classrooms affected students' concentration in classrooms. Constant noise exposure in classrooms obstruct learning and students exposed to noisy learning environment both in classroom or from outside have lower assessment scores on standardized tests (WHO, 2015). This study therefore focuses on assessing the influence of acoustic factors on students' performance in English in Makindu Sub County in Makueni County.

2.5 Spatial Factors and Student Performance in English Language

'Just as different learning goals require different learning strategies, different instructional strategies require different learning spaces', Taylor and Enggass, (2009). The Montessori teaching philosophy emphasises the spatial function as a significant factor. Lillard, (2005*)* stated that in regard to Montessori ideas about space "the underlying structure and order of the universe must be reflected in the classroom if the child is to internalize it" (Lillard, 2005). Therefore, the spatial function must help the children's ideas of conceptual order and foster engagement with learning materials.

Creative writing and literary skills in English are anchored on enhancing learners' creativity and stimulating their minds. In United States, Samantha, (2017) in her study on the impact of Physical classroom space on students

creativity in English among senior secondary schools established that flexibility is a key component in stimulating minds of students to think freely and creatively. Thus, optimal space adaptable for their learning needs is necessary for adaptability to sustain students' interests and ideas. Classroom space should be adequate to allow students want to present or demonstrate something, participate in role-play and dramatization and participate in group discussion comfortably.

In Kuwait, Mohammad, (2017) established that in learning of English language and other collaborative subjects providing flexible seating arrangements enables a diversity of learning activities to take place such as group discussions, role play and demonstration among the students. Teachers can organise the furniture in rows, cooperative groups or clusters, depending on their teaching strategy and the particular function of the space that is required. Matching seating options to the activity, providing varied seating encourage students to engage in collaborative learning experiences during English lessons, Marx and Hartig, (2017). Lindsey,(2018) found students seated in semi-circle seating arrangements engaged in questioning strategies more often than peers seated in rows during the English grammar lesson.

In Nigeria, Okwon, (2016) examined the impact of classroom congestion on students' performance in English composition writing among grade seven pupils in Lagos city. He concluded that in spacious classrooms with less than 30 students achieved more (65%) in achievement test than their counterparts (46%) in congested classrooms. The study attributed this to attaining more

social skills, room for peer interactions and feeling close to the teachers hence more teacher-students contact. Kitwazi, (2017) in a study on influence of classroom space on teacher-students interaction in Kampala municipality primary schools reported optimal results students in English achievements in grammar, writing, reading, vocabulary and comprehension were achieved when classrooms are spacious for both students and teachers interaction.

Kotut (2016) found that, despite being a crucial recruitment criteria, teacher training had no appreciable impact on English performance. It was discovered that the availability of educational resources had an average significant link with English performance. Magana (2015). It was determined that students' attitudes about English instruction and learning did not significantly affect their performance Njeru (2018). None of the aforementioned components, which affect students' academic performance in English, focused on how the physical classroom environment's spatial elements affect pupils. This study is founded on this background.

2.6 Thermal Factors and Students' Performance of English Language

The thermal quality has an impact on learning; the temperature in learning spaces affects students' behaviour and achievement, Harmon, (1953). High temperatures as well as low ones in classrooms can decrease students' achievement of class tasks, Teli et al., (2012). One of the significant requirements for a student's satisfactory performance is to maintain the temperature in the learning environment at an appropriate level, Earthman, (2002).

Four factors that affect the human body concerning temperature adjustment are radiant temperature, air temperature, humidity and air movement, Allen and Hessick, (2011). The ability to maintain the ideal temperature in a learning environment has a crucial impact on students' performance and mental efficiency, (Kopec, 2006). Ventilation systems that are important to refresh the air in the classroom and expel excess humidity, and support air movement; providing large openable windows allows students to manage temperature and enhances the ventilation quality (Earthman, 2017).

Cooler temperatures have been associated with increased levels of children's comfort, activity, productivity, and concentration. Twardosz, (2017) identified a relationship between air temperature and student performance in English reading tasks. Pascucci, (2016), established that temperature has been tremendous impact on student performance in English. Data collected from a study done by the University of Scranton in grade 12 students in public schools in Tulsa reveals that students perform best in reading, comprehension and grammar achievement tests in controlled temperatures with test scores averaging in the 90th percentile. In classes where temperatures were too hot scores averaged in the low 70s, and at the mid-70s when they were too cold.

Orioni, (2018) established that there was a correlation between classroom ventilation and academic performance in public secondary schools in Benue states schools in Nigeria. Students learning in poorly ventilated classrooms performed dismally in reading, creative writing and grammar areas of achievement test compared to those in properly ventilated. The study revealed that poorly ventilated classrooms exhibited students' restlessness and

indiscipline. This confirmed a similar study by Eneche, (2017) in Osun states primary schools where students in classes that were too hot or cold performed poorly in mathematics and English language achievement test in a quasi-experiment.

In Uganda, Nyawenga and Makosi, (2018) established that poor ventilation and poor physical environment is among the stressors among the students in public secondary schools in Guru District. Overcrowded classrooms and poorly developed ventilations was attributed to poor academic performance in English reading 36%, writing 38%, grammar 26% and comprehension 28% in achievement test. Students who are in a poorly aerated classroom may not concentrate effectively during the lessons especially English whose skill such as reading and writing require maximum concentration, Kotut, (2016). Focusing on thermal factors in classroom, this study will examine the relationship between thermal factors in classroom and their influence on learning of English and the performance in English language.

2.7 Summary of the Literature Review and Research Gaps

The chapter had reviewed the classroom physical environment factors influencing students' performance in English language. The review covered performance of English language in secondary schools, visual, acoustic, spatial and thermal factors. Njuguna, (2012) established that very large class size, conducive school learning environment led to dismal performance in English. The review established that there are scanty empirical studies conducted on the influence of physical classroom environment on students'

performance in English language. While there were studies on school physical environment and teachers satisfaction, Kiptum, (2018), students attitude and learning of English, Magana, (2015),teachers training and English performance, Kotut,(2016), the review did not find any study focusing on influence of visual, spatial, acoustic and thermal factors on students' performance in English language in Kenya. Wambua, (2018) carried out a study on influence of classroom learning environment on pupils' performance in social studies in lower primary schools in Kibwezi zone. Though pertinent to the present study, there was no study carried out in Makindu Sub-county to assess the influence of classroom physical environment factors on students' performance in English Language in public secondary schools. The current study therefore sought to fill the above aforementioned gaps.

2.8 Theoretical Framework

The environmentalist learning theory served as the study's main direction. The principal proponents of the theory were B.F. Skinner (1948) and Albert Bandura (1961). According to environmentalist theory of learning, a child's environment influences both their learning and behavior. Additionally, it is believed that behavior and education are responses to the environment. This viewpoint encourages families, schools, and educators to recognize that a kid develops and picks up new abilities in response to the things she encounters in her environment. According to the hypothesis, the environment has a significant impact on how the young mind learns and develops. The youngster won't learn as well as she can if she is in a setting that is not conducive to learning. Her educational prospects are increased when the setting is changed

to promote more learning. The development of the developing mind toward more knowledge is aided by creating a favorable and conducive learning environment, whether at home or in the school. According to the principle, modest changes can be made to your surroundings to encourage learning. Young learners find it difficult to read or study in dimly light places.It promotes good learning habits and skills to keep spaces meant for play or learning well lit. Lack of light not only has an impact on learning but can also make kids depressed. A learning environment's design and arrangement has an impact on everyone who uses it. The way the furniture is arranged in the classroom not only reflects the teaching style of the teacher, but it also encourages the child to explore and respond to her surroundings, which promotes learning. It is advantageous to set up a space that encourages eye contact with children and designates quiet nooks and work spaces. In the classroom or at home, creating informal learning spaces is another educational opportunity. A child cannot not feel motivated to learn if they are excessively hot or chilly. The youngster can learn her internal temperature and how to adjust it by keeping the learning environment at a base temperature. Loud noises are not good for the developing mind. The youngster feels nurtured and encouraged to learn uninterrupted by the removal of noisy objects. The power to alter the environment for the possible advantage of the learner is provided by environmentalist learning theory.

2.9 Conceptual Framework

The conceptual frame below shows the interrelationship between the independent variables (School Environment) and the dependent variable

(Performance of English language). The independent variable of classroom physical environment is characterized by visual factors, acoustic factors, spatial factors and thermal factors. These factors will impact on the teaching learning process and thus influence students' performance in English. The dependent variable was the performance of English in secondary schools which was characterized by good performance in oral skills and good performance in written skills.

Independent Variable

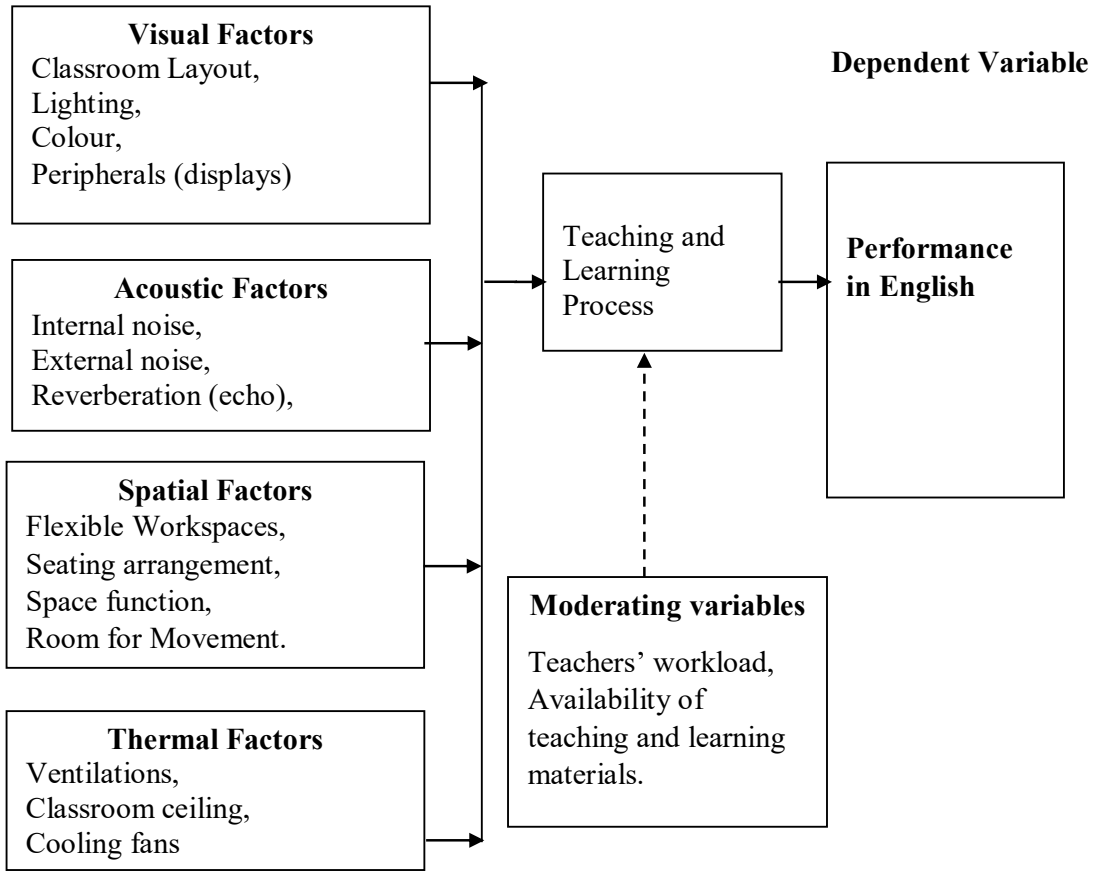

Figure 2.1 Conceptual Framework on Classroom Physical Environment and academic performance.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter comprised of the research design appropriate for this study followed by the target population from which possible findings from the study were generalized, the sample size and sampling techniques, which gave a representative inference of the population on all major variables. The chapter then identified and described the research instruments that would be used in the study, stating their validity, reliability tests and data analysis techniques. The chapter concluded by identifying the ethical considerations involved in the study.

3.2 Research Design

This study used a descriptive survey approach that includes personally interviewing a sizable number of people and frequently asking questions in the form of a questionnaire. Due to the high number of teachers and students participating and the benefit of receiving a lot of data from a big sample of people, this approach was best suited for this research.

According to Orodho (2009), descriptive research design is employed for gathering data about people's views, opinions, and behaviors about a range of educational or societal topics. One of most suitable method of study is a descriptive survey because the study's goal was to describe the individuals' behavior without actually influencing them.

3.3. Target Population

According to (Cooper and Schindler, 2008), a population is defined as the aggregate pool of components about which an analyst aims to draw inferences from. Therefore, the population that was targeted in this study shall include 2,260 form 2 and 3 students and 60 teachers of English from 20 public secondary schools in Makindu Sub- County Kenya. This choice was guided by the fact that students in both classes have at least undergone one year of instruction and teachers are adequately trained to teach English in secondary schools.

3.4 Sampling Size and Sampling Procedure

Orodho (2010) defines a sample as a small part of population which is thought to be a representative of the larger population, Sampling is a research technique used for selecting a given number of subjects from a target population as representatives of that target population. Mugenda and Mugenda (2003) propose that for descriptive surveys, a researcher took at least 10% of the total population when the population sampled from is relatively large and at least 30% for a relatively smaller population depending on time and resources available to the researcher. They further posit that for a small population all the subject may be sampled. Therefore, by census, all the 60 (100%) teachers were sampled for the study since it was a relatively smaller population. Since the students population was relatively large, 226(10%) was sampled.

Table 3. 1 Sample Size

Category	Target population	Sample Size	Percentage %
Teachers of English	60	60	100
Form 2 & 3 Students	2260	226	10
Total	**2320**	**286**	

Stratified sampling with proportionate allocation was selected for this study because it involves selection of individual sampling unit of a sample that is proportionate to the size of the unit which increased chances of sample representativeness (Singh & Singh, 2012; Orodho, Khatete, & Mugiraneza, 2016).These strata include (7) girls boarding schools, (5) boys boarding schools and (8) day schools. Simple random sampling was used within each stratum to select the samples to avoid biasness and ensure equal representation of the subgroups in the sample. In a simple random sampling, 90 students were sampled from day schools where 11 students came from each of six schools and 12 students from each of the two remaining. From the boarding schools, 136 students were sampled with (81) students from the seven girls' boarding schools and (55) students from the four boys boarding schools in a ration 7:5. Simple random sampling was used to sample teachers where 3 teachers came from each of the targeted 20 schools.

3.5 Research Instruments

The study used structured questionnaire to collect data from teachers of English and students. Mugenda and Mugenda (2003) define a questionnaire as a written set of questions to which the subject responds in writing. Creswell

(2009) states that structured questionnaire is preferred since it increases the degree of responses and are easily coded and analysed. It is convenient for generating quantitative and qualitative data from a large population within a short span of time because they address a specific objective. The questionnaire had six sections which include: section (A) Bio data of respondents, section B Performance in English, Section (C) visual factors, section (D) acoustic factors, section (E) spatial factors, section (F) thermal factors and section (G) classroom physical environment factors.

3.5.1 Validity of Instruments

As per Mugenda (2008), validity is used to describe the accuracy and precision of conclusions drawn from research findings. If the content is chosen and included in the data gathering tool and is pertinent to the need or gap identified, it is considered legitimate. To confirm that the research tools empirically demonstrated the study's variables, their validity was examined. The researcher asked the research supervisor to examine and evaluate the probability of errors and the projected degree of data correctness in order to determine the content validity of the research instrument. The validity of the instrument was determined by the researcher using expert judgment. The content validity of the instrument was determined by the study through discussion of the items in the instrument with the supervisors from the department and colleagues. The process of validation enabled the researcher to test the suitability of the questions; the adequacy of the instructions provided the appropriateness of the format and sequence of questions.

3.5.2 Reliability of the Instruments

Reliability is a measure of the degree to which a research instrument yields consistent results after repeated trials, Ngechu, (2004). To enhance reliability of the instruments a pre-test was conducted in other schools in Makueni County which were not included in the main study. The technique for extracting an estimate of reliability was acquired from administration of test-retest reliability method which concerned administering the identical instrument two times to the equal groups of subjects with two weeks' time lapse, (Mugenda and Mugenda 2003). A reliability coefficient was computed using Pearson Product Moment Correlation Coefficient formula using SPSS in order to indicate strength and direction of relationship between the independent and dependent variables.

$$r=\frac{N\sum XY-(\sum X)(\sum Y)}{\sqrt{[N\sum X^2-(\sum X)^2][N\sum Y^2-(\sum Y)^2]}}$$

Where

Y= retest scores

X= sum of the X scores

Y2=sum of the Y scores

X2=sum of the squared X scores

Y=sum of the squared Y scores

XY=sum of the products of paired X and Y scores

N= the number of pairs of x and y

Source: Freedman, D., Pisan, R., &Purves, R. (2007). Statistics (international student edition)

Zero coefficient value indicated no correlation between the variables hence no reliability. Fraenkel and Wallen, (2000) and (Mugenda and Mugenda, 2003), posit that the instruments will be considered reliable if the results produce a reliability coefficient > = 0.7.

3.6 Data Collection Procedures

In order to apply for research permission from the National Commission for Science, Technology, and Innovation, the researcher received an introduction letter from the University of Nairobi (NACOSTI). To get approval to conduct, this authorization was given to the Makueni County Commissioner and Director of Education.

Through the drop and pick procedure, the researcher personally delivered the questionnaires to the selected population, helping to increase the response rate. The importance of the study was explained to the questionnaire takers. The answers to the questions provided did not have good explanations. As soon as the surveys were completed, the researcher gathered them.

3.7 Data Analysis Techniques

Data analysis is the interpretation of collected raw data into useful information (Kombo, 2006). After collection of data from the field, the researcher use both qualitative and quantitative analysis. Data was organized and classified according to the objectives. Thus, the questionnaires were collected and cleaned up in readiness for data inputting and subsequent analysis. Statistical package for Social Scientists (SPSS) was used to analyze the questionnaires. Descriptive statistics such as frequencies, percentages,

mean score and deviation were tabulated for all the quantitative variables. This information was presented inform of tables. Pearson product moment correlation (r) was used to determine or test the strength and direction of relationship between variables. Significance level of 0.05 or 5% was used to determine the significance levels of association between variables. The qualitative data from open-ended questions was analyzed using conceptual content analysis and presented in prose form. A multiple linear regression model was used to determine the relative influence of visual, acoustic, spatial and thermal factors on students' performance in English.

3.8 Ethical Considerations

The ethical concerns in this instance will not only apply to methods and procedures employed but also on the subject matter itself. Respondents' anonymity, confidentiality and privacy will be observed during data collection. The researcher will obtain clearance from University of Nairobi and get permit from NACOSTI for authorization to collect research data. Permission will be sought from County commissioner and County Director of Education to allow the collection of data from respondents. The questionnaire will be accompanied by a cover letter which describes the objectives of the study and assure the respondents of confidentiality of the information they provide and request them to be honest in answering the questions. Participants will be made aware of the purpose of information the researcher wants from them and how the study will directly or indirectly affect them. Furthermore, no respondent will be coerced into the exercise at any level.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter focuses on the questionnaire return rate, analysis, presentation of data collected from the field and interpretation of the results thereof. In this chapter, data analysis is presented in line with the study objectives thus: Influence of visual factors, acoustic factors, spatial factors and thermal factors on students' performance in English language in public secondary schools in Makindu sub-county.

4.2 Return Rate

The researcher administered sixty (60) questionnaires to teachers of English and two hundred and twenty-six (226) to form 2 and 3 students. The researcher personally administered the questionnaires to the sampled respondents through the drop and pick method, which helped to achieve a good response rate. All the teachers (60) returned the questionnaires. Moreover, all the two hundred and twenty-six (226) to form 2 and 3 students returned the questionnaires as show in Table 4.1.

Table 4.1: Response Rate

Respondents	Administered	Returned	% Return rate
Teachers of English	60	60	100
Students	226	226	100

The return rates were 100% for teachers of English and for students respectively. According to Babbie (2010) and Best and Khan (2011), a

response rate of 50% is considered adequate, 60% good and above 70% very good. Therefore, the response rate from these respondents was considered to be very good and as such the researcher proceeded to analyze the data as planned.

4.3 Demographic Information

The study sought to find out the teachers and students' bio-data by way of gender, professional qualification, students' class, teaching experience and student's length of stay in the same school. Although it was not part of the purpose for this study, the researcher found it necessary to seek this data with the main purpose of describing the demographic characteristics of the sample and ascertaining any influence this had on the research findings. This information was also important in ascertaining the accuracy of the data collected.

4.3.1 Response Rate by Teachers and Students' Gender

The study sought to find out the teachers and students bio-data by way of gender as shown in Table 4.2

Table 4.2: Response Rate by Teachers and Students' Gender

Teachers' gender	**Frequency**	**Percent**
Male	24	40
Female	36	60
Total	60	100
Students' Gender	**Frequency**	**Percent**
Male	108	48
Female	118	52
Total	226	100

The gender distribution clearly depicts that there were more female teachers 60% than male teachers 40%. The same trend is depicted by the gender spread among the students. It should be noted that the 30% gender rule, Republic of Kenya (2010) in the public service has been achieved in the study area, with majority of the population being that of female and minority being male. The results show that all the genders were well represented in the study.

4.3.2 Professional Qualification of Teachers

The study sought to find out the teachers' way of Professional qualification as shown in Table 4.3

Table 4.3 Respondents by Professional Qualification of Teachers

Qualification	Frequency	Percent
Diploma	13	21.7
Degree	35	58.3
Masters	9	15
PhD	3	5
Total	60	100

It can be observed that majority of the teachers have a degree in education (58.3%), 21.7% have a diploma in education, 15% had master's degree in education and 5% have doctorate degree in education. This means that all the teachers under study have met the minimum qualification for teaching in secondary schools. Therefore, they can give an informed response.

4.3.3 Students' Class

The study also sought to find out the students' bio-data by their class as depicted in Table 4.4

Table 4.4 Respondents by Students' Class

Qualifications	Frequency	Percent
Form 2	108	47.8
Form 3	118	52.2
Total	226	100

All the students involved in this study were from form 2 (47.8%) and 3 (52.2%) thus they had stayed in the school long enough to give an objective account about the influence of classroom physical environment on their performance in English.

4.3.4 Student's Length of Stay in the Same School

Moreover, the study sought to establish for how long the students involved in the study had stayed in the same school. As shown in Table 4.5.

Table 4.5 Respondents by Student's Length of Stay in the Same School

Years	Frequency	Percent
1 Year	6	2.7
2 years	106	46.9
3 and above years	114	50.4
Total	226	100

As shown in table 4.5 most students had studied in their school for 2 years (46.9%) and 3 years and above (50.4%). This indicated that the students had sufficient experience of two years and above to comment on the influence of classroom physical environment on their performance in English language. The minority (6%) had 1-year experience due to interschool transfers.

4.3.5 Teaching Experience

Moreover, the study sought to establish the teachers teaching experience as shown in the Table 4.6.

Table 4. 6: Respondents by Teaching Experience

Years	Frequency	Percent
Below 2 years	4	6.7
3-5 years	47	78.3
6 and above years	9	15
Total	**60**	**100**

To ascertain the teachers teaching experience table 4.6 shows that majority of teachers (78.3%) had taught in the same school between 3 to5 years and (15 %) had taught for six and above years. Only (6.7%) of the respondents had less than 2 years teaching in the schools' understudy. This therefore means that majority of teachers (93.3%) had above three years teaching experience in the same school and could therefore objectively comment on the influence of classroom physical environment on students' performance in English language.

4.4 Performance of English in Secondary Schools

The dependent variable was the performance of English in secondary schools, which was characterized by good performance in oral skills and good performance in written skills.

4.4.1 Visual Factors and Students' Performance in English

The first objective was to establish the extent to which visual factors influence students' performance in English language in public secondary schools in Makindu sub-county. To get the opinions of teachers and students in regard to this variable, the respondents were asked to indicate the extent to which they agree with various statements on visual classroom factors and students' performance in English.

Table 4. 7: Agreement with Various Statements on Visual Factors and Students' Performance in English

Teachers	Mean	Std dev.
Blackboard is visible and of appropriate size	3.21	.623
My classroom has good natural lighting	3.64	.608
Learning reading skills is more effective in well-lit classrooms	3.54	.673
There are enough and functioning light bulbs in classroom	2.96	.962
Learners more active when they learn in a well-lit classroom	3.73	.752
I use of relevant charts, flashcards and photos when teaching.	2.86	.832
Displayed learning aids improve students grammar and vocabulary	2.78	.863
Classroom walls are painted with bright colours	1.65	.645
My students are more relaxed and active in classroom where interior and exterior decoration are good	2.72	.621
Classroom colours influence students' performance in English	2.18	.721

Students	Mean	Std dev.
Blackboard is visible and of appropriate size	3.41	.223
My classroom has good natural lighting	3.64	.208
Learning reading skills is more effective in well-lit classrooms	3.84	.243
There are enough and functioning light bulbs in classroom	2.98	.362
Learners more active when they learn in a well-lit classroom	4.21	.212
I use relevant charts, flashcards and photos when teaching.	3.76	.223
Displayed learning aids improves students grammar and vocabulary	4.12	.216
Classroom walls are painted with bright colours	2.55	.745
My students are more relaxed and active in classroom where interior and exterior decoration are good	3.54	.329
Classroom colours influence students' performance in English	2.39	.911

It was established from the table, that a majority of teachers agreed or strongly agreed that blackboards visible and of appropriate size as shown by mean of (3.21), that classrooms had good natural lighting (3.64) and learning reading skills is more effective in well-lit classrooms as shown by mean of (3.54). Further, the respondents agreed that there are enough and functioning light bulbs in classroom (2.96), students are more active when they learn in a well-lit classroom (3.73) and they use relevant charts, flashcards and photos when teaching English as shown by mean of (2.86). The majority of respondents also agreed that displayed learning aids improves students grammar and vocabulary (2.87) and students are more relaxed and active in classroom where interior and exterior decoration are good as depicted by a mean of (2.72). However, they disagreed that most classrooms walls (1.6) are painted

with bright colours and that Classroom colours influence students' performance in English as shown by mean of (2.18).

On the same, the students agreed that that blackboards visible and of appropriate size as shown by mean of (3.41), that classrooms had good natural lighting (3.64) and learning reading skills is more effective in well-lit classrooms as shown by mean of (3.84). Further, the respondents agreed that there are enough and functioning light bulbs in classroom (2.98), students are more active when they learn in a well-lit classroom (4.21) and teachers use relevant charts, flashcards and photos when teaching English as shown by mean of (3.76). The majority of respondents also agreed that displayed learning aids improves students grammar and vocabulary (4.12) and students are more relaxed and active in a classroom where interior and exterior decoration are good as depicted by a mean of (3.54). The findings concur with (Fentiman et al, 2013) and Makewa et al, (2012) who established that presence of visual displays and well coloured classrooms with descriptions on the school walls help to liven up classroom environment and affect students' achievement and increased students' interest because it gave them something practical to see, do, and think about.

However, majority of students disagreed that most classrooms walls (2.55) are painted with bright colours and that Classroom colours influence students' performance in English as shown by mean of (2.39). These findings concur with Negiloni, Ramani, and Sudhir (2017), who established that classroom visual environment factors such as luminance levels on the chalkboard and at

student's desk, chalkboard contrast and influenced students. The study agrees with Ghulam, Khuram, Naqvi, Nadeem Iqbal, (2015) who posit that using visuals displays in English lessons stimulates thinking and improves academic achievement of students in grammar, writing and vocabulary building.

This confirms a study by Abdul-Majeed, (2017) to investigate the effect of classroom environment on the achievement of first year secondary school students in English conducted in Gezira State in Sudan established that students who study in schools with favourable classroom lighting, well arranged desks and with proper visual aids did better in the English test than the Control group students. In the reading skill, the Experimental group score 73% compared to 53% for the Control group. In vocabulary, the Experimental group students score 76 % compared to 50% by the Control group. The Experimental group students also did better in writing as they scored 60% compared to only 49% for the Control group. However, the two groups tended to have similar grades in grammar. The above findings ascertain that visual factors influence students' performance in English language in public secondary schools in Makindu sub-county.

The links between visual stimuli and pupils' English performance were determined by inferential analysis. This was carried out in accordance with the goals of the study, presented in tables, and discussed. Responses to the questionnaires were collected on a 5-point Likert scale. This permits the variables to be transformed into a composite score of their means. The analysis of inferential statistics is therefore made possible by the means'

composite scores. The Pearson product moment correlation coefficient was used in the study to show how the various variables related to one another. Pearson In order to address the research objectives, a correlation analysis was carried out to ascertain the type of link between the dependent variable (students' performance in English) and independent variables (visual aspects).Due to the possibility that these factors could have either a positive or negative impact on students' English ability, the correlation analysis was conducted with a 95% confidence level and was two-tailed.

Table 4. 8: Visual Factors and Students' Performance in English Correlation Analysis

Correlation titles		**VF**
Visual factors	Pearson correlation	
	Sig. (2-tailed)	
	N	286
Performance in English	Pearson correlation	.658**
	Sig. (2-tailed)	.000
	N	286

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

Results in Table 4.8 shows that there was some correlation between the dependent and independent variables. Visual factors in classroom had a good positive linear correlation with students' performance in English with an R-value of 0.658 significant at 95% confidence level (p =0.000). Positive correlation meant there was a need for a research on the influence of visual factors on students' performance in Makindu sub- county.

4.4.2 Acoustic Factors and Students' Performance in English

The second objective was to examine the influence of acoustic factors on students' academic performance in English in public secondary schools in Makindu Sub County. The respondents were requested to indicate the extent to which they agree or disagree with various statements on the influence of acoustic factors on students' academic performance in English. Their replies were as shown in Table 4.9.

Table 4. 9: Agreement with Statement on the Influence of Acoustic Factors on Students' Academic Performance in English

Teachers	Mean	Std dev.
Students noise making in classroom is controlled	3.12	.452
External noise is minimized in classroom	2.89	.657
No Reverberation (echo) in classroom	3.74	.328
Sound amplifiers and speakers are fixed in large classrooms	1.84	.765
Students can easily hear what the teacher says without strain	3.47	.322
Students participate more in writing activities in a silent classroom	3.96	.214
Noise from outside classroom disrupts my content delivery	3.68	.128
students are at ease to learn English in a silent classroom	3.52	.213
Students' performance in English is hampered by internal and external noise in classroom	2.83	.347

Students	Mean	Std dev.
Students noise making in classroom is controlled	3.88	.562
External noise is minimized in classroom	2.76	.514
No Reverberation (echo) in classroom	3.86	.317
Sound amplifiers and speakers are fixed in large classrooms	2.23	1.212
Students can easily hear what the teacher says without strain	3.78	.232
Students participate more in writing activities in a silent classroom	3.54	.321
Students are at ease to learn English in a silent classroom	2.84	.326
My performance in English is hampered by internal and external noise in classroom	2.93	.286

The teachers agreed that students noise making in classroom is controlled as shown by a mean of 3.12, that external noise is minimized in classrooms as shown by a mean of 2.89 and that there is no echo in classrooms as shown by a mean of 3.74 but they disagreed that sound amplifiers and speakers are fixed in large classrooms as shown by a mean of 1.84. They further strongly agreed that students can easily hear what the teacher says without strain as shown by a mean of 3.47, that students participate more in writing activities in a silent classroom as shown by a mean of 3.96 and that noise from outside classroom disrupts teachers' content delivery as shown by a mean of 3.68. Majority of teachers were of the view that students are at ease to learn English in a silent classroom as depicted by a mean of 3.52 and that students' performance in English is hampered by internal and external noise in classrooms as shown by a mean of 2.83.

On the same, the students agreed that noise making in classroom is controlled as shown by a mean of 3.88, that external noise is minimized in classrooms as shown by a mean of 2.76 and that there is no echo in classrooms as shown by a mean of 3.86 but they disagreed that sound amplifiers and speakers are fixed in large classrooms as shown by a mean of 2.23. They further strongly agreed that students can easily hear what the teacher says without strain as shown by a mean of 3.78, that students participate more in writing activities in a silent classrooms as shown by a mean of 3.54 and majority of students were of the view that learners are at ease to learn English in a silent classroom as depicted by a mean of 2.84 and that students' performance in English is hampered by internal and external noise in classrooms as shown by a mean of 2.93. Therefore, the above findings show that that students' performance in English in public secondary schools in Makindu Sub County is hampered by internal and external noise in classrooms. Moreover, listening, speaking, writing and comprehension skills are best learnt in silent classrooms with no echoes.

The study concurs with Dockrell, (2008) who posits that tasks involving English language, such as reading and vocabulary, writing and those that have high cognitive processing demands involving attention, problem solving and memory appear to be particularly vulnerable to are done effectively in noise free classrooms. The finds also concur with Yang, Jiang and Zhao, (2017) in their study on effect of noise on English listening comprehension test who established that studying high noise classroom leads to dismal performance in the English reading and comprehension tests.

Inferential analysis was done to establish the relationships between acoustic factors and students' Performance in English in public secondary schools in Makindu sub-county. This was done in line with the study objectives and presented in table and discussion thereof. The questionnaires elicited responses that were on a 5-point Likert scale. This therefore enables the transformation of the variables into a composite score of their means. The composite scores of the means then enable the analysis of inferential statistics. The study employed Pearson product moment correlation coefficient to illustrate the relationships between variables. Pearson Correlation analysis was conducted to determine the nature of the relationship between the dependent variable (students' performance in English) and independent variables (acoustic factors) with the view of answering the research objectives. The correlation analysis was conducted at 95% confidence level and was two-tailed as these factors could influence students' performance in English negatively or positively.

Table 4. 10: Acoustic Factors and Students' Performance in English Correlation Analysis

Correlation titles		**AF**
Acoustic factors	Pearson correlation	.812**
	Sig. (2-tailed)	.000
	N	286
Performance in English	Pearson correlation	.776**
	Sig. (2-tailed)	.000
	N	286

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

Results in Table 4.10. shows that there was correlation between the dependent and independent variable. Acoustic factors had a correlation value of 0.776 (p = 0.000). This shows that there is a good linear relationship between acoustic factors in classroom and students' performance in English in Makindu sub county. The existence of the positive leaner relationship indicates that the aforementioned variables were valid for the study to be conducted.

4.4.3 Spatial Factors and students' performance in English

The third objective was to examine ways in which spatial factors influence student's performance in English language in public secondary schools in Makindu sub-county. The items used to study this variable were assessed on a 5-point Likert scale ranging from 1-strongly agree to 5- strongly disagree. The detailed descriptive results for the objective are as shown in Table 4.11.

Table 4. 11: Teachers Perceptions on Influence of Spatial Factors and students' Performance in English

Statement N=60	SA	A	N	D	SD	Mean	Std Dev
	%	%	%	%	%		
The learning space facilitates student movements during learning activities	8.2	63.0	5.2	11.3	12.3	2.62	.924
Classroom space allows teacher movements during the lesson	6.3	72.1	1.7	10.6	9.3	2.73	.829
Classroom space allows group learning activities	68.7	12.6	1.6	8.4	8.7	1.56	.624
Furniture is comfortable to be used for long periods of time	12.9	56.1	2.8	22.7	5.5	2.82	.982
Chairs can accommodate various body sizes	8.7	69.3	3.9	17.2	0.9	2.94	.902
Desks can to hold equipment (books, stationery)	12.8	54.4	0.0	25.6	7.2	1.89	.827
The classroom is spacious and comfortable for learning	18.9	68.0	0.0	12.8	0.3	1.53	.624
Classroom space influence students' performance in English	15.2	23.4	1.8	52.0	7.6	2.92	.912

It was established from the table, that a majority of teachers comprising of 63.0% and 8.2% agreed or strongly agreed that the learning spaces facilitates student movements during learning activities. Moreover, the teachers were in agreement (78.4%) that classroom space allows teacher movements during the lesson while others agreed or strongly agreed (81.3%) that classroom space allowed group learning activities during English lesson. Further, the respondents agreed (69%) that furniture in classroom are comfortable to be used for long periods of time while a good number of them were in agreement (78%) that students chairs can accommodate various body sizes. In addition, teachers alluded (67.2%) that students' desks can to hold equipment (books, stationery) and (86.9%) agreed that the classrooms were spacious and comfortable for learning English. However, some of the teachers disagreed (59.6%) that classroom space influenced students' performance in English.

The study further established students' perceptions in regard to Influence of spatial factors and student's performance in English. The results were as presented in Table 4.12

Table 4. 12: Students Responses Regarding Influence of Spatial Factors and Performance in English

Statement N=226	SA	A	N	D	SD	Mean	Std Dev
	%	%	%	%	%		
The learning space facilitates students movements during learning activities	10.6	72.1	3.5	9.4	4.4	2.62	.963
Classroom space allows teacher movements during the lesson	9.1	68.7	2.6	12.5	7.1	2.87	.734
Classroom space allows group learning activities	74.3	6.7	2.4	11.4	5.2	1.69	.688
Furniture is comfortable to be used for long periods of time	14.0	57.2	4.2	23.1	1.5	1.92	.773
Chairs can accommodate various body sizes	7.2	73.5	1.4	12.9	5.0	2.79	.912
Desks are spacious to hold stationery	13.7	52.1	1.9	15.1	17.2	1.78	.735
The classroom is spacious and comfortable for learning	20.2	52.3	0.0	11.7	13.9	1.67	.652
Classroom space influence students' performance in English	10.1	18.1	0.0	61.4	10.4	2.83	.914

It was established from the table, that a majority of students comprising of 72.1% and 10.6% agreed or strongly agreed that the learning spaces facilitates learners movements during learning activities. Moreover, the students agreed (77.4%) that classroom space allows teacher movements during the lesson while others agreed or strongly agreed (81%) that classroom space allowed group learning activities during English lesson. Further, the respondents agreed (71.2%) that furniture in classroom are comfortable to be used for long periods of time while a good number of them agreed (80.7%) that students chairs can accommodate various body sizes. In addition, majority of students alluded (65.8%) that their desks can to hold equipment (books, stationery) and (72.5%) agreed that the classrooms were spacious and comfortable for

learning English. However, majority of students disagreed (71.8%) that classroom space influenced students' performance in English.

Therefore, the above findings show that Classroom space in terms of learning space, comfortable chairs and desks has no direct significant influence on students' performance in English that students' performance in English in public secondary schools in Makindu sub county. However, classroom space and comfortable furniture play a key role in ensuring students' comfort during the lesson and in enhancing learners' attentiveness. Classroom space is also key in attaining more social skills, room for peer interactions and feeling close to the teachers hence more teacher –students contact.

The findings of this study concur with Samantha, (2017) who established that flexibility is a key component in stimulating minds of students to think freely and creatively and should be adequate enough to allow students want to present or demonstrate something, participate in role play and dramatization and participate in group discussion comfortably. However, the finding of this study contrasted that of Okwon, (2016) who concluded that in spacious classrooms with fewer students achieved more in achievement test than their counterparts in congested classrooms. Since majority of respondents (59.6%) and (71.8%) were of the view that classroom space does not directly influence students' performance in English.

The study employed Pearson product moment correlation coefficient to illustrate the relationships between spatial factors and performance in English. Pearson Correlation analysis was conducted to determine the nature of the

relationship between the dependent variable (students' performance in English) and independent variables (spatial factors) with the view of answering the research objectives. The correlation analysis was conducted at 95% confidence level and was two-tailed as these factors could influence students' performance in English negatively or positively.

Table 4. 13: Spatial Factors and Students' Performance in English Correlation Analysis

Correlation titles		**SF**
Acoustic factors	Pearson correlation	1
	Sig. (2-tailed)	
	N	286
Performance in English	Pearson correlation	.753**
	Sig. (2-tailed)	.000
	N	286

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

Results in Table 4.13 shows that there was correlation between the dependent and independent variable. Spatial factors had a correlation value of 0.753 with students' performance in English at 95% confidence level (p=0.000). This depicts that spatial factors in classroom had a good linear relationship with students' performance in English in Makindu Sub County. The existence of the positive leaner relationship indicates that the aforementioned variables were valid for the study to be conducted.

4.4.4 Thermal Factors and Students' Performance in English

The last objective was to examine how thermal factors influence performance in English in public secondary schools in Makindu sub-county. The respondents were to indicate their level of agreement with various statements

on the influencee thermal factors on students' performance in English language.

Table 4. 14: Agreement with Statements on the Influence of Thermal Factors on Students' Academic Performance in English

Teachers	**Mean**	**Std dev.**
The air circulation in classrooms is appropriate	3.24	.523
There are enough fans depending on classroom size	1.92	.786
Classes have leak free ceiling	2.48	.829
Size of windows in classroom are large enough to allow free air circulation	3.46	.351
High temperatures lower attention of students during English afternoon lessons.	3.57	.432
Students participate actively during lessons in properly ventilated rooms	3.43	.522
Students' performance in English is hampered by high temperatures in classrooms	3.69	.554
Students	**Mean**	**Std dev.**
The air circulation in classrooms is appropriate	3.32	.528
There are enough fans depending on classroom size	2.22	.685
Classes have leak free ceiling	2.46	.780
Size of windows in classroom are large enough to allow free air circulation	3.64	.428
High temperatures lower my attention during English afternoon lessons.	3.52	.524
I participate actively during lessons in properly ventilated rooms	3.67	.512
Students' performance in English is hampered by high temperatures in classrooms	3.35	.521

It was established from the table, that a majority of teachers agreed or strongly agreed that the air circulation in classrooms is appropriate as shown by a mean of 3.24, that Size of windows in classroom is large enough to allow free air circulation as shown by mean of 3.46, that high temperatures lower students attention during English afternoon lessons as shown by mean of 3.57, that students participate actively during lessons in properly ventilated rooms as shown by mean of 3.43 and that students' performance in English is hampered by high temperatures in classrooms as shown by a mean of 3.69. However, they disagreed that there are enough fans depending on classroom size as shown by mean of 1.92 and that Classes have leak free ceiling as shown by mean of 2.48.

On the same matter, majority of students agreed or strongly agreed that the air circulation in classrooms is appropriate as shown by mean of 3.32, that size of windows in classroom is large enough to allow free air circulation as shown by mean of 3.64 that high temperatures lower students attention during English afternoon lessons as shown by mean of 3.52, that students participate actively during lessons in properly ventilated rooms as shown by mean of 3.67 and that students' performance in English is hampered by high temperatures in classrooms as shown by mean of 3.35. However, they disagreed that there are enough fans depending on classroom size as shown by mean of 2.22 and that Classes have leak free ceiling as shown by mean of 2.46.

From the above findings, it can be ascertained that students participates actively during lessons in properly ventilated rooms and that high

temperatures lower students' attention during English afternoon lessons. Moreover, students' performance in English is hampered by high temperatures in classrooms as shown by mean of 3.69. However, in Makindu sub-county, the thermal factors are greatly put under control since many classrooms are well ventilated, the air circulation is appropriate; size of windows is large enough to allow free air circulation even in absence of fans.

Findings confirmed that Pascucci, (2016), established that temperature has tremendous impact on student performance in English. This similarly confirmed a study by Eneche, (2017) that schools where students in classes that were too hot or cold performed poorly in mathematics and English language achievement test in a quasi-experiment.

The study employed Pearson product moment correlation coefficient to illustrate the relationships between spatial factors and performance in English. Pearson Correlation analysis was conducted to determine the nature of the relationship between the dependent variable (students' performance in English) and independent variables (thermal factors) with the view of answering the research objectives. The correlation analysis was conducted at 95% confidence level and was two-tailed as these factors could influence students' performance in English negatively or positively.

Table 4. 15: Thermal Factors and Students' Performance in English Correlation Analysis

Correlation titles		SF
Acoustic factors	Pearson correlation	1
	Sig. (2-tailed)	
	N	286
Performance in English	Pearson correlation	.667**
	Sig. (2-tailed)	.000
	N	286

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

Results in Table 4.15 shows that there was correlation between the dependent and independent variable. Thermal factors had a correlation value of 0. 667**with students' performance in English at 95% confidence level (p=0.000). This depicts that thermal factors in classroom had a good linear relationship with students' performance in English in English in Makindu Sub County. All the variables were found to be significant at 5% level of significance as their p values were lower than 0.05. The existence of the positive leaner relationship indicates that the aforementioned variables were valid for the study to be conducted.

4.5 Regression Analysis

A multiple linear regression model was used to determine the relative influence of visual, acoustic, spatial and thermal factors on students' performance in English. The regression model was as follows: $Y= \beta0 + \beta1\chi1 + \beta2\chi2 + \beta3\chi3 + \beta4\chi4 + \varepsilon$ Where $\beta0$ is the constant or intercept, $\beta1$ - $\beta4$ are the regression coefficients (change in Y, given one unit change in χ). Y is the dependent variable (students' performance in English), $\chi1$ is visual factors, $\chi2$

is acoustic factors, $\chi 3$ is spatial and $\chi 4$ is thermal factors while ε is the error term.

Table 4. 16: Regression Analysis

Model	R	R square	Adjusted R square	Std. Error of Estimate
1	.742	.551	.534	.45073

a. Predictors: (Constant), VF, AF, SF, TF.

The study used Table 4.16 to establish whether students' performance in English had a linear dependence on the independent variables. The study established a correlation value of 0.742. This depicts a good linear dependence between the variables. An R-square value of 0.551 was established and adjusted to 0.534. The coefficient of determination depicts that visual, acoustic, spatial and thermal factors influences students' performance in English by about 55.1 per cent while 44.9 per cent variations in performance are brought about by factors not captured in the objectives.

CHAPTER FIVE

STUDY SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the analysis of the major findings of this study, conclusion and recommendations arising from the discussion.

5.2 Summary of the Findings

This study aimed at determining the influence of classroom physical environment factors on performance in English in public secondary schools in Makindu sub-county, Makueni County. The study was guided by four key objectives thus: to establish the extent to which visual factors influence students' performance in English language in public secondary schools in Makindu sub-county, to determine the extent to which acoustic factors influence performance of English language in public secondary schools in Makindu sub-county, to examine ways in which spatial factors influence student's performance in English language in public secondary schools in Makindu sub-county and to examine how thermal factors influence performance of English language in public secondary school in Makindu sub-county.

The study used descriptive survey research design since it enabled correction of information from respondents without compromising their privacy. The target population of the study consisted of teachers of English employed by Teachers Service Commission and public secondary school students in

Makindu sub-county. The total number of teacher's total was 60 and students were 2260. Simple random sampling was used to sample teachers where 3 teachers came from each of the targeted 20 schools.

Stratified sampling with proportionate allocation was selected for this study because it involves the selection of individual sampling unit of a sample that is proportionate to the size of the unit, which increases chances of sample representativeness (Singh & Singh, 2012; Orodho, Khatete, & Mugiraneza, 2016). These strata included (7) girls boarding schools, (5) boys boarding schools and day schools (8). Simple random sampling was used within each stratum to select the samples to avoid biasness and ensure equal representation of the subgroups in the sample. In a simple random sampling, 90 students were sampled from day schools where 11 students came from each of six schools and 12 students from each of the two remaining. From the boarding schools, 136 students were sampled with (81) students from the seven girls' boarding schools and (55) students from the four boys boarding schools in a ration 7:5.

The research instrument was piloted using the test retest technique and a Pearson correlation coefficient computed. The refined instruments were administered, filled and responses analyzed. The study applied the use of primary data collection technique. This was achieved through the use of questionnaires. Data from questionnaires was analyzed quantitatively. Both descriptive and inferential statistics was generated. Descriptive analysis generated data which was presented in tables, percentages and figures.

Inferential statistics generated data which was used to test the relationship between the dependent and independent variables. Pearson product moment correlation (r) was used to test for the relationship between the variables and regression analysis was to ascertain the level of influence. Statistical Package for Social Sciences (SPSS) version 21.0 was used to aid in data analysis. After a comprehensive data analysis, the findings of the study are as summarized below:

5.2.1 Visual Factors and Students' Performance in English

The first objective of the study was to establish the extent to which visual factors influence students' performance in English language in public secondary schools in Makindu sub-county. The quantitative descriptive results from the questionnaires showed that many items in this variable were significantly related to students' performance in English in Makindu sub-county. The results indicated that displayed learning aids improve student's grammar and vocabulary and students are more relaxed and active in classroom with interior and exterior decoration. Further, the results indicated that when there are enough and functioning light bulbs in classrooms students are more active. However, Classroom colours do not have significant influence on students' performance in English.

The results therefore concurred with the literature reviewed that indeed adequate classroom lighting, displayed learning aids in classrooms leads to high attentiveness and activeness among students in secondary schools. The inferential statistics in this study (Pearson Product Moment correlation results)

also show that visual factors and students' performance in English have a significant inverse correlation meaning that an improvement in the displaying learning aids, visible blackboards and classroom lighting lead to improved students' performance in English in public secondary schools in Makindu sub-county and the reverse is true.

5.2.2Acoustic Factors and Students' Performance in English

The second objective was to examine the influence of acoustic factors on students' academic performance in English in public secondary schools in Makindu Sub County. The quantitative descriptive results show that students can easily hear what the teacher says without strain when in a noise free classroom. The results established that students participate more in writing activities in a silent classrooms and noise from outside classroom disrupts teachers' content delivery during English lessons. The results further show that students are at ease and attentive to learn English in a silent classroom the study concludes that students' performance in English is hampered by internal and external noise in classrooms.

The results of inferential statistics (Pearson's Product-Moment Correlation) show that acoustic factors in classroom and students' performance in English in public secondary school teachers in Makindu sub-county have a significant negative (inverse) correlation. This implies that when acoustic factors in classroom are improved it corresponds with an improvement in students' performance in English in public secondary schools in Makindu Sub County and vice versa. Most of the literature reviewed supports these results that

indeed acoustic features in classrooms influence students' attentiveness and performance in English language reading, comprehension and writing tests.

5.2.3 Spatial Factors and Students' Performance in English

The third objective was to examine ways in which spatial factors influence student's performance in English language in public secondary schools in Makindu sub-county. The results of quantitative descriptive results show that the learning spaces in classes facilitate student and teachers' movements during learning activities, classroom space allowed group learning activities during English lesson, furniture in classroom are comfortable to be used for long periods of time and the students' chairs can accommodate various body sizes. In addition, students' desks can to hold equipment (books, stationery) and were spacious and comfortable for learning English.

Inferential statistical results (Pearson's Product-Moment Correlation) also show that classroom spatial factors and students' performance in English in public secondary schools in Makindu sub-county have a strong and significant negative (inverse) correlation meaning that an improvement on classroom space, desks and chairs lead to improved performance in English and vice versa. Regression analysis shows that students' performance in English had a linear dependence on the spatial factors.

5.2.4 Thermal Factors and Students' Performance in English

The last objective was to examine how thermal factors influence performance in English in public secondary schools in Makindu sub-county. The quantitative descriptive results from the questionnaires show that the air

circulation in classrooms is appropriate, that size of windows in classroom is large enough to allow free air circulation, high temperatures lower students' attention during English afternoon lessons and that students participate actively during lessons in properly ventilated rooms. The study also established that students' performance in English is hampered by high temperatures in classrooms. The study also found out that there are no enough fans depending on classroom size and most of classes do not have leak free ceiling. The inferential statistics results (Pearson's Product-Moment Correlation) also indicate that thermal factors and students' performance in English in public secondary schools in Makindu sub-county have a significant negative correlation. This means that an improvement in classroom thermal factors corresponds with an improvement in students' performance in English.

5.3 Conclusion of the Study

The study concluded that Visual factors and students' performance in English have a significant inverse correlation thus an improvement in the visual learning aids, visible blackboards and classroom lighting lead to improved students' performance in English in public secondary schools in Makindu sub-county and the reverse is true. The study also concluded that acoustic features in classrooms also influence students' attentiveness and performance in English language reading, comprehension and writing tests. Therefore, since acoustic factors in classroom and students' performance in English have a significant inverse correlation, when acoustic factors in classroom are improved it corresponds with an improvement in students' performance in English in public secondary schools in Makindu Sub County and vice versa.

Moreover, the study concluded that having appropriate size of classrooms facilitates student and teachers' movements during learning activities thus close monitoring of students' activities during the lesson. Furthermore, big and appropriate size of students' chairs and desks makes the students comfortable and able to concentrate in English learning activities for a long time. Since students' performance in English has a linear dependence on the spatial factors, improvement on classroom space, desks and chairs lead to improved performance in English.

The study further concluded that high temperatures lower students' attention during afternoon English lessons and that students participate actively during lessons in properly ventilated rooms. The study concluded that students' performance in English is greatly hampered by high temperatures in classrooms. Most schools in Makindu sub-county neither have enough fans depending on classroom size nor have leak free ceiling. The study further concluded that an improvement in classroom thermal factors corresponds with an improvement in students' performance in English when other factors are kept constant.

Lastly, the study led to the overall conclusion that, visual, acoustic, spatial and thermal factors significantly influence students' performance in English in public secondary schools in Makindu sub-county in Makueni county Kenya. Thus, performance of English would greatly be enhanced through improving on all these factors.

5.4 Recommendations

i) Schools' Boards of Management should ensure that classrooms are well lit by replacing the blown out bulbs regularly, brightly painted and have clear visible blackboards. The Teachers Service Commission should encourage teachers of English to use various learning aids, charts, projection of images, pictures and other displays during the lesson to improve the students' grammar and vocabulary.

ii) The school principals and teachers should ensure internal and external noise is minimized around classroom areas. Teachers should ensure students noise making is minimized in classes. The board of management should ensure that the large classrooms have sound amplifiers and echo proof gadgets to enable students to listen to teachers without straining.

iii) The school board of management should ensure that classrooms are spacious enough to enable teachers and student's free movement during lessons, formation of groups and other learning activities. The school board of management should also ensure that students' desks are spacious enough to accommodate all the learners' books; chairs are comfortable and big enough for all student sizes.

iv) The Ministry of Education and the school board of management should ensure that all classrooms are well ventilated, allow fresh air circulation, have large and glass fitted windows. The school board of management should ensure classrooms are fitted with cooling fans to minimize heat during afternoon lessons and have leak free ceiling to minimize the coldness at nights.

5.5 Suggestions for Further Research

i) This research did not consider the mediating, moderating and/or intervening effect on students' performance in English, teachers' workload, availability of teaching and learning material, availability of library and students' attitude towards studying English. Further research may reveal other factors that may influence students' performance in English

ii) The scope of the research was in public secondary schools in Makindu sub-county. Further research may also be necessary for extent analysis (whether the observed state, conclusions and recommendations apply to the target sub-county, county, surrounding counties or the entirety of the Republic of Kenya).

iii) This study mainly concentrated on the influence on classroom physical environment factors on students' performance in English in public secondary schools in Makindu sub-county. Future studies may go a little further and increase the scope by including teachers and students in private secondary schools either exclusively or inclusively. That is either teachers and students in public and private secondary schools principals or a comparison of both. Similar studies may also be conducted on both teachers and students in public primary and private primary schools.

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APPENDICES

Appendix I: Questionnaire for Teachers of English

This questionnaire is designed to help the researcher assess the influence of classroom physical environment on students' performance in English in public secondary schools in Makindu sub county, Makueni County. The information you give will be used for the purpose of the study only. Please indicate the correct option by inserting a tick in the appropriate box provided or by writing the answer in the provided space

Section A: Demographic data

1. What is your gender?

   Male [ ] Female [ ]

2. What is your age in year?

   Below 25 [ ] 25-30 [ ] 31-35 [ ] 36-40 [ ] 46-50 [ ] 51 and above [ ]

3. What is your highest professional qualification?

   Diploma [ ] Bachelors [ ] Masters [ ] PhD [ ]

   If any other specify……

4. Kindly indicate for how long you have taught English in public secondary schools.

   Below 2years [ ] 3-5 [ ] 6 and above [ ]

Section B: Academic Performance in English

5. Kindly indicated the students mean score in English subject in KCSE for the 2018 to 2020 in your school

KCSE Year	Mean score
2018	
2019	
2021	

6. In this section, tick where appropriate using the following scale 1-Strongly Disagree (SD) 2-Disagree (D) 3-Neutral (N) 4-Agree (A) 5-Strongly Agree (SA)

S/N	Statement	SD	D	N	A	SA
1	The school registers high performance in English					
2	Students perform better in English than in other subjects					
3	English speaking improves the performance					
4	Performance of English in the school has steadily been improving					
5	Most of the students do well in English					
6	Spacious classroom encourage students to study English					
7	Displayed learning documents improves students grammar and vocabulary					
8	Studying English in a noise free classroom improves performance					
9	Studying English in properly ventilated rooms encourage better performance					

Section C: Spatial Factors and students' performance in English

7. Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	SA	A	D	SD
classroom space is of appropriate size in accordance with the number of students				
The learning space facilitates student movements during learning activities				
Classroom space allows teacher movements when monitoring students' learning activities				
Classroom space allows group learning activities				
Furniture are comfortable to be used for long periods of time				
Chairs can accommodate various body sizes				
Desks can to hold equipment (books, stationery)				
The classroom is spacious and comfortable for learning				
Classroom space influence students in English				

8. Which other space related areas would you like improved to enhance performance in English?

   .....

   .....

Section D: Visual Factors and students' performance in English

9. Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	SA	A	D	SD

Blackboard is visible and of appropriate size				
I have good natural lighting in my classroom				
Teaching reading skills is more effective in well-lit classrooms				
There are enough and functioning light bulbs in classroom				
The light meets the needs of learning and teaching activities				
Students are more active when they learn in well-lit classroom				
I use of relevant charts, flashcards and photos when teaching English.				
Displayed learning documents improves students grammar and vocabulary				
Classroom walls are painted with bright colours				
My students are more relaxed and active in classroom where interior and exterior decoration are good				
Classroom colours influence students' performance in English				

10. In your view, which other visual related area requires improvement to enhance performance in English…….

Section E: Acoustic factors and students' performance in English

11. Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	**SA**	**A**	**D**	**SD**

Students noise making in classroom is controlled by teachers				
External noise is minimized in classroom				
No Reverberation (echo) in classroom				
Sound amplifiers and speakers are fixed in large classrooms				
Students can easily hear what the teacher says without strain				
Students participate more in reading and writing activities in a silent classroom				
Noise from outside classroom disrupts my content delivery				
Teachers and students are at ease to learn English in a silent classroom				
Students' performance in English is hampered by internal and external noise in classroom				

12. What acoustic related areas would you like improved to enhance performance in English?.....

Section F: Thermal factors and students' performance in English

13. Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	**SA**	**A**	**D**	**SD**

The air circulation in classrooms is appropriate				
There are enough fans depending on classroom size				
Classes have leak free ceiling				
Size of windows in classroom is large enough to allow free air circulation				
High temperatures lower attention students during English afternoon lessons.				
Students participates actively during lessons in properly ventilated rooms				

Thank you for your time and participation

Appendix II: Questionnaire for Students

This questionnaire is designed to help the researcher assess the influence of classroom physical environment on students' performance in English in public secondary schools in Makindu sub county, Makueni County. The information you give will be used for the purpose of the study only. Please indicate the correct option by inserting a tick in the appropriate box provided or by writing the answer in the provided space

Section A: Demographic data

1. What is your gender?

   Male [ ] Female [ ]

2. What is your age in year?

   Below 15 [ ] 15 and above [ ]

3. Which class do you study is your highest professional qualification?

   Form 2 [ ] form 3 [ ]

4. Kindly indicate for how long you been in this school?

   1 year [ ] 2 years [ ] 3 years [ ] 4 years [ ]

Section B: Performance in English

5. In this section, tick where appropriate using the following scale

1-Strongly Disagree (SD) 2-Disagree (D) 3-Neutral (N) 4-Agree (A) 5-Strongly Agree (SA)

S/N	Statement	SD	D	N	A	SA
1	The school registers high performance in English					
2	I perform better in English than in other					

	subjects					
3	English speaking improves the performance					
4	Performance of English in the school has steadily been improving					
5	Most of the students do well in English					
6	Spacious classroom encourage students to study English					
7	Displayed learning documents improves my grammar and vocabulary					
8	Studying English in a noise free classroom improves performance					
9	Studying English in properly ventilated rooms encourage better performance					

Section C: Spatial Factors and students' performance in English

6 Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	**SA**	**A**	**D**	**SD**
My classroom space is of appropriate size in accordance with the number of students				
The learning space facilitates students movements during learning lesson				
Teachers of English move around the class monitoring students' learning activities during the lesson				
Our Classroom space allows group learning				

activities				
Furniture are comfortable to be used for long periods of time				
Chairs can accommodate various body sizes				
Desks can to hold equipment (books, stationery)				
The classroom is spacious and comfortable for learning				
Classroom space influence my performance in English				

7 Which other space related areas would you like improved to enhance performance in English?.....

Section D: Visual Factors and students' performance in English

8 Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	**SA**	**A**	**D**	**SD**
Blackboard is visible and of appropriate size				
My classroom has good natural lighting				
Learning reading skills is more effective in well-lit classrooms				
There are enough and functioning light bulbs in classroom				

The light meets the needs of learning and teaching activities				
I am more active when I learn in a well-lit classroom				
Teachers of English use of relevant charts, flashcards and photos when teaching.				
My grammar is enhanced when teachers use displayed learning materials				
Classroom walls are painted with bright colours				
I am more relaxed and active in classroom where interior and exterior decoration are good				
Classroom colours influence my performance in English				

9 In your view, which other visual related area requires improvement to enhance performance in English…….

Section E: Acoustic factors and students' performance in English

10 Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	**SA**	**A**	**D**	**SD**
Teachers and prefects control students noise making in classroom				
External noise is minimized in classroom				

No Reverberation (echo) in my classroom				
Sound amplifiers and speakers are fixed in large classrooms				
I can easily hear what the teacher says without strain				
I participate more in reading and writing activities in a noise-free classroom				
I am at ease to learn English in a silent classroom				
My performance in English is hampered by internal and external noise in classroom				

11 What acoustic related areas would you like improved to enhance performance in English?.....

Section F: Thermal factors and students' performance in English

12 Indicate the extent to which you agree with the following statements using the following key: SA = Strongly Agree A=Agree D= Disagree SD = Strongly Disagree.

Statement	**SA**	**A**	**D**	**SD**
The air circulation in classrooms is appropriate				
There are enough fans depending on classroom size				
Classes have leak free ceiling				
Size of windows in classroom is large enough to				

allow free air circulation				
My attention and concentration is lower during hot afternoon English afternoon lessons.				
I participate more actively during lessons in properly ventilated rooms				
Extremely lower temperatures influence my concentration during reading and comprehension lessons				
Unregulated temperatures influence my performance in English				

Section G: Classroom physical environment factors and students' performance in English

13 Kindly indicate the extent to which the following Classroom physical environment factors influence students' performance in English in your school. Use a scale where: LE =low extent, ME= moderate extent, GE=great extent and VG= Very great extent

Factors	**LE**	**ME**	**GE**	**VG**
Spatial factors				
Visual factors				
Acoustic factors				
Thermal factors				

Thank you for your time and participation

Appendix III: Letter of Recommendation from University of Nairobi

UNIVERSITY OF NAIROBI
FACULTY OF EDUCATION
DEPARTMENT OF EDUCATIONAL MANAGEMENT POLICY &CURRICULUM STUDIES

dept-edpcs@uonbi.ac.ke
P.O. BOX 30197
OR P.O. BOX 92 -00902

KIKUYU

OUR REF: E55/850952016 **November 8th, 2021**

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: SHERRY MAKEBA WAWIRE– REG NO. E55/85095/2016

This is to confirm that **Sherry Makeba Wawire** is a Master of Education student in the department of Educational Management Policy and Curriculum Studies of the University of Nairobi. She is currently working on her research proposal entitled **"*Influence of Classroom Physical Environment on Students Performance in Public Secondary Schools in Makindu Sub County Makueni County*".** Her area of specialization is Curriculum Studies

Any assistance accorded to her will be highly appreciated

JEREMIAH M. KALAI, PHD
ASSOCIATE PROFESSOR& CHAIRMAN
DEPARTMENT OF EDUCATIONAL MANAGEMENT POLICY AND CURRICULUM STUDIES

Appendix IV: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **564929**

Date of Issue: **15/November/2021**

RESEARCH LICENSE

This is to Certify that Miss.. SHERRY MAKEBA WAWIRE of University of Nairobi, has been licensed to conduct research in Makueni on the topic: "Influence of Classroom Physical Environment on Students Performance in Public Secondary Schools in Makindu Sub County Makueni County" for the period ending : 15/November/2022.

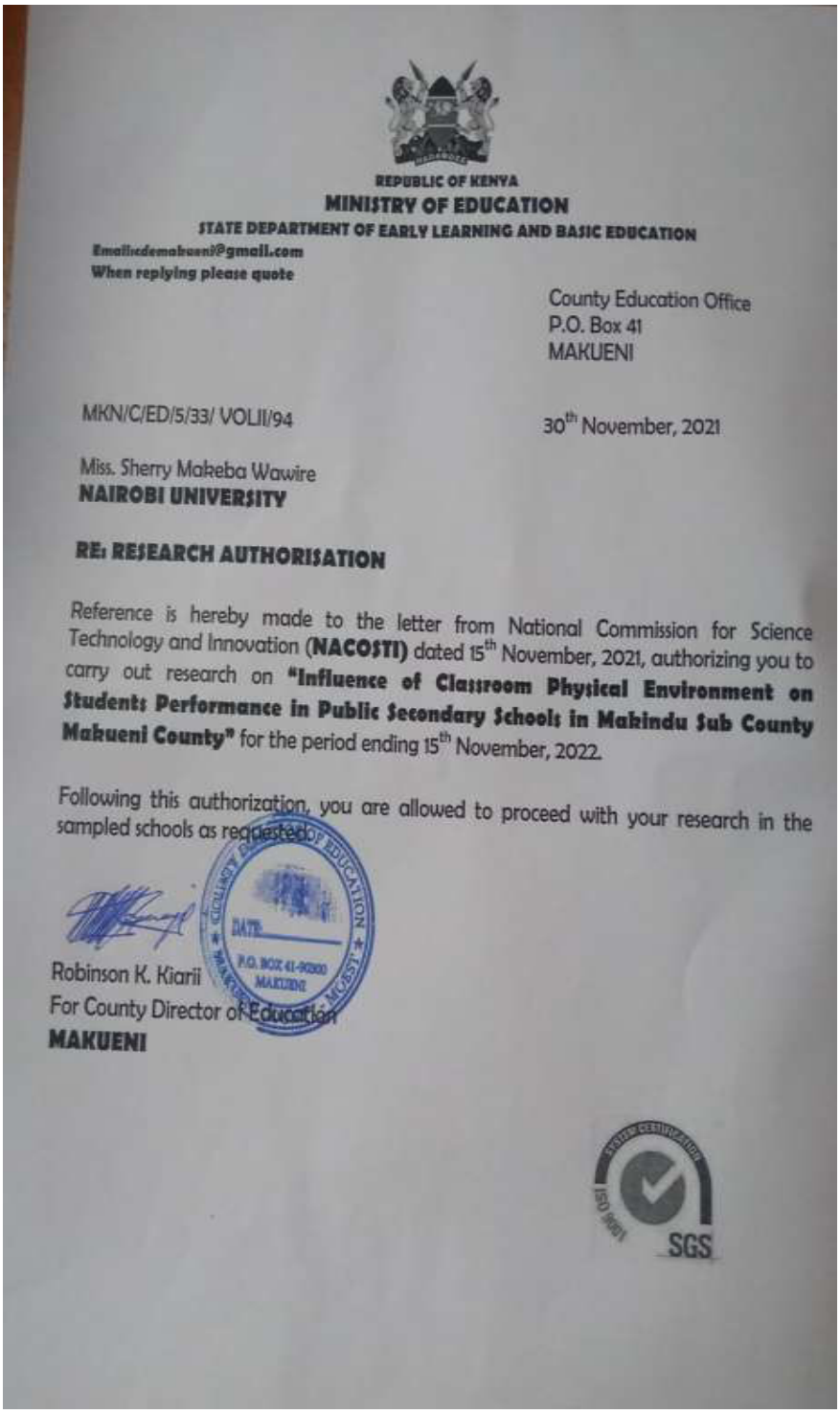
License No: **NACOSTI/P/21/14314**

564929

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE TECHNOLOGY &

Appendix VI: Research Authorization Letter from County Director of Education



REPUBLIC OF KENYA

MINISTRY OF EDUCATION

STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Email:cdemakueni@gmail.com
When replying please quote

County Education Office
P.O. Box 41
MAKUENI

MKN/C/ED/5/33/ VOLII/94

30th November, 2021

Miss. Sherry Makeba Wawire
NAIROBI UNIVERSITY

RE: RESEARCH AUTHORISATION

Reference is hereby made to the letter from National Commission for Science Technology and Innovation (**NACOSTI**) dated 15th November, 2021, authorizing you to carry out research on **"Influence of Classroom Physical Environment on Students Performance in Public Secondary Schools in Makindu Sub County Makueni County"** for the period ending 15th November, 2022.

Following this authorization, you are allowed to proceed with your research in the sampled schools as requested.

Robinson K. Kiarii
For County Director of Education
MAKUENI