METACOGNITIVE KNOWLEDGE AND COGNITIVE READING STRATEGY USE AS PREDICTORS OF READING COMPREHENSION PERFORMANCE AMONG FORM THREE STUDENTS IN KIAMBU COUNTY, KENYA

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A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILMENT OF REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN EDUCATIONAL PSYCHOLOGY IN THE SCHOOL OF EDUCATION OF KENYATTA UNIVERSITY

OCTOBER, 2018
DECLARATION

I declare that this thesis is my original work and has not been presented in any other university/institution for consideration. This thesis has been complemented by referenced sources duly acknowledged. Where text, data, graphics, pictures or tables haven been borrowed from other sources, including the internet, these are specifically accredited and references cited in accordance in line with anti-plagiarism regulations.

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DEDICATION

I dedicate this work to my parents the late Reuben Mwathi Wangome and Hannah Wairimu Mwathi for teaching me the value of a good education. To my husband, Ndirangu, children: Kevin, Crispus, Olive, Noel and nephew Alex.
ACKNOWLEDGEMENTS

First and foremost I give thanks and Glory to God Almighty for granting me the opportunity, capability and means to complete this work successfully. Secondly, I thank my supervisors Dr. Jotham Dinga and Dr. Edward Kigen for their encouragement, thoughtful guidance, critical comments and corrections on this thesis. I also appreciate my readers for their valuable advice and review of this thesis.

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<td>CRSQ</td>
<td>Cognitive of Reading Strategy Questionnaire</td>
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<tr>
<td>CDE</td>
<td>County Director of Education</td>
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<td>EFL</td>
<td>English as a Foreign Language</td>
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<td>ESL</td>
<td>English as a Second Language</td>
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<tr>
<td>ELLs</td>
<td>English Language Learners</td>
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<td>KCSE</td>
<td>Kenya Certificate of Secondary Education</td>
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<tr>
<td>KIE</td>
<td>Kenya Institute of Education</td>
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<tr>
<td>KNEC</td>
<td>Kenya National Examination Council</td>
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<td>MARSII</td>
<td>Metacognitive Awareness Reading Strategy Inventory</td>
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<tr>
<td>MCKQ</td>
<td>Metacognitive Knowledge Questionnaire</td>
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<tr>
<td>MRSQ</td>
<td>Metacognitive Reading Strategy Questionnaire</td>
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<tr>
<td>MoEST</td>
<td>Ministry of Education, Science and Technology</td>
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<tr>
<td>NACL</td>
<td>National Adolescent Literacy Coalition</td>
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<tr>
<td>NCES</td>
<td>National Centre for Education Statistics</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science, Technology and Innovation</td>
</tr>
<tr>
<td>RTI</td>
<td>Research Training Institute</td>
</tr>
<tr>
<td>SCEO</td>
<td>Sub County Education Officer</td>
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<tr>
<td>TOEFL</td>
<td>Test of English as a Foreign Language</td>
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<tr>
<td>TOEFL-RBC</td>
<td>Test of English as a Foreign Language - Reading Basic Comprehension</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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ABSTRACT

The ability to understand and use information from text is a key predictor of a student’s success in school learning. Not all factors related to this ability have been adequately investigated. The purpose of this study was to examine metacognitive knowledge and cognitive reading strategy use as predictors of reading comprehension performance among form three students in Lari Sub County, Kiambu County. The study also tested for gender differences in metacognitive knowledge and cognitive reading strategy use. Flavell’s metacognition Theory guided the study. The study adopted a correlational research design. The target population was all the form three students from all public and private secondary schools in Lari Sub County. Purposive sampling was used to select Lari Sub County and form three students while proportionate stratified random sampling technique was used to select schools from the 38 public and private schools in Lari Sub County as well as to select the 320 students from the schools selected. Data was collected using five instruments: Cognitive Reading Strategy Use Questionnaire, Metacognitive Knowledge Questionnaire, observation checklist, pro forma summary of students’ scores in reading comprehension and a comprehension test. A sample size of 32 students (10% of the actual sample) was used for the pilot study. This was from a school within the county, which was not in the actual study sample. This was done to ascertain the reliability and validity of the research instruments. Data collected was analyzed using both descriptive and inferential statistics. Pearson’s Product Moment Correlation Coefficient(r), Multiple Regression and independent samples t-test were used for inferential data analysis. The results revealed that there was a moderate, positive significant correlation between person knowledge ($r(317) = .21, p < .05$) and reading comprehension. Task knowledge and strategy knowledge had a positive but insignificant correlation with reading comprehension. Global reading strategy use ($r(317) = .21, p < .05$), support reading strategy use ($r(317) = .21, p < .05$) and problem solving reading strategy use ($r(317) = .19, p < .05$) were all positively and significantly correlated to reading comprehension, with global and support reading strategies having the strongest correlation. The findings further revealed that there were no significant gender differences in person knowledge, ($t = -1.36, df=317, p > .05$) task knowledge ($t = -1.34, df=317, p > .05$) and strategy knowledge ($t = -1.07, df = 317, p > .05$). Among the cognitive reading strategy use sub scales, only problem solving reading strategy use had a significant gender difference which was in favor of boys. Person knowledge and global reading strategy use were found to be the best predictors of reading comprehension performance. Findings from observation data showed that, none of the cognitive reading strategies sub scales had significant correlation with reading comprehension performance. No significant gender differences were found in the use of three sub scales of cognitive reading strategies observed. It was recommended that teachers lay more emphasis on global reading strategy use; found to be the best predictor of reading comprehension. Teachers should also assist girls improve their use of problem solving reading strategy use.
CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.0 Introduction
This chapter covers the background to the study, statement of the problem, purpose of the study and objectives of the study. The research questions, significance of the study, delimitations and limitations of the study and assumptions of the study are also discussed. This chapter also discusses theoretical framework, conceptual framework and operational definition of key terms.

1.1 Background to the Study
Reading comprehension is regarded as a fundamental skill in learning (Kulo, Onchera, & Indembukhani, 2014) To succeed in a literate society, students should comprehend what they read failure of which hinders learners’ success in education and career development. In the modern society, the job market requires a literate and highly qualified workforce. Schools are, therefore, expected to direct their effort towards preparing learners to comprehend what they read as a way of enhancing academic performance (Kilos et al., 2014).

Despite the stated importance of reading comprehension in school learning as well as outside school, reading comprehension is still poorly performed. Globally, Studies have provided evidence that, learners at all levels of education still register poor reading comprehension performance. In the United States of America, data from National Assessment of Educational Progress, (2015) in reading showed that, about 63% of the
twelfth grade students read below proficient achievement level. It further revealed that there was no significant change in the percentage of proficient readers compared to the year 2013.

At regional level, Wisdom and Ajayi, (2012) reported that majority of high school students in Nigeria could not comprehend what they read at their grade level. They argued that this was as a result of lack of independent reading and background experience. As a result of their poor reading comprehension, they failed to recall and apply information from texts. This led to poor academic attainment, failure, frustration and drop out from school. A similar concern was raised in Zambia where more than 50% of the students who wrote twelfth grade final exam in 2008 scored less than half of the total mark in reading comprehension. Others scored between zero-5 marks out of 20. It is argued that this may have been as a result of poor reading skills (Chazangwe, 2011).

The situation is not any different in Kenya where Kenya National Examination Council (KNEC, 2014) reported that performance in English paper two which tests reading comprehension improved marginally by 0.24 points from 28.53% in 2011 to 28.77% in 2012 and then dropped drastically to 17.98% in 2013. The report further revealed that, most candidates could neither recall information read from text nor infer. It was suggested that students need to be taught how to make inferences and deductions from clues in the text. Ministry of Education Science and Technology, MoEST, (2016), announced that performance of candidates in the 2015 KCSE examination in English recorded a national mean score of 40.29% (D+), which is way below the average grade
In Kenya, English is the official language as well as the language of instruction. As such, comprehending what is read in English is a key determining factor of the performance in most of the school subjects offered in the curriculum (Kibui & Athiemoolam, 2012). Despite this fact, students continue to register poor reading comprehension performance.

Uwezo, a research organization that monitors educational achievement, reported that, despite significant gains in school enrolment, pupils are not learning core skills such as reading comprehension skills expected at their age and grade level in Kenya, Uganda, and Tanzania (Uwezo, 2015, 2016). The study focused on learning facilities and children’s socio-economic background, age, and teacher-pupil ratio school type. Their concern was also expressed by Kibui and Athiemoolam (2012) who pointed out at the national concern in Kenya about inadequate comprehension of texts in English by children of all levels of learning.

According to Dinga (2011), pupils appear to have a basic idea about text reading. However, some pupils lack basic but important skills such as making reference to the text when answering comprehension questions. This could be lack of metacognitive knowledge of reading strategies and their application. The present study sought to investigate metacognitive knowledge and cognitive reading strategy use among high school students.

In Kiambu, Macharia (2013) found that, due to the demanding integrated English curriculum, there was no enough time for teachers to teach all the required skills in
English language. This could lead to poor reading comprehension as reading skills are among the skills taught in the English language curriculum. However, in his study on factors leading to poor performance among high school students in Lari Sub County, Mwaura (2014) found that parents’ level of education and their socio economic status influenced students’ performance in English and other school subjects. This study indicates that in Lari Sub-County, there is poor performance in English as a subject. Mwaura (2014) did not focus on areas of English subject that are worst performed, neither did he look at cognitive and psychological factors that may lead to the poor performance. The current study looked into cognitive and psychological factors that may affect reading comprehension which is a key factor in performance of any subject area.

Studies have also reported gender differences in reading comprehension with most studies reporting significant gender differences in favour of girls. According to Logan and Johnson, (2010), there were gender differences in reading in the United Kingdom. They explained that this could be as a result of gender differences in attitude towards reading and motivation. Similar concerns were raised by UNESCO, (2011) in Vietnam. UNESCO underscored the importance of understanding how the two genders read and the source of any gender inequalities. This according to UNESCO, (2011) would help improve reading comprehension among both boys and girls. They also emphasized that understanding the cause of gender differences in learning outcomes is a crucial step to establishing effective instructional intervention in dealing with quality and inequalities concerns.
In South Africa, Madoda, (2016) reported that among grade three rural learners; girls had better reading comprehension performance than boys. Similar concerns were raised in Kenya by Uwezo, (2015) where girls were reported to have higher reading comprehension performance than the boys in primary schools in most of the counties in Kenya.

Researchers have shown a lot of interest in the role of metacognitive knowledge also referred to metacognitive awareness in reading comprehension performance. According to (Flavell, Miller, & Miller, 2002), for comprehension to take place the reader must possess metacognitive knowledge. This includes: person knowledge (knowledge about one’s strengths and weaknesses as a reader), task knowledge (knowledge about the characteristics of the text such as its purpose and the demands) and strategy knowledge (knowledge of techniques or strategies available for use in achieving reading comprehension. Possession of appropriate metacognitive knowledge makes one a good and successful reader (Vandergrift, 2003).

Research findings show that, metacognitive knowledge has positive influence on reading comprehension performance. Person knowledge has been found to have a significant influence on learners’ reading comprehension (Li, 2012; Tubing, 2013 & Mwaniki, 2015). Training of task knowledge, person knowledge and strategy knowledge among learners has been found to improve their comprehension performance (Ismael, 2015).
Another prerequisite to successful reading comprehension is the quality and quantity of reading strategies (Noli & Sabariah, 2011). Reading strategies are defined as deliberate, conscious techniques that readers employ to enhance their comprehension or retention of information from texts (Choo, Eng & Ahmad, 2012). Mokhtari and Sheorey, (2002) classified reading strategies into three types namely: global reading strategies, problem solving reading strategies and support reading strategies, which the current study adopted. Reading strategies are important in helping the learners’ reading process and providing them with clear sense of direction on what they are actually digesting while reading (Li, 2010). Studies have shown that, awareness and use of reading strategies have a significant influence on the learners’ reading comprehension at all educational levels (Alhaqhani & Riazi, 2012; Clarisse, 2011; Madhumathi & Ghosh, 2012; Mebratu, 2014 & Dinga, 2011).

However, use of reading strategies has been found to interact with metacognitive knowledge to determine reading comprehension. A metacognitively skilled reader will attempt to construct meaning of the text, keenly select appropriate strategies, monitor and evaluate their use of strategies. These readers recognize and rectify comprehension failures to enhance reading comprehension (Singhal, 2001). Students therefore need to have a high metacognitive knowledge base for them to be successful in reading comprehension tasks.

Studies on the influence of reading strategy use and metacognitive knowledge from developed countries are available. These studies show that metacognitive knowledge
and reading strategy use are key factors in reading comprehension and general academic performance. However, these studies do not address the students from developing countries who are likely to have different educational experience from those in developed countries. Secondly, most studies have focused on students at university level, creating the need to address lower levels such as secondary school students. Metacognitive knowledge and reading strategy use of the university students used as samples in some of these studies, is likely to differ from that of secondary school students due to age and educational background differences. Studies carried out in Kenya and in Kiambu on poor reading comprehension have not addressed whether reading strategy use and metacognitive knowledge influence reading comprehension performance among the secondary school students. Kenyan studies (Dinga, 2011 & Mwaniki, 2015) on strategy use and metacognition were mainly carried out in primary schools. There was, therefore, need to investigate these two variables in relation to reading comprehension among Kenyan secondary school students.

The current study addressed this gap by investigating whether metacognitive knowledge and cognitive reading strategy use predicted reading comprehension among form three students in Lari Sub-County of Kiambu County, Kenya. It will also investigate gender differences in metacognitive knowledge and cognitive reading strategy use as some of the factors that affect reading comprehension performance.
1.2 Statement of the Problem

Performance in English subject at KCSE in Lari Sub-county has been below the average grade of C for the last five years (Appendix IX). Students’ overall performance in KCSE has also been below average grade (C) and the worst among the three sub counties of the former Kiambu West District for the same period of time (Appendix X). This situation is worrying considering the repercussions of academic failure. Persistent low achievement in any school subject may lead to motivational insufficiency, low self-esteem, truancy and poor academic performance in general. Poor performance in school limits the students’ chances of advancing in their education and in their desired career choices. The long term effects would be poor socio-economic development; increased crime rates and lack of qualified workforce in the country.

It is therefore of paramount importance that students perform well in school. For a student to perform well examinations, they should have the ability to comprehend what they read and apply the information when writing exams. Lack of the ability to comprehend instructional texts may be the cause of poor academic performance in Lari Sub County. This situation can be reversed by investigating and understanding some of the key factors that interact to influence reading comprehension performance and thereafter provide proper guidance to assist students improve their reading comprehension.

Studies indicate that a number of factors influence reading comprehension. Studies done in the developed countries indicate that metacognitive knowledge and reading strategy
use predict reading comprehension performance. However, these studies do not indicate which of the two constructs is a better predictor and how the two constructs predict reading comprehension performance jointly among high school students in the African context. The findings from these studies are from different cultural background from that of the Kenyan students and may not be generalizable to Kenyan students in anyway. There is therefore need for local research to exhaustively investigate and understand these two variables to inform reading practice and assist our students improve their reading comprehension performance. The main focus of the current study was to examine how metacognitive knowledge and cognitive reading strategy use predicted reading comprehension performance of form three students in Kiambu County, Kenya.

1.2.1 Purpose of the Study
The present study aimed at examining the relationships between metacognitive knowledge, cognitive reading strategy use and reading comprehension performance among form three students in Lari Sub-county in Kiambu County. The study also sought to determine the predictive value of metacognitive knowledge and cognitive reading strategy use in predicting reading comprehension performance of learners. Gender differences in metacognitive knowledge and reading strategy use were also investigated.

1.2.2 Objectives of the Study
The objectives of the study were as follows:

i. To find out the relationship between metacognitive knowledge and reading comprehension performance in Lari Sub County.
ii. To determine the relationship between cognitive reading strategy use and reading comprehension performance among high school students in Lari Sub County.

iii. To test for gender differences in metacognitive knowledge and cognitive reading strategy use among high school students in Lari Sub County.

iv. To determine the predictive value of metacognitive knowledge and cognitive reading strategy use in predicting learners’ reading comprehension performance among high school students in Lari Sub County.

1.2.3 Research Questions

The following research questions were addressed in the study:

i. What is the relationship between metacognitive knowledge and reading comprehension performance among high school students in Lari Sub County?

ii. What is the relationship between cognitive reading strategy use and reading comprehension performance among high school students in Lari Sub County?

iii. What are the gender differences in metacognitive knowledge and cognitive reading strategy use among high school students in Lari Sub County?

iv. What is the predictive value of metacognitive knowledge and cognitive reading strategy use in predicting learners’ reading comprehension performance among high school students in Lari Sub County?
1.3 Significance of the Study

More knowledge may be created from the findings of the current study, adding onto the already existing knowledge on metacognitive knowledge and reading strategy use. This includes how they relate to improve reading comprehension performance for better performance in all content areas. The study may also inform secondary school curriculum developers to design appropriate teaching materials related to metacognitive knowledge and reading strategies that teachers can utilize to assist students enhance their reading comprehension performance.

The findings from this study may also benefit teachers of English in two ways: First, it may highlight the levels of metacognitive knowledge and reading strategy use by the students which the teachers may not be aware of; Secondly, it may create awareness among the teachers on the need to lay more emphasis on training the poor performing students to enhance their metacognitive skills and their use of reading strategies for better comprehension and general academic performance.

1.4 Limitations and Delimitations of the Study

1.4.1 Limitations of the Study

The predictor variables were not manipulated; therefore causal relationships among the predictor variables and the outcome variable were not established. Secondly, the application of the findings of the current study to students outside Lari Sub County may not be possible as the sample only included high school students from Lari Sub County. Thirdly, the data collection was mainly done through self-report by the students which
may have introduced a degree of subjectivity. The researcher triangulated the findings by using an observational checklist for cognitive reading strategy use. Finally, although many variables could affect reading comprehension performance, this study investigated only two factors.

1.4.2 Delimitations of the Study

The study was restricted to only form three students from both public and private secondary schools in Lari Sub County in Kiambu County. This is because the sub county has been below the average grade (C) in KCSE English performance and was also ranked last in KCSE for the last three years among the three Sub counties that were formerly under Kiambu West District. There are many other factors that may predict reading comprehension, but this study was only focused on metacognitive knowledge and cognitive reading strategy use.

1.5 Assumptions of the Study

During the study, the following assumptions were made: first, that the students were honest and that they gave correct information about their metacognitive knowledge and their perceived use of cognitive reading strategies. Secondly, it was assumed that all the selected students had gone through similar learning experiences. This assumption was based on the fact that all schools that were selected followed the same secondary education curriculum and were selected from the same Sub County. Finally, it was assumed that the students had already developed some metacognitive knowledge, that
they used reading strategies while reading text and that they already had some level of reading comprehension abilities.

1.6 Theoretical and Conceptual Framework

1.6.1 Metacognition Theory (Flavell, 1979)

The study was guided by metacognition theory by Flavell (1979).

Flavell proposed a formal model of metacognitive monitoring which incorporated metacognitive knowledge and metacognitive experiences. Flavell identified the first category as metacognitive knowledge. He defined metacognitive knowledge as acquired knowledge or beliefs on factors that affect our cognitive activities. Metacognitive knowledge is divided into three categories: Person variables, task variables and strategy variables.

The person category of knowledge is the general knowledge about how humans learn and about a person's knowledge and beliefs about him/herself as a learner. An example is the belief such as a person believing that she/he can learn better by listening than by reading. Such beliefs about oneself as a learner may enhance or hinder performance in learning.

The task category of metacognitive knowledge is knowledge about the nature of a task and its processes and demands. This knowledge guides the individual in the management of a task, and provides information about the degree of success that he/she is likely to produce. Task information can be adequate or inadequate.
The strategy category of metacognitive knowledge includes knowledge about cognitive and metacognitive strategies, as well as knowledge of when and where these strategies can be used. This involves identifying goals, for example comprehension, the sub-goals and selection of cognitive strategies/processes to use in achieving the goal.

In discussing metacognitive strategies, Flavell (1979) states that, for a reader to achieve a goal, she/he depends heavily on both metacognitive knowledge and metacognitive experience. Flavell states that metacognitive experiences are items of metacognitive knowledge which may include evaluation on how far one is in completing the task. It may also be a feeling of confusion which a reader may or may not want to act on. Metacognitive experience helps the reader know whether what they are reading makes sense. When they lose meaning of the text, they often apply one or more reading strategies to help them regain the meaning of what they were reading. The current study did not study metacognitive experiences as a variable because according to Flavell, its part of Metacognitive knowledge items.

This theory was extended by Brown, (1987). She said that metacognition consisted of two components namely: knowledge about cognition and regulation of cognition. She defined knowledge of cognition as information that human thinkers have concerning their own cognitive processes. Regulation of cognition was defined as activities used to regulate and oversee learning. These activities may include planning activities, monitoring activities during learning and checking outcomes at the end of the task. According to Brown (1987), compared with features of knowledge about cognition,
regulation of cognition was considered to be unstable and also age independent. This extension of the theory by Brown, 1987 also informed the researcher’s classification of metacognition components into metacognitive knowledge and reading strategy use.

In relation to the current study, the theory explains the function of metacognitive knowledge and use of reading strategies in enhancing reading comprehension. According to Flavell et al., (2002), skilled readers have more knowledge on their reading abilities (person knowledge), purpose and demands of the text/task at hand (task knowledge), and the reading strategies available and their appropriate use in achieving a cognitive goal (strategy knowledge). Metacognitive theory proposes that, metacognitive knowledge leads to metacognitive experience. Through metacognitive experience, a reader who possesses a strong metacognitive knowledge is able to use reading strategies effectively to overcome barriers. This in turn leads to better reading comprehension. This suggests that metacognitive knowledge and reading strategy use may jointly influence reading comprehension.

This theory was used successfully by Mwaniki (2015) as a guide to her study on metacognition and attitude towards reading as predictors of reading comprehension among class six pupils in Dagoreti Division in Nairobi. Although these pupils were younger than those in the current study, Flavell (1979) did not limit the application of this theory to a particular age group. The theory, therefore, adequately guided the current study in the investigation of the correlation between metacognitive knowledge, cognitive
reading strategy use and reading comprehension of form three students in Kiambu County, Kenya.

1.6.2 Conceptual Framework
Figure 1.1 shows that the main variables of the study were: Metacognitive knowledge and cognitive reading strategy use as the predictor variables and reading comprehension as the outcome variable. It was hypothesized that reading comprehension was influenced by metacognitive knowledge sub scales (person knowledge, task knowledge, and strategy knowledge) as well as the use of different sub scales of cognitive reading strategies. A student with high scores in metacognitive knowledge sub scales and in the three sub scales of cognitive strategy use is likely to have a good reading comprehension. In contrast, a student with low scores in metacognitive knowledge sub scales (person knowledge, task knowledge, and strategy knowledge) and cognitive strategy use in the three sub scales (global reading strategy use, problem solving reading strategy use and support reading strategy use) is likely to have a poor reading comprehension. Metacognitive knowledge and cognitive reading strategy use were hypothesized to interact to influence the outcome of reading comprehension. Thus, a student with high scores in metacognitive knowledge sub scales was likely to use cognitive strategies in the three sub scales more and effectively. This would then lead to good performance in reading comprehension. On the other hand, a student with low scores in metacognitive knowledge sub scales was likely to use cognitive strategies in the three sub scales less and ineffectively. This student would therefore perform poorly
in reading comprehension. Gender as an intervening variable, was hypothesized to bring about differences in metacognitive knowledge, cognitive reading strategy use and reading comprehension performance.

**Figure 1.1. Conceptual Framework**

**Source:** Researcher, 2018
1.7 Operational Definition of Terms

**Metacognitive Knowledge:** The overall score that a student obtained on the Metacognitive Knowledge Questionnaire, on their evaluation metacognitive knowledge sub scales.

**Person-knowledge:** A score obtained by a student on awareness about their abilities and attitude towards a task on the Metacognitive Knowledge Questionnaire.

**Reading Comprehension performance:** The average score a student obtained from two reading tasks given.

**Cognitive Reading Strategy Use:** The score a student obtained on Cognitive Reading Strategy use Questionnaire.

**Strategy Knowledge:** A score that a student obtained on awareness about reading strategies on the Metacognitive Knowledge Questionnaire measured at the interval scale.

**Task Knowledge:** A score that a student obtained on awareness about text on the Metacognitive Knowledge Questionnaire measured at the interval level in the current study.
CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction
The chapter focused on review of literature linked to the variables of the current research. This was so as to identify gaps in methodology, theory and practice in the previous studies, which the current study intended to fill. The chapter contains review of literature related to metacognitive knowledge, reading strategies, and their relationship to reading comprehension performance.

2.2 Metacognitive Knowledge and Reading Comprehension Performance
Many research studies have been carried out on the relationship between metacognitive knowledge and reading strategy use. These studies reveal different relationships between the two variables. Some studies show that there is a significant relationship, while other studies find no significant relationship between the two variables.

Lahuerta (2011) carried out a study on the relationship between metacognitive awareness and reading in English as a foreign language among the Spanish university students. Sixty six second year students who were Spanish native speakers participated in the experimental study. The researcher used a metacognitive questionnaire to collect information on the students’ perceived reading ability in English as a foreign language and their silent reading strategies. The findings revealed a positive relationship between metacognitive awareness and reading comprehension. Given that the subjects were college students from a western country, their age as well as their educational
background and socio-cultural background may be a key factor in their awareness of reading strategies and reading comprehension. The study by Lahuerta (2011) also did not examine the students’ metacognitive knowledge which is believed to play a key role in choice of reading strategies. The current study investigated reading strategy use as well as metacognitive knowledge among Kenyan high school students. The current study also used survey method as opposed to experimental method used in (Lahuerta, 2011). The experimental method tends to use a small sample which may not be representative of the larger population.

Zare and Mubarakeh (2010) conducted a study to investigate self-efficacy (person knowledge) and strategy use of 45 Iranian senior high school students. The participants, with an age mean of 18 years, were randomly selected. A self-efficacy questionnaire was used and results indicated that, reading self-efficacy and overall reading strategies and categories of reading strategies are significantly positively related. Since the above study was carried out among high school students in Asia, the current study was necessary since these two groups of students are in different learning environments.

In another study, Memis and Bozkurt (2013) investigated the relationship between metacognitive awareness, motivation, reading levels and reading comprehension success of fifth grade students in Turkey. Five hundred and seventy seven boys and girls with a mean age of nine years participated in the study. A reading comprehension test was used to measure reading comprehension success. Metacognitive awareness was measured using metacognitive Reading Comprehension Awareness scale. The results
revealed that there was a moderately significant relationship between reading comprehension and metacognitive awareness. The current study was still necessary since the findings from the reviewed study may not be generalizable to the Kenyan secondary school students given the age differences between the two samples.

Adbelaal and Sase (2014) carried out a study to examine the relationship between background knowledge of a topic (task knowledge) and reading comprehension. The study involved 20 postgraduate students (12 males and eight females) from Universiti Putra Malaysia. They used two reading passages and data was analyzed using Pearson’s product moment correlation. The findings revealed that there was a significant relationship between background knowledge of a topic and reading comprehension. Adbelaal and Sase (2014) used a sample of postgraduate students whose age and academic experience is more advanced than that of secondary school students. Moreover, the study investigated only one component of metacognitive knowledge, leaving out strategy knowledge as well as person knowledge. The current study sought to fill these gaps by drawing a sample from Kenyan secondary schools students and investigating the relationship between the three components of metacognitive knowledge and the students’ reading comprehension performance.

The findings of Memis and Bozkurt (2013) concur with the findings of the study of Anjomshoaa, Golestan and Anjomshoaa (2012) which examined the role of metacognitive awareness on reading comprehension among undergraduate of English studies in Iran. They were female and male Iranian students of between the age of 19
and 20 years. Metacognitive Reading Strategy Questionnaires (MRSQ) and TOEFL reading comprehension sub-set (TOEF-RBC) were used to obtain data from 81 university students. The results of the study revealed a moderate positive and significant relationship between metacognitive awareness and performance in reading comprehension. Both studies were neither done in Kenya nor among high school students. This necessitated the current study to fill the gap on the relationship between metacognitive knowledge and reading comprehension performance among Kenyan high school students. This is owing to the fact that the two samples have educational background differences (as they go through different educational systems) and age differences.

Uwezo (2015) carried out a study on 130,653 class two to class eight pupils (eight to 16 years old) in 156 Districts of Kenya. The survey study measured the ability of the pupils to read and comprehend. The study considered factors such as: social-economic background, school type, gender, age, and teacher-pupils ratio. Reading comprehension was tested using a story for each class level. From the findings, seven out of 10 class three pupils could not read and comprehend a class two level English story. In class eight, four out of 100 pupils could not read and comprehend a class three story. These findings may not be generalized to a high school situation. The current study was, therefore, necessary. Uwezo (2015) did not consider other learner factors that affect comprehension. The current study investigated metacognitive knowledge of the learners as a predictor of reading comprehension.
Kibui and Athiemoolam (2012) carried out a study among form two Kenyan learners to examine their comprehension and vocabulary. The employed three reading comprehensions with multiple choice and interpretive questions 422 grade 10 leaners (of between 15-19 years of age) representing 16 schools from four provinces (Nairobi, Central, Coast, Eastern, North Eastern, Rift Valley, Nyanza and Western) of Kenya. Descriptive method was used in the study. The results revealed that 60% of the learners have a low level proficiency in comprehension. The finding also revealed that the learners were unable to recognize the purpose of the text. It was necessary to study how all metacognitive knowledge sub scales predict reading comprehension. The current study used descriptive as well as inferential statistics in analyzing data to give deeper interpretation of the data. The current study was also carried out among the form three students which is a grade high than the sample in (Kibui and Athiemoolam, 2012).

2.3 Reading Strategy Use and Reading Comprehension Performance

Studies on relationship between reading comprehension and reading strategy use are available mostly from Asia and western countries. Few studies on reading strategy use and reading comprehension are available from Kenya. These studies show varied findings on the relationship of these two variables. Some of the studies show significant relationship and other show non-significant between the two variables.

In his study, Karbalaei (2010) carried out a survey study to investigate whether there were any significant differences between EFL and ESL readers in metacognitive reading strategies use while reading academic texts in English. One hundred and ninety
undergraduate students; ninety three Indians and ninety six Iranians completed metacognitive awareness of reading strategies questionnaire after a reading test. Fifty four per cent of the Indians were males while forty six per cent were females. Among the Iranian subjects, thirty two per cent were males and sixty eight per cent were females. The mean age for the Indians was 20 years while that of the Iranians was 22 years. The results indicated that both groups reported a similar pattern of strategy awareness. However, Indians showed a greater knowledge as well as application of global strategies.

These findings may suggest that, students’ cultural and educational background may be a key factor in determining their knowledge and application of reading strategies; this made it necessary to embark on the current study. The reviewed study did not investigate whether the awareness of reading strategies necessarily led to better reading comprehension. This is one of the objectives of the current study. The sample of the reviewed study consisted of university students from Asia; the current study involved Kenyan secondary school students in examining reading strategy use as a determinant of performance in reading comprehension. There may be a factor of differences in learning environments and the age of the participants in these two studies.

Molla (2015) carried out a correlational study on reading strategy use and reading comprehension among Ethiopian EFL learners. The participants were 30 male and 10 female second year university English majors. A reading comprehension test and a reading strategy inventory were used. The findings revealed that Ethiopian EFL learners
used reading strategies moderately and that their reading comprehension is below what is expected of them. Reading strategy use was neither positively nor negatively correlated to reading comprehension. The sample size for this study was too small and may not have been representative of the larger population. Although the study was carried out in an African country, the findings may not be a true reflection of the situation in Kenya due to differences in social, political and educational backgrounds, hence the need for the current study.

Fitrisia, Tan and Yusuf (2015) sought to find out the relationship between metacognitive awareness and reading strategies in improving students’ performance in reading comprehension. Two hundred and seventy two boys and girls of 17-18 years from five secondary schools in Banda Aceh, Indonesia were involved. Two standardized English reading comprehension tests and the Metacognitive Awareness of Reading Strategies (MARSRI) were employed in the study that used correlational design. The study revealed that the level of MARSRI for problems solving reading strategy use was higher than for global strategy and support strategy use. Although the study was conducted among high school students like the current study, the educational system as well as the learning environment may be different from that of Indonesia. It was therefore necessary to conduct a study among the Kenyan high school students for more conclusive results.

A study by Ghafourma and Afghari (2013) investigated the interaction between reading ability, strategic skills and reading comprehension performance of five hundred and six
post graduate Iranian EFL students. A reading comprehension test and a metacognitive strategy questionnaire were employed in data collection. The findings revealed that students with high reading proficiency used metacognitive strategies more frequently than those at low and intermediate levels of reading proficiency. Metacognitive awareness had a positive correlation with the students’ reading comprehension. The study concluded that there was a positive interaction between the students’ language ability and use of reading strategies. The use of self–report questionnaire may have introduced subjectivity in the findings. The current study used questionnaires as well as an observation checklist. The sample of the current study was drawn from high school students in Kenya. The age and the social-cultural background are different from those of the sample used by (Ghafourma & Afghari, 2013).

A descriptive study by Anne (2014) investigated cognitive reading strategies frequently used among Indonesian English as Foreign Language (EFL) university students in a university to improve their performance in reading comprehension. The study also investigated the reading strategies considered most helpful in answering questions in reading comprehension test successfully. The study employed a self-report questionnaire administered to 76 students and Think-aloud protocols were conducted with 15 students. Results showed that the most frequently used cognitive reading strategies were: using the title to prediction and (global strategies), use of dictionary (support strategies). Think-aloud protocol has a limitation as it is said to interfere with the reading process. The current study used observational method to collect qualitative data to support data
from the reading strategy use questionnaire. These data collection methods are considered less interruptive. The study did not investigate whether the reading strategies determined reading comprehension performance. This was investigated in the current study.

Zhang and Wu (2009) carried out a descriptive study to assess metacognitive awareness and reading strategy use of Chinese senior high school students learning English as a Foreign Language (EFL). Two hundred and fifty form two students responded to a 28-items survey of reading strategy (SORS). The findings showed that, the students in high proficiency group outperformed the low, and the intermediate groups in two categories of reading strategy use: global reading strategy use and problem solving reading strategy use. The study was carried out among Chinese high school students whose learning environment may be different from that of Kenyan high school students. The study did not investigate the metacognitive knowledge and its relationship with reading comprehension. This was one of the objectives of the current study. Unlike the study by Zhang and Wu (2009), the current study used observation method to study reading strategy use.

Tabatabaee and Lofti (2014) investigated the relationship between metacognitive awareness of reading strategies and critical reading ability among Iranian EFL advanced learners using a correlational design. The study involved 113 third year and fourth year male and female students majoring in English translation/ Literature. The students were between 21-36 years of age. The research instruments used in the study were: Nelson
test of proficiency and a metacognitive awareness of reading strategies inventory (MARSI). The findings showed that there was a significant correlation between metacognitive awareness of reading strategies and their critical reading ability. However, this study was carried out among Iranian university students with a big age differences and learning experiences which could have affected the findings. Therefore, the findings cannot be generalized to high school students in Kenya. This made the current study necessary.

Shang (2011) explored the relationship between English as a Foreign Language (EFL) reading comprehension and reading strategy use among 180 Taiwanese second year undergraduate students. The study involved 62 males and 118 females majoring in English. The students were between the ages of 19-20 years. A questionnaire and a reading comprehension test were used. Results indicated that readers with the high proficiency level particularly used more testing strategies (support strategies) than students with low proficiency. This study agreed with Rastakhiz and Safari (2014) who investigated the relationship between global reading strategies and support reading strategies on Iranian intermediate EFL learner’s reading comprehension ability. The study involved 100 learners who responded to a Survey of Reading Strategy questionnaire and a TOEIC reading test. The results show that the learners preferred support reading strategies and that support strategies lead to better comprehension. The use of self-report only for data collection in these two studies may have introduced subjectivity in the findings of the reading strategies used. The current study used an
observational checklist as well as questionnaires. It was also necessary to carry out the current study to establish which of the reading strategies categories led to better reading comprehension among Kenyan high school students.

To assess metacognitive awareness of reading strategy use for university students in Saudi Arabia, Dawaideh, (2013) carried out a survey. The researcher used Metacognitive Awareness of Reading Strategy Inventory (MARSI) on 550 respondents (296 males and 281 females) of 19-22 years randomly selected undergraduate students. The results revealed that the students used problem solving reading strategies more followed by global reading strategies and support reading strategies both with moderate degree of use. These finding concurred with Li (2010) in a study of reading strategies used by senior middle school students in China. It was found that, students preferred problem solving reading strategies followed by global and support reading strategies. However, the studies only relied on questionnaires for the investigations and did not investigate the relationship of the reading strategies with reading comprehension. The current study employed a questionnaire as well as an observation checklist. Li, (2010) did not examine the predictive values of reading strategies in predicting reading comprehension.

The effect of reading strategy use on the Taiwanese EFL learners’ reading comprehension were investigated by Shang (2011) in a study that involved 110 university students (27 males and 83 females) majoring in English in Taiwan. The students were between the ages of 19-20 years. The students practiced reading strategies
such as predicting, vocabulary, previewing and inferences under guided learning to enhance students’ reading comprehension. The findings revealed that the students generally used more cognitive, testing strategies, rehearsal and eliminating techniques to achieve higher scores in reading comprehension. A weak correlation between reading strategy use and reading comprehension was also reported. In the study by Shang, (2011), the participants were only 110 undergraduate students in Taiwan, making it difficult to generalize the findings of the study to other students of different countries, age and educational backgrounds such as high school students in Kenya.

Adzmin et al., (2011) carried out a survey to measure university students’ awareness level of reading strategy and their perceived use of reading strategies while reading academic material. Sixty undergraduate engineering students were used in the study. The subjects who were all males of between 18-38 years (a mean age of 25.3) responded to a Survey of Reading Strategies questionnaire (SORS). The results indicated that the students used mainly problem solving reading strategies. The study relied solely on self-report from the university students.

The findings of Adzmin et al., (2011) are in agreement with the findings in the study of Alhaqbani and Riazi (2012) who investigated metacognitive awareness of reading strategy use in Arabic as a second language. One hundred and twenty two undergraduate students mostly from Africa (54.3%) and Asia (41.8%) completed a 30 item Survey of Reading Strategies questionnaire. Results indicated that this students perceived problem solving strategies as more useful than global and support strategies. The current study
employed observational method as well among form three students to find out if it had similar results among Kenyan high school students. Adzmin et al., (2011) used a sample of one gender whose age difference was big, so their findings are more likely to be biased and unreliable. The current study involved males and females to investigate any gender differences.

In a research by Clarisse (2011), university students from Philippine responded to a Reading Beliefs Inventory (RBI) and the Survey of Reading Strategies Inventory (SORS). They also sat for a reading comprehension test set by the researcher. The students were 113 males and 113 females of between 19-22 years (mean age of 17.7). The objective was to find out which was a better predictor of reading comprehension performance between metacognitive reading strategies and beliefs about reading/person knowledge. Only problem solving strategies had a positive correlation with reading comprehension performance. The reading beliefs of high school students in Africa and college students in Asia may be different due to age and educational level, educational background and learning environments differences, hence the need for the current study.

On various categories of reading strategy use, Rastakhiz and Safari (2014) investigated the relationship between global reading strategies, support reading strategies and reading comprehension performance of the Iranian intermediate EFL learners. One hundred learners all female (20-24 years) were selected to participate in the study. Test of English for International Communication (TOEIC) Reading test and the Survey of Reading Strategies Questionnaire were used to collect data. The findings revealed that
support reading strategies were used more than global reading strategies. Those learners that used support reading strategies were more successful in reading comprehension than those that used global reading strategies. The sample of the above study was biased since all the participants were females. It was therefore necessary to carry out the current study using a sample of both boys and girls to see what the outcome would be. Therefore the current study also investigated gender differences which Rastakhiz and Safari (2014) did not investigate.

Regionally, Mebratu (2014) carried out an experimental study on the effect of cognitive reading strategy training on English as Foreign Language learners’ comprehension skills in Ethiopia. A reading skills test was employed before and after cognitive reading strategy training for the experimental group. In addition a questionnaire was administered to both groups of 120 grade 10 students. The results revealed that cognitive reading strategy training has a positive impact on developing the students’ comprehension skills as the experimental group performed better than the control group in the test. The learners were found to be better in using strategies of extracting ideas from the text and poor in guessing and deciding on the idea of the text. From the results it would be important to further investigate the relative influence on reading comprehension, given cognitive reading strategy use of different sub scales and other factors such as metacognitive knowledge. The current study drew the sample from form three students and also employed observational method that the above study did not use, for more reliable findings.
Another study by Li (2012) assessed the role of metacognitive knowledge and vocabulary size in EFL academic reading of Chinese tertiary EFL learners. Five hundred and forty eight non-English second year University students (males and females) were involved. The research tools used were a questionnaire on metacognitive knowledge and a reading comprehension test. The results indicated that Chinese tertiary EFL metacognitive knowledge played a major role in EFL reading comprehension ability when vocabulary reaches above threshold of 3,000 words level. The difference in level of education as well as the difference in learning environment between these participants and the participants in the current study necessitated the current study.

Anastasiou and Griva (2009) in their study explored primary school students’ awareness of reading strategies and to identify possible differences between the poor and the good readers and reading comprehension in Greece. The participants were 18(10 boys and 8 girls) poor readers and 18(10 boys and 8 girls) good readers between the ages of 11 and 12 years from sixth grade. Retrospective interviews and reading comprehension tests scores were used. Poor readers were found to be less aware of more sophisticated cognitive reading strategies. It was also found that reading strategy awareness made unique contribution to text comprehension. The sample size for this study was too small to be representative of all sixth graders. Since the sample was drawn from an Asian population and consisted of primary school pupils, it was necessary to carry out this study to find out the situation of high school students in an African setting like Kenya. When a retrospective interview as a method of data collection is used, the participants
may not remember their previous experiences and may not give reliable information. A different method ought to have been used to complement it. The current study employed observation method to compliment the questionnaire.

Regionally, Ofodu and Adodipe (2011) carried out a survey study in Ekiti Nigeria to examine students’ metacognitive awareness and application of metacognitive strategies in comprehending academic material. One hundred and twenty secondary school boys and girls of between 14 and 19 years were involved. The students completed a Survey of Reading Strategy questionnaire. The findings revealed that, secondary school students were aware of metacognitive strategies in reading and comprehension exercises. It was also revealed that they applied these strategies and that there was a significant relationship between students’ awareness, application of metacognitive reading strategy use and proficiency in reading comprehension. The study did not investigate how metacognitive awareness/knowledge and application of metacognitive reading strategies jointly predict performance in reading comprehension. The two studies above reviewed also investigated metacognitive awareness of reading strategies but did not investigate metacognitive awareness/knowledge of self and task which are the other categories of metacognitive knowledge. The current study investigated all the three sub scales of metacognitive knowledge to establish which of them is a better predictor of reading comprehension performance. It also used an observational checklist alongside a questionnaire for more conclusive findings.
Recently, Alfaki and Siddiek (2013) in their experimental study used a previewing strategy called THIEVES (previewing Titles, Headings, Introductions, Every first sentence, Visuals, and End of chapter Summary) in Sudan. The aim was to investigate the role of activating background knowledge in reading comprehension through text previewing. The study involved 40 third year secondary school students between 17 and 18 years of age. A positive correlation between pre-reading activities (global reading strategies) and better reading comprehension performance was found. The study did not investigate the while reading (problem solving reading strategies) and post reading (support reading strategies) activities which was one of the objectives of the current study.

Athiemoolam and Kibui (2012) carried out a study among form two Kenyan learners to examine their comprehension and vocabulary. The employed three reading comprehensions with multiple choices and interpretive questions 422 grade 10 leaners (of between 15-19 years of age) representing 16 schools from four provinces (Nairobi, Central, Coast, Eastern, North Eastern, Rift Valley, Nyanza and Western) representing 16 schools from four provinces in Kenya. The study employed quantitative method. The results revealed that 60% of the learners have a low level proficiency in comprehension. The finding also revealed that the learners were unable to make calculated guesses, infer from the text and lacked predictive as well as interpretive silks. It was important to investigate how cognitive reading strategy use predicts reading comprehension.
In Kenya, Dinga (2011) in his study investigated use of cognitive reading strategies for explicit and implicit text meaning by primary school pupils in Kisumu municipality. The study used *ex post factor* design and an observation checklist as the instrument to observe the behaviour of 758 standard seven and five pupils (boys and girls) as they read. Their age means were 11, 12 and 12 for urban, peri urban and rural respectively. The study revealed that cognitive reading strategy use was positively and significantly correlated to reading comprehension. Since age difference may be a factor in reading strategy use, the current study investigated reading strategy use and metacognitive knowledge among high school students using a predictive correlational design.

### 2.4. Gender Differences in Metacognitive Knowledge and Reading Strategy Use
Research has been carried out to investigate the issue of gender differences in metacognitive knowledge. Results from some studies seem to confirm the assumption that metacognitive knowledge for boys is significantly different from that of girls. However, other studies found that there were no significant gender differences in metacognitive knowledge.

Other studies have focused on gender differences in reading strategy use. Some studies found significant differences will other found insignificant gender differences in the two variables. This section will focus on various studies that investigated gender difference in metacognitive knowledge either together or separately.

Griva, Anastasia and Klio (2011) conducted a study to determine correlation between gender, reading preferences and reading strategies of 206 boys and 199 girls (M= 11.21
years old) fifth and sixth graders in Greece. Data from retrospective interview revealed that the female students’ flexibility in strategy use and their metacognitive awareness was higher compared to male students. This findings are however not generalizable as this study was carried out among students of different level of education, age and learning environment from that of the participants of the current study.

Contrary findings were reported by Munsakorn (2012) in a study carried out on awareness of reading strategies among EFL learners at Bangkok University. Huge similarities were found in reading strategy awareness among males and females. The results on the reading strategy awareness indicated that there was no statistically significant difference between males and females in terms of overall strategy \( (p = 0.05) \). Males and females used same number of overall strategies \( (M = 3.60) \) and did not differ significantly on any individual reading strategies. The current study was carried out among high school students in Kenya. This was so as to find out whether among younger high school students with a different educational background, gender differences in metacognitive knowledge and reading strategy use existed or not.

The findings of Munsakorn (2012) were echoed by those of Yarahmadi (2011) who conducted a descriptive survey study on gender differences in use of problem solving strategies among 108 male and female senior English translation students at Islamic University in Iran. The researcher used a Metacognitive Awareness of Reading Strategies Inventory (MARSI). The students were between 23 and 26 years of age. No
significant gender differences were found. The current study was important to investigate whether this is the case among Kenyan high school students.

In Romania, another study by Liliana and Lavinia, (2011) on gender differences in metacognitive skills using Junior Metacognitive Awareness Inventory, both boys and girls were found to use their general metacognitive skills in learning. However, gender differences were found in: knowledge about one’s own intellectual strengths and weaknesses, perception of performance as a result of one’s will and effort, perceptions regarding teacher’s expectations and use of various learning strategies and monitoring the learning process. The study involved 91 pupils (38.9% boys and 61.1% girls) from three schools in Romania. The subjects mean age was 14.62 years. This study was conducted among primary school pupils in Romania, it is therefore important to investigate whether or not gender differences in metacognitive awareness exist among high school students in Kenya.

In Africa, one of the studies that reported non-significant gender differences in awareness and use of effective study techniques was that of (Agina-Obu, Amakiri, & Emesiobi 2011). The study was carried out to investigate awareness and use of effective study techniques among post basic students in Rivers State in Nigeria. A Students’ Awareness and Use of Effective Study Techniques Questionnaire (SAUESTQ) was completed by 400 post basic students (200 males and 200 females) from 10 secondary schools. Although this study was carried out in a high school in an African country, the educational curricula of Kenya and that of Nigeria might be different and this may bring
about difference in the findings. This made it necessary for the current study to be conducted.

Madoda (2016) explored gender differences in reading comprehension of 95 pupils (49 boys and 46 girls) of between eight and 10 years old form rural Isixhosa, South Africa. A test of English reading comprehension and a test of Isixhosa reading comprehension were administered. T-test was used to determine whether there was a significant gender difference in reading comprehension. The findings showed that there was a significant gender difference in English comprehension in favour of girls. The recommendation was that the teachers encourage boys to read widely and policy makers to deal with the inequalities in education system in South Africa. In a different study, Ladipo and Gbotosho, (2015) investigated gender difference as a determinant of reading habits and academic achievement of undergraduate medical students in Nigeria. The study used a questionnaire and records of academic achievement and results showed that male students were better in academic achievement. No gender differences were found in reading habits. The current study was necessary due to age and educational level differences of the subjects involved.

Mwaniki (2015) carried out a correlational study on pupils’ metacognition and attitudes towards reading and how they correlate with reading comprehension performance. The study employed a reading comprehension test and questionnaires to obtain metacognition and attitudes towards reading. Three hundred and twenty class six pupils from selected public primary schools in Nairobi County were involved. The findings
showed no significant gender differences in pupil’s metacognition. There was need for the current study among secondary school student to investigate whether there are gender differences in metacognitive knowledge component of metacognition.

Dinga (2011) in his study investigated use of cognitive reading for explicit and implicit text meaning by primary school pupils in Kisumu municipality. The study used an ex post facto design was used. The research instrument was an observation checklist which was used to observe 758 class five and seven pupils (boys and girls) as they read. Their age means were 11, 12 and 12 for urban, peri urban and rural respectively. The study found that there was no significant gender difference in strategy use. However, apart from using a sample from primary schools, the study did not investigate gender differences in metacognitive knowledge a factor found to be crucial for effective strategies use. This was one of the objectives of the current study.

2.5 Predictive Value of Metacognitive Knowledge and Reading Strategy Use on Reading Comprehension Performance

Research on reading reveals the contributions of metacognitive knowledge and reading strategy use as predictors of reading comprehension performance. Some studies have shown the two variables as significant predictors of reading comprehension while other studies found them to be non-significant predictors.

Using metacognitive Awareness Reading Strategy Inventory (MARSI), Estacio, (2013) conducted a study among 30 Philippine students that investigated their metacognitive
awareness and perceived use of reading strategies. Reading comprehension tests on recall were also used to measure reading comprehension. The study concluded that none of the two variables was a predictor of reading comprehension performance. Owing to the differences in curricula, home and school environment, it was important to carry out the current research among Kenyan students to obtained more conclusive results.

On the other hand, Memis and Bozkurt (2013) examined the relationship of metacognitive awareness, reading motivation, reading levels and reading comprehension ability. The study was among 570 grade 5 pupils age 9 years from the Province Zonguldak District of Eregli in Turkey. They used reading comprehension success test, metacognitive Reading Awareness comprehension Scale, and Reading Motivation Scale to establish the learners reading comprehension ability, metacognitive awareness and reading motivation respectively. Metacognitive awareness was found to be a positive predictor of reading comprehension. The current study sought to examine metacognitive awareness/knowledge as a predictor of reading comprehension among high school student in Kenya. The sample in the study of Memis and Bozkurt (2013) was from grade five while in the current study the sample was drawn from form three students. The study did not investigate reading strategy use as a predictor of reading comprehension performance. There was need therefore, to carry out this study.

In a study, Khonamri, (2009) investigated the relationship between ESL advanced students’ beliefs, metacognition and their strategic reading performance in Punjab University, India. The participants were 178(88.8% females and 11.2 males). Their age
was between 20 and 26 years. The researcher used questionnaires for beliefs and metacognition and learners’ strategic behaviour was studied using think-aloud analyses. The results showed that metacognitive knowledge had no significant role in strategic reading behaviour of the participants. However, it was found to be useful in facilitating their reading performance. Reading strategy use as a predictor of reading comprehension was not investigated. Use of think-aloud technique could have interfered with the reading process affecting the students’ reading performance. It was therefore necessary to conduct a study using a different method of data collection such as a questionnaire or an observation checklist as in the current study.

Locally, Mwaniki (2015) carried out a correlational study on pupils’ metacognition and attitudes towards reading and how they correlate with reading comprehension performance. The study employed a reading comprehension test and questionnaires to obtain metacognition and attitudes towards reading. Three hundred and twenty class six pupils from selected public primary schools in Nairobi County were involved. Metacognitive knowledge component of metacognition was found to be a better predictor of reading comprehension performance than metacognitive strategy use. Although this study was carried out in Kenya, it involved primary school pupils; this necessitated the current study among older participants to find out whether the situation was the same.

In another local study, Kulo, Onchera and Indembukhani (2014) investigated the influence of background knowledge on reading comprehension ability of form three
students in Kisumu. They employed classroom observation and students questionnaire on a sample of 256 boys and girls selected through systematic random sampling. The students were between 16 and 20 years of age. The results revealed that learners’ background knowledge (schemata) had significant influence in reading comprehension ability. However the study did not investigate the relative effect on reading comprehension performance of other metacognitive knowledge components and reading strategy use. Although this study was carried out among Kenyan secondary school students, the finding may not be generalizable to other counties in Kenya. The current study sought to find out if the situation is similar in other counties in Kenya.

2.6 Summary of Review of Related Literature

A number of studies on factors that affect reading comprehension performance have been reviewed. On the relationship between metacognitive knowledge and reading comprehension, majority of the studies reviewed found a positive correlation between the two variables. The relationships found ranged from weak to strong. Few studies, however, found no relationship between metacognitive knowledge and reading comprehension performance. Majority of the research studies reviewed on the relationship between reading strategy use and reading comprehension performance reported a positive relationship (with some reporting weak relationships) between the two variables. Few of the reviewed studies found no relationship between reading strategy use and reading comprehension performance.
On gender differences in metacognitive awareness and reading strategy use, most of the studies reviewed reported non-significant gender differences in the two variables. Few studies reviewed, however, reported significant gender differences in metacognitive knowledge and reading strategy use.

Metacognitive knowledge was reported by most of the studies reviewed to be a better predictor of reading comprehension performance than reading strategy use. Two of the studies reviewed, however, reported reading strategy use as a better predictor of reading comprehension performance than metacognitive knowledge. This brings about inconsistencies that need to be addressed by the current study.

The bulk of the literature that was reviewed is from Asia, Europe and few African countries like Nigeria and Ethiopia where school and home environments may be different from those of Kenya. Some of the studies also involved older or younger students in universities, colleges, and primary schools. It is therefore important to note that, findings from such studies may not be generalizable to high school students from Kenya. Few local studies on reading comprehension, metacognitive knowledge and reading strategies use were available for review. The locally available studies mostly studied primary school pupils’ metacognition and use of reading strategies. The researcher, therefore, decided to embark on this study to fill these gaps by examining how metacognitive knowledge and cognitive reading strategy use determine reading comprehension performance among secondary school students in Kiambu County in Kenya.
Some of the reviewed studies used observation checklists, questionnaires, or think aloud protocols only. When used alone, these instruments have limitations and may not give conclusive findings. Considering these limitations, the researcher used questionnaires and an observation checklist for more conclusive findings. Other studies used experimental design which tends to use a very small sample whose findings may not be generalizable to the larger population. The current study used survey design in order to use a large sample.
CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction
This chapter explains the methodology used in the study to arrive at the findings. It covers the research design, research variables, location of the study and the target population of the study. The sampling procedures, sample size, research instruments, pilot study, reliability and validity, data collection procedures, data analysis procedures and logistical and ethical considerations are also discussed.

3.2 Research Design
The study adopted a predictive correlational design to establish the relationship between metacognitive knowledge, cognitive reading strategy use and performance in reading comprehension performance among the form three students. Predictive correlational design was chosen because it predicts the variance of one or more variables based on variance of another variable(s) (Sousa, Driessnack & Mendes, 2007). In this study, the predictive values of metacognitive knowledge and cognitive reading strategy use in predicting reading comprehension performance were investigated.

3.2.1 Research Variables
Students’ metacognitive knowledge and cognitive reading strategy use were the predictor variables in this study. The two predictor variables had three sub scales each. The three sub scales in metacognitive knowledge were: task knowledge, person knowledge and strategy knowledge. Metacognitive knowledge was inferred from a total
score at interval scale using a Metacognitive Knowledge Questionnaire (MCKQ) which consisted of 17 items.

For cognitive reading strategy use the sub scales were: global reading strategy use, support reading strategy use and problem solving reading strategy use. Cognitive reading strategy use was inferred from a total score at interval scale using a Cognitive Reading Strategy Use Questionnaire (CRSQ). The CRSQ consisted of 16 items. The scoring was done by adding a student’s score from each sub scale to get an aggregate score for CRSUQ from the Likert scale. The outcome variable was reading comprehension performance. The score for reading comprehension was the mean of two reading comprehension tests given to the students one week before data collection. The maximum score was 20. The students were classified into two: high comprehension (those who scored 11 and above) and low comprehension (those who scored ten and below). Gender, on categorical scale, was the intervening variable in this study.

3.3 Location of the Study

The research was undertaken in Lari Sub County, in Kiambu County. Data from Kiambu County Education office show that from the year 2012 to 2016, Lari Sub County was the last among all the three Sub Counties which were formerly under Kiambu West in the Kenya Certificate of Secondary Examination (KCSE) performance and scored a mean of below average in English (see appendix IX and X). It was hypothesized that deficiency in metacognitive knowledge leads to ineffective use of reading strategies and hence poor performance in reading comprehension. Poor performance in reading comprehension in
turn leads to poor academic performance since the students cannot extract information from text and apply it in writing examinations. Therefore, the students cannot provide the correct answers to the examination questions. This made it absolutely necessary to conduct this study in this location.

3.4 Target Population
The target population was all 7,744 (3,988 boys, 3,756 girls) students in all the 38 public and private secondary schools in Lari Sub County. The accessible population was the entire 1710 (872 boys and 838 girls) form three students in the eight schools selected through proportionate stratified sampling. Form three students were chosen because they have been in school longer than form one and two students. It was also assumed that their metacognitive knowledge and reading strategy use may be more developed than those of form one and two students. The form three students were also a few months from sitting for KCSE, as they were in second term. It was assumed that, the findings would reveal the metacognitive knowledge levels and reading strategy use of KCSE candidates. It was also assumed it would reveal how they determine reading comprehension performance among high school students. This may also indicate the kind of intervention needed; if any. The form four students were not chosen as they were busy preparing for their KCSE being term two of their final year.
3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Techniques

Although there are 12 sub counties in Kiambu County, purposive sampling was used to select Lari Sub County. This method was used owing to the continued poor performance of Lari Sub County for three consecutive years (see appendix IX). Purposive sampling was also used to select form three students. Form three students were chosen because they were assumed to have a more developed metacognitive knowledge and reading strategy use. They were also more available than the form fours. Proportionate stratified sampling was used to select schools and students from the strata of private schools and public schools. This ensured that the homogeneous subgroups were represented in the study in their proportions (Mugenda & Mugenda, 2003). The schools in Lari Sub County were stratified into public and private and the students were stratified into boys and girls. Simple random sampling was used to select the number of students needed form each selected school. A total of 32 students (10% of the total sample) were sampled from the study sample using simple random sampling for observation of reading strategy use.

3.5.2 Determination of the Sample Size

The sample size for each different genders and for public and private schools was calculated using the equation for proportionate stratified sampling; \( n_h = \left( \frac{N_h}{N} \right) \times n \) (Kish, 1965). Where ‘\( n_h \)’ represents the sample of a stratum ‘h’, ‘\( N_h \)’ represents the population size for stratum ‘h’, ‘\( N \)’ is the entire population size and ‘\( n \)’ is the total...
sample size. Consequently, from the two school strata: six public schools and two private schools were selected yielding a total sample of eight schools. The proportionate stratified sampling yielded a total sample of 320 participants distributed across the selected schools thus: 125 boys from public schools and 38 boys from private schools; and 106 girls from public schools and 51 girls from private schools. Form three students were chosen because they have been in school longer than form one and two students and the form four were busy preparing for final exams being second of their final year. Nineteen per cent and 21% of the target population of schools and students respectively, constituted the sample size. According to Gorard, (2001), this percentage of a sample size is considered appropriate for a normal distribution. The sample size is presented in Table 3.1.

Table 3.1

Sample Size

<table>
<thead>
<tr>
<th>Schools</th>
<th>Boys</th>
<th>Girls</th>
<th>Sch.</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>28</td>
<td>670</td>
<td>565</td>
<td>125</td>
<td>106</td>
</tr>
<tr>
<td>Private</td>
<td>10</td>
<td>202</td>
<td>273</td>
<td>38</td>
<td>51</td>
</tr>
<tr>
<td>Sub totals</td>
<td>-</td>
<td>872</td>
<td>838</td>
<td>163</td>
<td>157</td>
</tr>
<tr>
<td>Total</td>
<td>38 (100)</td>
<td>1710 (100)</td>
<td>8 (21)</td>
<td>320 (19)</td>
<td></td>
</tr>
</tbody>
</table>

Note. ( ) percentage
3.6 Research Instruments

The study used five instruments to collect data from form three students: Cognitive Reading Strategy Use Questionnaire (CRSQ), Metacognitive Knowledge Questionnaire (MCKQ), a Pro forma summary of student’s performance in reading comprehension, a reading comprehension passage and an observational checklist.

3.6.1. Metacognitive Knowledge Questionnaire (MCKQ)

The metacognitive knowledge questionnaire (Appendix II) consisted of two parts; Part A and B. Part A sought for information on the gender, age and school type of the participants while part B sought to find out the metacognitive knowledge of the students. To determine the metacognitive knowledge of the participants and for data on all the other objectives related to metacognitive knowledge, the participants responded to a 17-item metacognitive knowledge Questionnaire (MCKQ).

The questionnaire consisted of eight items (1-8), on person knowledge for example; *I am good at identifying and grouping related information*; four items (9 -12) on task knowledge, for example; *I learn best when I know something about the topic and* five items (13-17) on strategy knowledge, for example; *I have a specific purpose for each reading skill I use*. The MCKQ was adapted from Scrawl and Sperling (1994) version of Metacognitive Awareness Inventory (MAI) and modified to make it more comprehensible by the participants by paraphrasing some words for the purpose of the current study. The adaption was also done by selecting only items on metacognitive knowledge category which were relevant to this study and leaving out items on other categories of metacognition.
The scores for the MCKQ ranged from 5 = strongly agree to 1= strongly disagree. Responses for each individual were summed up to get a composite score to determine a student’s level of metacognitive knowledge. The scores for each sub scale were also summed up to determine a student’s knowledge on different sub scales of metacognitive knowledge, for the purposes of correlating the score with a student’s reading comprehension performance score. The scoring was done by adding a student’s score from each sub scale to get an aggregate score for MCKQ from the Likert scale. To get the average score, the aggregate score of a student was divided by 17; the number of items in the questionnaire. An average score of 3.5 and above in MCKQ was considered to be high metacognitive knowledge, 2.5 to 3.4 moderate and 2.4 and below, low metacognitive knowledge. This was adapted from the key to interpreting the means for each item and overall rating of Survey of Reading Strategies by Mokhtari and Sheorey (2002).

The internal consistencies of the three sub scales of metacognitive knowledge questionnaire were obtained using data from the pilot study. The reliability coefficients which were considered reliable are presented in Table 3.2.
Table 3.2

*Cronbach’s Reliabilities for MCKQ*

<table>
<thead>
<tr>
<th>Serial no.</th>
<th>Sub scale</th>
<th>No. of items</th>
<th>Cronbach’s alpha(α)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Person Knowledge</td>
<td>9</td>
<td>.77</td>
</tr>
<tr>
<td>2</td>
<td>Strategy Knowledge</td>
<td>4</td>
<td>.67</td>
</tr>
<tr>
<td>3</td>
<td>Task Knowledge</td>
<td>4</td>
<td>.67</td>
</tr>
<tr>
<td></td>
<td>MCKQ (overall)</td>
<td>17</td>
<td>.73</td>
</tr>
</tbody>
</table>

*Note: N = 32*

3.6.2 Cognitive Reading Strategy Use Questionnaire (CRSQ)

To determine the reading strategies used by the students and for data on all the objectives related to reading strategy use, the CRSQ (Appendix III) was adapted from Survey of Reading strategy (SORS) by Sheorey and Mokhtari, (2002). This was done by picking only items on cognitive reading strategies and leaving out those on metacognitive strategies. This is because cognitive reading strategies are concerned with the processing of information in order to learn (Yasmin and Muharrem, 2006). This was a major concern of the current study.

The adapted questionnaire comprised of 16 items measuring use of three broad categories of reading strategies: global reading strategy use, problem solving reading strategy use and support reading strategy use. A 5-point likert scale ranging from 5= ‘always do’ to 1= ‘never do’ was used. Eight items (1-8) fell under the global category for example; *How often do you use bolded words and italicized words to identify key*
information? Two items (9-10) fell under problem solving category, for example; *how often do you try to create mental pictures to help you remember what you read?* Six items (11-16) fell under the support category, for example; *how often do you underline or circle information to help you remember it?*

All the responses for each individual were summed up to get a composite score for each individual to determine the overall score for strategy use. The scores for each subscale were also summed up to determine students’ score for strategy use in each sub scale and for the purpose of correlating each of the sub scales with reading comprehension performance. To get the average score, the aggregate score of a student was divided by 16; the number of items in the questionnaire. An average score of 3.5 in the CRSQ was considered as high strategy use, 2.5 to 3.4 as moderate strategy use and 2.4 and below as low strategy use, Mokhtari and Sheorey (2002).

The internal consistencies of the three sub scales of cognitive reading strategy use questionnaire were determined using cronbach’s alpha using the data from the pilot study. The coefficient alphas obtained are presented in Table 3.3. The reliability coefficients obtained were: $\alpha = .77$ for global reading strategy use, $\alpha = .72$ for problem solving reading strategy use and $\alpha = .68$ for support reading strategy use. These reliability coefficients indicated that the questionnaire was reliable.

<table>
<thead>
<tr>
<th>Table 3.3</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cronbach’s Reliabilities for CRSQ</em></td>
</tr>
<tr>
<td>Serial No.</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Note. N=32

### 3.6.3 Reading Comprehension Task

The reading passage (Appendix IV) was adopted from New Integrated English Book Three that was at the participants’ level. The reading comprehension task was followed by eight questions whose scores were not used in the study. These questions were only meant to engage the participants in applying strategies in attempting to answer them. Thirty two (32) students, about 10% of the study sample were engaged in a silent reading task for the purpose of observing the cognitive reading strategies the students employed while reading texts.

### 3.6.4 Pro Forma Summary of Student's Reading Comprehension Performance

The researcher designed a pro forma schedule (Appendix V) which was used to get the students’ scores from their teachers of English in two comprehension tests administered one week before data collection. The researcher selected two reading comprehension tests from term two form three English syllabus, to be marked out of 20 marks by the teacher of English from the selected schools. An average score for the two comprehension tasks was calculated for each student. The participants with a score of
zero-10 were categorized as having low reading comprehension performance and those with a score of 11 - 20 as having high reading comprehension performance.

3.6.5 Observation Checklist

The observational checklist (Appendix VI) designed by the researcher was used to record the frequency with which six observable cognitive reading strategies were used by the 32 students who were randomly selected for observation, as they read silently. Total frequencies for each category of cognitive reading strategies were obtained. These were then correlated with the students’ reading comprehension scores. The reading comprehension task was administered during data collection. Four students from each of the eight schools in the study were sampled for reading comprehension and observation.

The observational technique was selected because it provides rich, objective and relatively accurate data on a situation as it exits independent of the respondents’ willingness to respond (Kothari, 2004). This, therefore, helped to verify the responses of the respondents in Cognitive Reading Strategy Use Questionnaire.

3.7 Pilot Study

A Pilot study was conducted among 32 (16 boys and 16 girls) form three students from a secondary school in Kiambu County. The school in the pilot study did not participate in the main study. The pilot study provided the researcher with ideas, approaches and clues about the effectiveness and weaknesses of the research tools. Analyzing the pilot study’s data also established the applicability of the selected correlational design as well as the hypotheses testing procedures. As suggested by Meriwether (2012) the researcher
sought opinion of the English teachers and the participants about the tools and data collection procedures. The pilot study helped in refining the questionnaire items and instructions. This increased chances of getting clearer findings in the main study. Consistent with the recommendation by Hardy and Bryman (2009), the pilot study involved a sample equivalent to 10% of the actual sample size.

3.7.1 Validity of the Instruments
Content validity was used to establish the extent to which the research instruments measured what they were supposed to measure and perform as they were designed to perform. The researcher relied on expert judgment from the supervisors and secondary school teachers of English to enhance the content validity of the research instruments. Where necessary, the items of the scales were revised to make them more comprehensible by form three students. The MAI form which MCKQ was adapted was used by Sajna and Premachandran, (2016) with 180 secondary school and assured content validity. SORS was used by Sheorey and Mokhtari, (2002) and found high validity.

3.7.2 Reliability of the Instruments
To establish the reliability of the research tools, test-retest reliability method was employed. The pilot study sample responded to the questionnaires twice with an interval of two weeks to avoid reactivity. A test-retest reliability coefficient for internal consistencies of the sub scales of CRSQ and MCKQ were computed using cronbach’s alpha. This was to establish the consistency of the research instruments in eliciting
similar responses whenever used in a study. CRSQ had an overall cronbach’s alpha of $\alpha = .72$ (Table 3.2) and MCKQ had an overall cronbach’s alpha of $\alpha = .73$ (Table 3.3). A cronbach’s alpha of 0.70 is deemed sufficient to consider a research reliable instrument (Orodho, 2004).

3.8 Data Collection Procedures
Data were collected by the researcher with the assistance of the teachers of English were assisted in administering comprehension test the students. The researcher first familiarized the students with the main objective of the study. The instruments were then distributed to the students who were allowed 30 minutes to respond to the two questionnaires. The questionnaires for the observation group were administered separately. The group was allowed a total of 55 minutes. First, they were allowed 25 minutes for the comprehension task and then 30 minutes to respond to the two questionnaires. This order was to ensure that items in Cognitive Reading Strategy Questionnaire did not interfere with ways in which the students used reading strategies while reading. The reading strategies used by selected students as they read the comprehension passage were observed and checked (√) on the observation checklist. The purpose of observation was to see whether students actually used the reading strategies the same way they reported in the cognitive reading strategy use questionnaire (CRSQ).
3.9 Data Analysis

After the data were organized and coded, descriptive and inferential statistics were used to analyze them. Descriptive statistics involved use of frequencies and percentages. Inferential statistics involved Pearson’s Product Moment Correlation, independent samples t-test and multiple regressions analysis. The results were presented in tables and percentages. The following hypotheses were tested:

H₀₁: There is no significant relationship between metacognitive knowledge and reading comprehension performance.

To make the first hypothesis more testable, the following three supplementary null hypotheses were formulated:

H₀₁.₁: There is no significant relationship between task knowledge and reading comprehension performance.

H₀₁.₂: There is no significant relationship between person knowledge and reading comprehension performance.

H₀₁.₃: There is no significant relationship between strategy knowledge and reading comprehension performance.

Pearson’s Product Moment Correlation Coefficient was used to test the supplementary null hypotheses.

H₀₂: There is no significant relationship between cognitive reading strategy use and reading comprehension performance.

To make the second hypothesis more testable, the following three supplementary null hypotheses were formulated:
H02.1: There is no significant relationship between global reading strategy use and reading comprehension performance.

H02.2: There is no significant relationship between support reading strategy use and reading comprehension performance.

H02.3: There is no significant relationship between problem solving reading strategy use and reading comprehension performance.

Pearson’s Product Moment Correlation Coefficient was used to test the supplementary null hypotheses.

H03: There are no significant gender differences in metacognitive knowledge and cognitive reading strategy use.

To make the third hypothesis more testable, the following six supplementary null hypotheses were formulated:

H03.1 There are no significant genders difference in person knowledge.

H03.2 There are no significant gender differences in task knowledge.

H03.3 There are no significant gender differences in strategy knowledge.

H03.4 There are no significant gender differences in global reading strategy use.

H03.5 There are no significant gender differences in support reading strategy use.

H03.6 There are no significant gender differences in problem solving reading strategy use.

Independent samples t-test was used to test for gender differences.
$H_{04}$: Metacognitive knowledge and cognitive reading strategy use have no significant predictive value in determining students’ reading comprehension performance.

To make the forth hypothesis more testable, the following two supplementary null hypotheses were formulated:

$H_{04.1}$ Metacognitive knowledge has no significant predictive value in predicting reading comprehension performance.

$H_{04.2}$ Cognitive reading strategy use has no significant predictive value in predicting reading comprehension performance.

Multiple Regression Analysis was used to test the supplementary null hypotheses.

3.10 Logistical and Ethical Considerations

3.10.1 Logistical Considerations
After the researcher was cleared by Kenyatta University Graduate School, she proceeded to seek for permission from the National Commission for Science, Technology and Innovation (NACOSTI). Thereafter; the researcher informed the Kiambu County Director of Education (CDE) and the Lari Sub County Education Officer (SCEO) of her intention to collect data in their respective areas of jurisdiction. After obtaining permission from the aforementioned officers, the researcher booked appointments with the principals of the selected schools. During the visits to the schools, she introduced herself to the schools’ administrations and sought permission to collect data from students in those schools. The purpose of the data collected, dates, time of data collection and expectations were agreed upon.
3.10. 2 Ethical Considerations

The researcher informed the selected students of her intention to obtain data from them. The researcher also explained to them the use of the data collected and sought their consent for participation. To ensure voluntary participation, the researcher sought the students’ consent through a letter of informed consent for students (Appendix I). The students were assured that their responses would be kept confidential, and were only going to be used for the study. Anonymity was also assured by asking students not to write their names on the research instruments.
CHAPTER FOUR
PRESENTATION, INTERPRETATION AND DISCUSSION
OF RESEARCH FINDINGS

4.1 Introduction
This chapter captured the findings of the study based on hypotheses and research objectives. The findings were summarized using descriptive statistics and inferential statistics were used to test the null hypotheses. The chapter is divided into four main parts: introduction of the chapter, general and demographic information of the participants, results, interpretation, and discussion of findings. The analysis of the observed data is also presented at the end of chapter.

4.2 General and Demographic Information
This section presented General and demographic details of the respondents which included gender and age of the students. The section also shows return rate of the questionnaires.

4.2.1 Return Rate of the Research Instrument
The researcher administered the questionnaires in all the selected schools with the assistance of teachers of English in each school. This ensured that all the questionnaires were properly filled and returned. The return rate of the questionnaire was 100 per cent since the researcher supervised filling and collection of questionnaires. The researcher also conducted the observations personally. In this study, 320 form three students from 6 public and 2 private secondary schools from Kiambu County, Lari Sub County completed the questionnaires during the second term of the year 2016. The
participants from public secondary schools were 231 while those from private secondary schools were 89. Out of the 320 filled questionnaires, one was discarded during cleaning of data because it was incomplete. The target and actual sample size from the properly filled questionnaire are shown in Table 4.1.

Table 4.1

Return Rate

<table>
<thead>
<tr>
<th>Return Rate</th>
<th>Properly Filled Questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
</tr>
<tr>
<td>Public</td>
<td>125</td>
</tr>
<tr>
<td>Private</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>163</td>
</tr>
</tbody>
</table>

Note. N = 319. ( ) = percentage.

4.2.2 Demographic Characteristics of the Respondents

Gender, age and school type as the demographic characteristics of the respondents were captured in this section. The respondents’ age was cross tabulated with gender and school type and the results were as presented in Table 4.2. The age of the learners was categorized into two age groups in the ranges of 15-17 years and 18-20 years. About fifty one percent of the participants were males while the females were about forty nine percent. In addition, majority (75.2 %) of the learners were in the age group of 15-17 years. This is considered the appropriate age to be in form three in Kenya as children join primary school when there are between six and seven years old. Only about a
quarter (24.8%) of the sample was in the age group of 18-20 years. There were more male respondents in both age groups. The female respondents in the age group of 15-17 were a third (32.9%) while those in the age group of 18-20 were less than 10%.

Table 4.2

*Cross Tabulation of Age and Gender of the Respondents*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>15-17</th>
<th>18-20</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>135</td>
<td>42.3</td>
<td>55</td>
</tr>
<tr>
<td>Girls</td>
<td>105</td>
<td>32.9</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>75.2</td>
<td>79</td>
</tr>
</tbody>
</table>

*Note. N = 319.*

4.2.3 Distribution of Participants’ Age

The description of the age of the participants was done and the results presented in Table 4.3. The median and the mode were both 17 years. The mean age was 16.97 years. This was within the range of the form three students’ age in Kenya. The kurtosis shows a normal distribution of the ages of the respondents.
Distribution of Participants’ Age

<table>
<thead>
<tr>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.97</td>
<td>17</td>
<td>17</td>
<td>0.95</td>
<td>0.6</td>
<td>0.64</td>
</tr>
</tbody>
</table>

*Note.* SD = Standard deviation.

The descriptive statistics of the participants’ age and gender was also done and the results presented in Table 4.4.

**Table 4.4**

**Participants’ Age by Gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>$M$</th>
<th>$N$</th>
<th>SD</th>
<th>Max</th>
<th>Kur</th>
<th>Sk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>17.0552</td>
<td>163</td>
<td>.95097</td>
<td>20.00</td>
<td>.211</td>
<td>.499</td>
</tr>
<tr>
<td>Girls</td>
<td>16.8718</td>
<td>156</td>
<td>.94164</td>
<td>20.00</td>
<td>1.240</td>
<td>.635</td>
</tr>
<tr>
<td>Total</td>
<td>16.9655</td>
<td>319</td>
<td>.94938</td>
<td>20.00</td>
<td>.639</td>
<td>.557</td>
</tr>
</tbody>
</table>

*Note.* Min= minimum; Max=Maximum; SD = Standard deviation; Sk = Skewness; Kur = Kurtosis.

The boys had a higher age mean ($M = 17, SD = .95$) than girls ($M = 16.9, SD = .94$). The maximum age for boy and girls was 20 years. The kurtosis and the skewness for both boys and girls was below 3 meaning that the age distribution was normal.

The participants’ age was also cross tabulated with their school type and the results were presented on table 4.5.

**Table 4.5**
Participants’ Age by School Type

<table>
<thead>
<tr>
<th>School</th>
<th>15.00</th>
<th>16.00</th>
<th>17.00</th>
<th>18.00</th>
<th>19.00</th>
<th>20.00</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>10</td>
<td>66</td>
<td>99</td>
<td>43</td>
<td>8</td>
<td>4</td>
<td>230</td>
</tr>
<tr>
<td>Private</td>
<td>0</td>
<td>26</td>
<td>39</td>
<td>19</td>
<td>4</td>
<td>1</td>
<td>89</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>92</td>
<td>138</td>
<td>62</td>
<td>12</td>
<td>5</td>
<td>319</td>
</tr>
</tbody>
</table>

Note. N = 319.

Majority (230) of the students from public and private schools were between sixteen and seventeen years old. This was an indication that majority of the students in both private and public secondary schools were within the expected age for a form three student.

4.3 Results of the Study
Descriptive statistics and inferential statistics to test the null hypotheses were given in line with each objective. This was followed with a discussion of the findings.

4.3.1 Relationship between Metacognitive Knowledge and Reading Comprehension Performance
In the first objective, the present study sought to find out the relationship between metacognitive knowledge and reading comprehension performance. Metacognitive knowledge was operationalized by analyzing the participants’ scores in metacognitive knowledge questionnaire (MCKQ). Each item on MCKQ ranged from 1-5 on a five point Likert scale ranging from 1 = strongly disagree (SD) to 5 = strongly agree (SA).
4.3.2 Description of Participants’ Metacognitive Knowledge

Using metacognitive knowledge scores, the participants were classified into low, moderate and high level of metacognitive knowledge. The participants with an average score of 3.5 and above were considered as having high metacognitive knowledge level, those with 3.4-2.5 as having moderate and 2.4 and below as having low level of metacognitive knowledge. This key was adapted from the key to interpreting the means for each item and overall rating of Survey of Reading Strategies by Mokhtari and Sheorey (2002). The results are presented in Table 4.6.

Table 4.6

<table>
<thead>
<tr>
<th>MCK</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>250</td>
<td>78.4</td>
</tr>
<tr>
<td>Moderate</td>
<td>63</td>
<td>19.7</td>
</tr>
<tr>
<td>Low</td>
<td>6</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>319</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note. N = 319. MCK- Metacognitive Knowledge: F- Frequency.*

The findings from the study as shown in Table 4.6 indicted that more than three quarters (78.4 %) of the participants had high metacognitive knowledge level while those with moderate Metacognitive knowledge level were less than a quarter (19.7%). Those participants with low Metacognitive knowledge level were 1.9%.
The participants’ metacognitive knowledge scores were analyzed to get the descriptive statistics as shown in Table 4.7.

Table 4.7

Descriptive Statistics of Metacognitive Knowledge

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>R</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCK</td>
<td>319</td>
<td>41.00</td>
<td>40.00</td>
<td>81.00</td>
<td>65.35</td>
<td>7.84</td>
<td>-.40</td>
<td>.61</td>
</tr>
</tbody>
</table>

Note. MCK=Metacognitive Knowledge; R = Range Min = Minimum; Max=Maximum; SD = Standard deviation; Sk = Skewness; Kur = Kurtosis.

The range was 40 and was very close to the minimum score which was 41. The maximum score was 81 and the mean was high at 65. SD =7.84. This was as compared to the possible minimum score of 34 and possible maximum score of 85. The scores of metacognitive knowledge were negatively skewed (-.40) which means that the respondents might have rated themselves highly on this scale. The kurtosis was .61 implying that many scores were clustered around the mean.

A descriptive analysis was done for each sub scale of metacognitive knowledge using total score per sub scale and the results were presented in Table 4.8.
Table 4.8

Descriptive Statistics of Sub Scales of Metacognitive Knowledge

<table>
<thead>
<tr>
<th>Subscales</th>
<th>N</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK</td>
<td>319</td>
<td>26.00</td>
<td>17.00</td>
<td>43.00</td>
<td>34.10</td>
<td>4.7</td>
<td>-.744</td>
<td>.676</td>
</tr>
<tr>
<td>TK</td>
<td>319</td>
<td>14.00</td>
<td>6.00</td>
<td>20.00</td>
<td>14.91</td>
<td>2.9</td>
<td>-.389</td>
<td>-.296</td>
</tr>
<tr>
<td>SK</td>
<td>319</td>
<td>12.00</td>
<td>8.00</td>
<td>20.00</td>
<td>16.36</td>
<td>2.5</td>
<td>-.713</td>
<td>.082</td>
</tr>
</tbody>
</table>

*Note. N = 319. PK= Person knowledge; SK= Strategy knowledge; TK=Task knowledge; Min = Minimum, max= Maximum; SD= Standard deviation; Sk= skewness; Kur = kurtosis.*

As shown in Table 4.8, person knowledge had a range of 26.00 while strategy knowledge and task knowledge had a range of 12.00 and 14 respectively. Person knowledge had a mean of $M=34.1 (SD = 4.7)$ and task knowledge and strategy knowledge had $M = 14.91 (SD = 2.9)$ and $M = 16.36 (SD = 2.5)$ respectively. The standard deviation ranged from 2.5 to 4.7. The scores for metacognitive knowledge subscales were found to be negatively skewed which implies that the respondents rated themselves highly on all the subscales. The kurtosis values for strategy knowledge, person knowledge and task knowledge were below three implying that the scores satisfied the criteria for normal distribution.

To determine the interrelationships among the three sub scales of metacognitive knowledge sub scales, the researcher carried out a bivariate correlation analysis. The resultant correlation matrix was as presented in Table 4.9.
Table 4.9

*Correlational Matrix of Metacognitive Knowledge Sub Scales*

<table>
<thead>
<tr>
<th>s/no</th>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Person knowledge</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Task Knowledge</td>
<td>.41**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Strategy Knowledge</td>
<td>.41**</td>
<td>.30**</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. N= 319. ** Correlation significant at 0.01 level (2 tailed).*

All the sub scales of metacognitive knowledge were positively and significantly correlated to each other. PK and TK \((r (317) = .41, p < .01)\); PK and SK \((r (317) = .41, p < .01)\); SK and TK \((r (317) = .30, p < .01)\). This was expected because according to the metacognitive theory (Flavell, 1979) which guided this study, the three sub scales are highly interactive. The strongest positive significant correlation was between task knowledge and person knowledge, and strategy knowledge and person knowledge \((r (317) = .41, p < .01)\) this was followed by correlation between strategy knowledge and task knowledge \((r (317) = .30, p < .01)\). This was an indication that the three sub scales of metacognitive knowledge work together to bring about success in reading comprehension. If a reader is aware of his/her ability as a reader and the type, purpose and demands of a reading task, he/she is aware the appropriate reading strategies available for use in a particular reading task.
4.3.3 Description of Participants’ Performance in Reading Comprehension

A descriptive analysis of reading comprehension performance scores was undertaken. The participants’ reading comprehension mean scores were obtained from two reading comprehension tests. The descriptive statistics presented in Table 4.10 were obtained.

Table 4.10

<table>
<thead>
<tr>
<th>Description of Participants’ Performance in Reading Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>( N )</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>319</td>
</tr>
</tbody>
</table>

*Note.* Min = minimum score; Max = Maximum score; \( SD \) = Standard deviation \( Sk \) = Skewness; \( Kur \) = Kurtosis.

The table shows that the minimum reading comprehension score was 2.00 while the maximum score was 19.00 out of the possible 20. There was therefore a huge difference between the lowest and the highest reading comprehension score. The mean score was 11.15, \((SD=3.36)\).

The researcher further analyzed the participants’ performance in reading comprehension into two levels. The participants with a score of between zero and 10 were categorized as having low reading comprehension performance and those with a score between 11 and 20 as having high reading comprehension performance. The classification was presented in Table 4.11.
Table 4.11

*Description of Levels of Performance in Reading Comprehension*

<table>
<thead>
<tr>
<th>Comprehension levels</th>
<th>Frequency</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>177</td>
<td>55.4</td>
</tr>
<tr>
<td>High</td>
<td>142</td>
<td>44.5</td>
</tr>
</tbody>
</table>

*Note. N = 319.*

As shown in Table 4.11, majority (55.4%) of the participants were categorized as having low comprehension performance while less than half (44.5%) were categorized as having high comprehension performance. This could mean that there is a probability that poor reading comprehension is a cause of poor academic performance in Lari Sub County.

### 4.3.4 Hypothesis Testing

The first null hypothesis of the study stated that there is no significant relationship between metacognitive knowledge and reading comprehension performance in English. To make this null hypothesis more testable, the following three supplementary null hypotheses were formulated:

- **Hₐ₁.₁.** There is no significant relationship between task knowledge and reading comprehension performance.
- **Hₐ₁.₂.** There is no significant relationship between person knowledge and reading comprehension performance.
- **Hₐ₁.₃.** There is no significant relationship between strategy knowledge and reading comprehension performance.
To determine the relationship between metacognitive knowledge sub scales and reading comprehension performance, the researcher carried out a bivariate correlation between metacognitive knowledge sub scales scores and reading comprehension scores. The resultant correlational matrix is presented in Table 4.12.

**Table 4.12**  
*Correlational Matrix of Metacognitive Sub Scales and Reading Comprehension performance*

<table>
<thead>
<tr>
<th>Variables</th>
<th>PK</th>
<th>TK</th>
<th>SK</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TK</td>
<td>.41**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td>.41**</td>
<td>.30**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Comprehension</td>
<td>.21**</td>
<td>.06</td>
<td>.53</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. N = 319. SK = Strategy Knowledge; PK = Person Knowledge, TK = Task Knowledge; **Correlational significant at .05 level (2 tailed).*

A positive non-significant relationship was found between task knowledge and performance in reading comprehension ($r (317) = .06, p > .05$). Therefore, the first supplementary null hypothesis which stated that there is no significant relationship between task knowledge and reading comprehension performance was retained. It was concluded that there is no significant relationship between task knowledge and reading comprehension performance.
The second supplementary null hypothesis stated that there is no significant relationship between person knowledge and reading comprehension performance. In this regard, person knowledge had a moderate positive significant correlation with reading comprehension performance \(r (317) = .21, p < .05\), as shown in Table 4.12. These findings failed to support the second supplementary null hypothesis. Therefore the second supplementary null hypothesis was rejected, and it was concluded that there is a significant relationship between the students’ person knowledge and their reading comprehension performance.

The third supplementary null hypothesis stated that there is no significant relationship between strategy knowledge and reading comprehension performance. As shown in Table 4.12, strategy knowledge was found to have a positive but insignificant relationship with reading comprehension performance \(r (317) = .53, p > .05\). Therefore, the third supplementary null hypothesis was retained and it was concluded that there is no significant relationship between strategy knowledge and reading comprehension.

4.3.5 Discussion of the Results
In this study, it was hypothesized that there was no significant relationship between metacognitive knowledge and reading comprehension performance. Correlational analysis revealed that, person knowledge was moderately but positively and significantly correlated to reading comprehension performance. Task knowledge and
strategy knowledge had a non-significant correlation with reading comprehension performance.

The current findings supported the findings by Lahuerta (2011) who reported positive correlation between person knowledge and performance in reading comprehension. Notably, the two studies were carried out among university students in the western countries. Despite the differences in cultural background and educational level, the findings showed that person knowledge is a key factor for better reading comprehension performance. Person knowledge in reading involves a readers’ awareness of his/her learning abilities as well as their strengths and weaknesses. According to the findings of the current study, the students with high person knowledge performed better in reading comprehension. These findings may mean that readers, who were aware of their strengths and weaknesses in reading, were more likely to perform better in reading comprehension tasks. For example, readers who are aware that they comprehend better in a quiet place are more likely to find an environment conducive for reading. This may enhance their comprehension and they may perform better than a reader who is not aware of the kind of environment that is conducive for them to comprehend better. Others readers who know that they have to read slowly to comprehend better are likely to do so.

The current study found that task knowledge has a positive correlation with performance in reading comprehension although the correlation was not significant ($r (317) = 0.60, p > 0.05$). This suggests that readers’ familiarity with the purpose and the demands of the
text does not play a major role in enhancing performance in reading comprehension. These findings contradict the findings of Adbelaal and Sase (2014) who found that task knowledge (background knowledge of the topic) was so significant in task performance that when it decreased success in task decreased too. This study was conducted among university masters students. The difference between the findings of the two studies may be because of the age difference of the samples used.

Strategy knowledge which is the reader’s awareness of the reading strategies available for use while reading a text, was found to have a positive but insignificant correlation with performance in reading comprehension ($r (317) = .53, p > 0.05$). This indicates that, the mere knowledge or awareness of the existence of these reading strategies does not play a role big enough to enhance the reading comprehension performance of the reader. The application of the strategies is crucial in enhancing reading comprehension performance. These findings contradict the findings of Tabatabaee and Lofti (2014) who found a significant relationship between reading strategy awareness of Iranian EFL advanced learners and their critical reading ability. These learners were aged between 21-36 years as compared to the sample in the current study which was between 15 and 20 years. This age difference may be the reason behind the differences in these findings.

### 4.4 Relationship between Cognitive Reading Strategy Use and Reading Comprehension Performance in English

Objective number two of the current research was to evaluate the relationship between cognitive reading strategy use and reading comprehension performance. Cognitive
reading strategy use was operationalized by analysing the participants’ scores in the Cognitive Reading Strategy Use Questionnaire (CRSQ). CRSQ consisted of sixteen items divided into three sub scales; global reading strategy use which had eight items; problem solving reading strategy use which had two items and support reading strategy use which had six items. For each item on CRSQ, scores ranged from 1 to 5 on a five point likert scale ranging from 1 = *Never* to 5 = *Always*.

### 4.4.1 Description of Cognitive Reading Strategy Use of the Participants

The participants’ cognitive reading strategy use was analyzed using the cognitive reading strategy use questionnaire score. The results were as presented in Table 4.13.

Table 4.13

*Descriptive Statistics of Cognitive Reading Strategy Use*

<table>
<thead>
<tr>
<th>CRSQ Scores</th>
<th>N</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>319</td>
<td>55.00</td>
<td>21.00</td>
<td>76.00</td>
<td>56.82</td>
<td>8.37</td>
<td>-.49</td>
<td>.86</td>
<td></td>
</tr>
</tbody>
</table>

*Note. N=319. CRSQ = Cognitive Reading Strategy Questionnaire; Min = Minimum; Max = Maximum; Sk = skewness; Kur= Kurtosis; SD = Standard deviation.*

Table 4.13 indicates that 21 was the least obtained score while 76 was the highest score out of the possible 16 and 80 respectively. The mean score was 56.82 with a standard deviation of 8.37. The scores were negatively skewed (skewness = -.49) which indicated that most of the participants rated themselves highly on cognitive reading strategy use questionnaire items.
The researcher further analyzed scores on the use of cognitive reading strategy use sub scales. This was done to get the descriptive statistics as presented in Table 4.14.

Table 4.14

<table>
<thead>
<tr>
<th>Description of Cognitive Reading Strategy Use Sub Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>GRSU</td>
</tr>
<tr>
<td>PSRSU</td>
</tr>
<tr>
<td>SRSU</td>
</tr>
</tbody>
</table>

Note. N = 319. GRSU = Global Reading Strategy Use; PSRSU = Problem Solving Reading Strategy Use; SRSU = Support Reading Strategy Use; Min = Minimum; Max = Maximum; Sk = Skewness; Kur = Kurtosis; SD = Standard Deviation.

The results presented in Table 4.14 show that global reading strategy use had a range of 29. Support reading strategy use had a range of 27and problem solving reading strategy use had a range of 8. Global reading strategy use had a mean of 26.3 (SD = 4.69) while problem solving reading strategy use had a mean of 7.72 (SD = 1.86). The three sub scales of Cognitive reading strategy use were negatively skewed with support reading strategy use having the highest negative value (-.36). This means the respondents may have rated themselves highly on all sub scales.

The data were further analyzed for the participants’ level of cognitive reading strategy use and level of reading comprehension performance. The findings were presented in Table 4.15.
Table 4.15

*Levels of Cognitive Reading Strategy Use and Reading Comprehension Performance*

<table>
<thead>
<tr>
<th>Comprehension levels</th>
<th>Cognitive Reading Strategy Use levels</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>High</td>
<td>85 (26.6)</td>
<td>87 (27.3)</td>
</tr>
<tr>
<td>Low</td>
<td>40 (12.5)</td>
<td>9 (2.8)</td>
</tr>
<tr>
<td>Total</td>
<td>125 (39.2)</td>
<td>178 (55.8)</td>
</tr>
</tbody>
</table>

*Note.* *N* = 319. ( ) = Percentage.

As shown in the table, it was interesting to note that, most (27%) participants who were high (scored 11-20) in reading comprehension performance used cognitive reading strategies moderately (average score of 3.4 – 2.5) compared to those who were low (scored zero - 10) in comprehension performance majority (12%) of whom, used cognitive reading strategies at high frequency (average score of 3.5 and above). There was little difference in the number of students who were high in reading comprehension (scored 11-20) and used cognitive reading strategies at high scored 11-20) or moderate frequency (average score of 3.4-2.5). This could mean that moderate to high cognitive reading strategy use is sufficient for success in reading comprehension.

To determine the interrelationships among use of different types of cognitive reading strategies, the researcher carried out a bivariate correlation analysis in order to obtain a correlational matrix which was then presented in Table 4.16.
Table 4.16

*Correlational Matrix of Cognitive Reading Strategies Sub Scales*

<table>
<thead>
<tr>
<th></th>
<th>GRSU</th>
<th>SRSU</th>
<th>PSRSU</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRSU</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRSU</td>
<td>.32**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PSRSU</td>
<td>.25**</td>
<td>.29**</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. N = 319. GRSU = Global Reading Strategy Use; SRSU = Support Reading Strategy Use; PSRSU = Problem solving Reading Strategy Use; **Correlation significant p < .05 level (2-tailed).*

The resultant correlational matrix revealed that use of the three cognitive reading strategies sub scales were positively and significantly correlated to each other. This was expected because according to the theory used in this study, the sub scales of cognitive reading strategies are interrelated (Flavell, 1979). The strongest correlation was between support reading strategy use and global reading strategy use ($r (317) = .32$, $p < .05$) while the weakest was between problem solving reading strategy use and global strategy use($r (317) = .25$, $p < .05$). The findings suggest that the sub scales of cognitive reading strategies are also distinguished from each other.

To determine the relationship between cognitive reading strategy use and reading comprehension performance, the researcher carried out a bivariate correlation between cognitive reading strategy use overall scores and reading comprehension scores. The results are presented in Table 4.17.
Table 4.17

*Correlational Matrix of Cognitive Reading Strategy Use Scores*

<table>
<thead>
<tr>
<th></th>
<th>Comprehension</th>
<th>CRSU Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>1</td>
<td>.27**</td>
</tr>
<tr>
<td>CRSU Scores</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. N = 319. CRSU = Cognitive Reading Strategy Use; **Correlational significant at .05 level (2 tailed).*

The resultant correlational matrix in was presented in Table 4.17. The results indicate that, there was a weak positive significant relationship \( r(317) = .27, \quad p < .05 \) between overall cognitive reading strategy use and reading comprehension performance of form three students in Lari.

**4.4.2 Hypothesis Testing**

To determine the relationship between cognitive reading strategy use and reading comprehension performance in English as the second objective, the following hypothesis was formulated:

\( H_{02} \): There is no significant relationship between cognitive reading strategy use and reading comprehension performance in English.

In order to make this hypothesis more testable, the following supplementary null hypotheses were formulated:

\( H_{02.1} \): There is no significant relationship between global reading strategy use and reading comprehension performance.
H02.2: There is no significant relationship between support reading strategy use and reading comprehension performance.

H02.3: There is no significant relationship between problem solving reading strategy use and reading comprehension performance.

To test the supplementary null hypotheses, a bivariate correlational analysis was done using Pearson’s Product Moment Correlation Coefficient. The resultant correlational matrix was presented in Table 4.18.

Table 4.18

*Correlational Matrix of Use of Cognitive Reading Strategies Sub Scales and Reading Comprehension Performance*

<table>
<thead>
<tr>
<th></th>
<th>SRSU</th>
<th>PSRS</th>
<th>GRSU</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRSU</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSRS</td>
<td>.29**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRSU</td>
<td>.32**</td>
<td>.25**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Comprehension</td>
<td>.21**</td>
<td>.19**</td>
<td>.21**</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. N = 319. SRSU = Support Reading Strategy Use; PSRS = Problem-Solving Reading Strategy Use; GRSU = Global Reading Strategy Use.*

The use of all the sub scales of cognitive reading strategies was positively and significantly correlated to performance in reading comprehension. Global reading strategy use had a positively significant correlation with reading comprehension performance in English ($r (317) = .21, p < .05$). Therefore, the results failed to support
supplementary null hypothesis 2.1 that stated that there is no significant relationship between global reading strategy use and reading comprehension performance. The supplementary null hypothesis was therefore rejected and a conclusion that there is a positively significant correlation between global strategy use and reading comprehension performance was drawn.

Support reading strategy use had a positive significant correlation with reading comprehension performance ($r (317) = .21, p < .05$). The results did not support the supplementary null hypothesis 2.1 that stated there is no significant relationship between support reading strategy use and reading comprehension performance. The supplementary null hypothesis was therefore rejected and a conclusion that there is a significant relationship between support reading strategy use and reading comprehension performance was arrived at.

Problem solving reading strategy use also had a positive and significant correlation with reading comprehension performance ($r (317) = .19, p < .05$). The results therefore failed to support the supplementary null hypothesis 2.3 that stated that there is no significant relationship between problem solving reading strategy use and reading comprehension performance. The supplementary null hypothesis was rejected. It was also concluded that, there is a significant relationship between problem solving reading strategy use and reading comprehension performance.
4.4.3 Discussion of Findings

From the findings, support reading strategy use had a positive, significant correlation \( r (317) = .21, p < .05 \) with reading comprehension performance in English. These findings agree with the findings of Rastskhiz and Safari (2014) who found that support reading strategies led to better comprehension among students in intermediate school in Iran. The findings also concurred with the findings of Shang (2011) in a study that was carried out among undergraduate students in Taiwan. Both studies found that use of support reading strategies were positively and significantly correlated to reading comprehension performance. These findings imply that cultural background and age may not be a major factor in determining relationship between support reading strategy use and reading comprehension performance in English. The findings also imply that readers, who use support reading strategies more while reading, are more likely to perform better in reading comprehension.

Global reading strategy use was found to have a positive and significant relationship \( r (317) = .21, p < .05 \) with reading comprehension performance in English. These findings disagree with the finding of Molla (2015) on a study that was carried out among Ethiopian EFL learners in Dilla University. The findings revealed that global reading strategy use was not correlated to reading comprehension performance in anyway. Although the study was carried out in an African country, the sample size was drawn from university students unlike in the current study where the sample was drawn from high school students. These findings suggest that in determining the relationship
between global reading strategies and performance in reading comprehension, educational level and age may be major factors.

Problem solving reading strategy use was found to have a positive and significant relationship ($r (317) = .19, p < .05$), with performance in reading comprehension. The results agree with those of Zhang and Wu (2009) in a study to assess metacognitive awareness and reading strategy use of Chinese senior high school students learning English as a Foreign Language (EFL), which revealed that, the students in high proficiency group outperformed the low, and the intermediate groups in two categories of reading strategy: global and problem solving reading strategies. Zhang and Wu’s (2009) sample was similar to the one used in the current study. This may mean that although the learning environments are different it may not be a major determining factor in the relationship between problem solving reading strategy use and performance in reading comprehension.

4.5 Gender Differences in Metacognitive Knowledge and Cognitive Reading Strategy Use

Investigating gender differences in metacognitive knowledge and cognitive reading strategy use of the students was the third objective of the study. Independent samples t-test was used to analyse gender differences.

4.5.1 Description of Gender Differences in Students’ Metacognitive Knowledge

The metacognitive knowledge scores were analysed in order to find out the mean and the standard deviation. The findings were given in Table 4.19.
Table 4.19

*Gender Differences in Students’ Metacognitive Knowledge*

<table>
<thead>
<tr>
<th>Gender</th>
<th>$N$</th>
<th>Mean</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>163</td>
<td>64.81</td>
<td>7.65</td>
</tr>
<tr>
<td>Girls</td>
<td>156</td>
<td>65.92</td>
<td>8.03</td>
</tr>
<tr>
<td>Total</td>
<td>319</td>
<td>65.35</td>
<td>7.84</td>
</tr>
</tbody>
</table>

*Note.* $N = 319$. $SD$ = Standard Deviation.

Results in Table 4.19 show that, the mean metacognitive knowledge scores were 64.81 for boys and 65.92 for girls. Therefore, girls had a higher metacognitive knowledge mean ($M = 65.92$, $SD = 8.03$) score than boys ($M = 64.81$, $SD = 8.03$).

The data were further subjected to analysis of gender against metacognitive knowledge levels. The results were presented in Table 4.20.

Table 4.20

*Levels of Metacognitive Knowledge and Gender of the Participants*

<table>
<thead>
<tr>
<th>MCK Levels</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>High</td>
<td>126 (46.1)</td>
<td>124 (32)</td>
</tr>
<tr>
<td>Moderate</td>
<td>33 (11.9)</td>
<td>29 (7.5)</td>
</tr>
<tr>
<td>Low</td>
<td>4 (1.3)</td>
<td>3 (1.2)</td>
</tr>
<tr>
<td>Total</td>
<td>163 (60.2)</td>
<td>156 (39.8)</td>
</tr>
</tbody>
</table>

*Note.* $N = 319$. ( ) = Percentage; MCK = Metacognitive knowledge.
The results in Table 4.20 showed that, more boys (46.1%) had a higher level of metacognitive knowledge than girls (32%). Majority (78.1%) of the students had high metacognitive levels.

Metacognitive knowledge had three sub scales. It was deemed necessary to investigate gender differences in these sub scales namely: person knowledge, task knowledge and strategy knowledge. The results are presented in Table 4.21 show that girls had a slightly higher mean ($M = 3.9$, $SD = .50$) than boys ($M = 3.8$, $SD = .51$) in person knowledge and task knowledge sub scales ($M = 3.8$, $SD = .67$) for girls and ($M = 3.7$, $SD = .73$) for boys. Boys and girls had an equal mean in strategy knowledge sub scale ($M = 4.1$, $SD = .63$) for boys and ($M = 4.1$, $SD = .59$) for boys. The means are all low implying that data are clustered around the mean and are more reliable.

Table 4.21

*Gender Differences in Means of Metacognitive Knowledge Sub Scales*

<table>
<thead>
<tr>
<th>Sub-scales of MCK</th>
<th>Gender</th>
<th>$n$</th>
<th>mean</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person knowledge</td>
<td>Boys</td>
<td>163</td>
<td>3.8</td>
<td>.51</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>156</td>
<td>3.9</td>
<td>.50</td>
</tr>
<tr>
<td>Task knowledge</td>
<td>Boys</td>
<td>163</td>
<td>3.7</td>
<td>.73</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>156</td>
<td>3.8</td>
<td>.67</td>
</tr>
<tr>
<td>Strategy knowledge</td>
<td>Boys</td>
<td>163</td>
<td>4.1</td>
<td>.59</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>156</td>
<td>4.1</td>
<td>.63</td>
</tr>
</tbody>
</table>

*Note. $N = 319$. MCK = Metacognitive Knowledge; $SD = Standard Deviation.*
4.5.2 Description of Gender Differences in Cognitive Reading Strategy Use

The participants’ cognitive reading strategy use scores were analyzed according to gender. The results are presented in Table 4.22.

Table 4.22

*Cognitive Reading Strategy Use Scores by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>163</td>
<td>56.40</td>
<td>8.64</td>
</tr>
<tr>
<td>Girls</td>
<td>156</td>
<td>57.44</td>
<td>7.95</td>
</tr>
</tbody>
</table>

*Note. N = 319. SD = Standard Deviation.*

The results presented in Table 4.22 reveal that girls had a higher mean \(M = 57.44, \ SD =7.95\) than boys \(M = 56.40, \ SD = 8.64\). The participants’ had been categorized into high, moderate and low use of cognitive reading strategies using the cognitive reading strategy use scores.

A cross tabulation of gender and these levels was done. The findings are presented in Table 4.23. Results showed that more boys (29.5 %) were categorized as using cognitive reading strategies at a moderate frequency than girls (26.3 %). About the same percentage of boys and girls were also categorized as using cognitive reading strategies at a high frequency; 19.5% and 19.7% respectively.
Table 4.23

Levels of Cognitive Reading Strategies Use by Gender

<table>
<thead>
<tr>
<th>CRSU Levels</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys F</td>
<td>Girls F</td>
</tr>
<tr>
<td>High</td>
<td>62 (19.5)</td>
<td>63 (19.7)</td>
</tr>
<tr>
<td>Moderate</td>
<td>94 (29.5)</td>
<td>84 (26.3)</td>
</tr>
<tr>
<td>Low</td>
<td>7 (2.2)</td>
<td>9 (2.8)</td>
</tr>
<tr>
<td>Total</td>
<td>163 (59.5)</td>
<td>156 (40.4)</td>
</tr>
</tbody>
</table>

*Note. N = 319. CRSU- Cognitive Reading Strategy Use; ( ) = Percentage; F = Frequency.*

Cognitive reading strategy use was divided into: global reading strategy use, support reading strategy use and problem solving reading strategy use. The researcher deemed it necessary to investigate the gender mean differences in these categories. The results are presented in Table 4.24.
Table 4.24

*Cognitive Reading Strategy Use Sub scales Means by Gender*

<table>
<thead>
<tr>
<th>Cognitive reading strategy use</th>
<th>Gender</th>
<th>n</th>
<th>mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global reading strategy use</td>
<td>Boys</td>
<td>163</td>
<td>3.3</td>
<td>.58</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>156</td>
<td>3.3</td>
<td>.56</td>
</tr>
<tr>
<td>Support reading strategy use</td>
<td>Boys</td>
<td>163</td>
<td>3.2</td>
<td>.70</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>156</td>
<td>3.3</td>
<td>.60</td>
</tr>
<tr>
<td>Problem-solving reading strategy use</td>
<td>Boys</td>
<td>163</td>
<td>3.8</td>
<td>.97</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>156</td>
<td>4.0</td>
<td>.82</td>
</tr>
</tbody>
</table>

*Note. N = 319. SD = Standard Deviation.*

Results showed that boys and girls had an equal mean \((M = 3.3, SD = .58)\) and \((M = 3.3, SD = .56)\) respectively in global reading strategy use while the girls had a higher mean in support \((M = 3.3, SD = .60)\) and problem solving reading strategy use \((4.0, SD = .82)\) than the boys.

**4.5.3 Hypothesis Testing**

The third objective of this study was to determine any gender differences in metacognitive knowledge and cognitive reading strategy use. In this regard, the following hypothesis was formulated:

\(H_{03}\) There are no significant gender differences in metacognitive knowledge and cognitive reading strategy use.
To make this hypothesis more testable the following six supplementary null hypotheses were formulated:

H_{03.1} There are no significant gender differences in person knowledge.

H_{03.2} There are no significant gender differences in task knowledge.

H_{03.3} There are no significant gender differences in strategy knowledge.

H_{03.4} There are no significant gender differences in global reading strategy use.

H_{03.5} There are no significant gender differences in support reading strategy use.

H_{03.6} There are no significant gender differences in problem solving reading strategy use.

To test the first three supplementary null hypotheses, independent samples t-test was performed at an alpha level of .05 to compare the scores for the boys and girls in the three sub scales of metacognitive knowledge. The researcher first screened the obtained data to ascertain whether they met the assumptions of the independent samples t test. As shown on table 4.8, the kurtosis and skewness statistics of the participants’ scores in cognitive reading strategy use sub scales were below three. These scores were normally distributed according to criteria outlined by Schmider et al., (2010) on the measure of distribution shape. Homogeneity of variance was also tested and satisfied as presented in Table 26, since the Levene’s F test was higher than the statistical significance (p > .05) for all predictor variables.
Table 4.25

*Independent Samples t-test for Gender Differences in Metacognitive Knowledge*

<table>
<thead>
<tr>
<th>Variable</th>
<th>F</th>
<th>sig</th>
<th>t</th>
<th>df</th>
<th>siga</th>
<th>MD</th>
<th>SE</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK</td>
<td>1.03</td>
<td>.31</td>
<td>-1.36</td>
<td>317</td>
<td>.31</td>
<td>-54</td>
<td>.53</td>
<td>-1.60</td>
</tr>
<tr>
<td>TK</td>
<td>.71</td>
<td>.40</td>
<td>-1.34</td>
<td>317</td>
<td>.52</td>
<td>-21</td>
<td>.32</td>
<td>- .85</td>
</tr>
<tr>
<td>SK</td>
<td>.80</td>
<td>.37</td>
<td>-1.07</td>
<td>317</td>
<td>.19</td>
<td>-37</td>
<td>.28</td>
<td>- .91</td>
</tr>
</tbody>
</table>

*Note.* N = 319. PK = person knowledge; TK = task knowledge; SK = strategy knowledge; MD = mean difference; SE = standard error; CI = confidence interval of the difference; LL = lower limit; UL = upper limit; "a"p = .05 (2 tailed).

The results given in Table 4.25 showed that there were no significant gender differences in person knowledge, (t = -1.36, df = 317, p > .05), task knowledge (t = -1.34, df = 317, p > .05) and strategy knowledge (t = -1.07, df = 317, p > .05). The first three supplementary null hypotheses were therefore retained. It was also concluded that, there are no significant gender differences in task knowledge, person knowledge and strategy knowledge. This was an indication that the metacognitive knowledge of boys and girls was not significantly different.

To test the last three supplementary null hypotheses, independent samples t-test was performed at an alpha level of .05 to compare the scores for the boys and girls in the three sub scales of cognitive reading strategy use. The researcher first screened the obtained data to ascertain whether they met the assumptions of the independent samples
As shown on Table 4.13, the kurtosis and skewness statistics of the participants’ scores in cognitive reading strategy use sub scales were below three. This score were normally distributed according to criteria outlined by Schmider et al., (2010) on the measure of distribution shape. Data on cognitive reading strategy use were subjected to independent samples t-test. Table 4.26

Table 26

*Independent Sample T-test for Gender Differences in Cognitive Reading*

<table>
<thead>
<tr>
<th>Strategy Use</th>
<th>Levene’s Test</th>
<th>t</th>
<th>df</th>
<th>sig</th>
<th>MD</th>
<th>SE</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSRSU</td>
<td>3.78</td>
<td>-.30</td>
<td>317</td>
<td>.02</td>
<td>.21</td>
<td>.68</td>
<td>1.39</td>
</tr>
<tr>
<td>SRSU</td>
<td>4.14</td>
<td>-1.20</td>
<td>317</td>
<td>.41</td>
<td>-0.43</td>
<td>.52</td>
<td>-1.45 .59</td>
</tr>
<tr>
<td>GRSU</td>
<td>0.49</td>
<td>.60</td>
<td>317</td>
<td>.33</td>
<td>.51</td>
<td>.53</td>
<td>-1.54 .52</td>
</tr>
</tbody>
</table>

*Note.* $N = 319$. PSRS = problem solving reading use; SRSU = support reading strategy use; GRSU = global reading strategy use; $MD =$ mean difference; $SE =$ standard error; $CI =$ confidence interval of the difference; $LL =$ lower limit; $UL =$ upper limit; $^a_p = .05$ (2 tailed).

The findings presented in Table 4.26 show that there were no significant differences ($t = -.599, df = 317, p > .05$) between the means of global reading strategy use for boys ($M = 3.3, SD = .58$) and girls ($M = 3.3, SD = .56$) and support reading strategy use ($t = -1.20, df = 317, p >.05$) between boys ($M = 3.2, SD = .70$) and girls ($M = 3.3, SD = .60$). Therefore, the fourth and the fifth supplementary null hypotheses were retained. It was
concluded that there are no significant gender differences in the means of global reading strategy use and support reading strategy use. A positive significant gender difference ($t = .60, df = 317, p < .05$) was found in the means of problem solving reading strategy use of boys ($M = 3.8, SD = .97$) and girls ($M = 4.0, SD = .82$). Boys were found to be using problem solving reading strategies more than girls. The sixth supplementary null hypothesis was rejected and a conclusion that there is a significant gender difference in problem solving reading strategy use was drawn.

4.5.4 Discussion of Findings
The findings show that there were no statistically significant differences between boys’ and girls’ means of global reading strategy use and support reading strategy use. Problem-solving reading strategy use was found to have a positive significant difference between boys and girls. This difference was in favor of boys. The findings also revealed that there were no significant gender differences in all the sub scales of metacognitive knowledge.

The findings that there were no significant gender differences in all the sub scales of metacognitive knowledge contradict the findings of Liliana and Lavina (2011) who reported a significant gender difference in person knowledge (knowledge about one’s intellectual strengths and weaknesses). However, the sample of the current study differs from the one used by Liliana and Lavinia (2011) as they used primary school pupils in Romania. The differences in age and learning environment could have contributed to the differences in the findings as students in secondary schools are more likely to have
acquired more metacognitive skills than those in primary school. The cultural differences as well as the differences in the educational curricula in Kenya and Romania could also have contributed to the differences in findings of the two studies.

The findings of the current study that reported significant gender differences in support reading strategy use contradict the findings of the study by Munsakorn (2012) which found a huge similarity in the strategy use of male and female students. This may be as a result of the difference in the samples’ age and level of education. The findings revealed significant gender differences in support reading strategy use (the strategies of establishing coherence). The findings that there is a significant gender difference in problem solving strategies also contradict the findings of a study by Yarahmadi (2011) that found no significant gender differences in problem solving reading strategy use among university students. The differences in educational level and the cultural background of the two samples may have contributed to the differences in the findings. However these findings concur with the findings of the study among middle school pupils in China by Li and Yangtze (2008) and a study by Munsakorn (2012) among university students in Thailand both of which found significant gender differences in all the sub scales of cognitive reading strategy use. This implies that differences in age and cultural backgrounds may not be a factor in determining gender differences in the use of cognitive reading strategies.
4.6 Predictive Values of Metacognitive Knowledge and Cognitive Strategy Use in predicting Reading Comprehension Performance in English

The fourth objective of the study was to determine the predictive values of metacognitive knowledge and cognitive reading strategy use in predicting students’ reading comprehension performance.

4.6.1 Description of Levels of Metacognitive Knowledge and Cognitive Reading Strategy Use

The researcher did a cross tabulation between the levels of metacognitive knowledge and the levels of cognitive reading strategy use of the participants. The results are presented in Table 4.27.

Table 4.27

<table>
<thead>
<tr>
<th>MCK Levels</th>
<th>CRSU Levels</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>High Frequency</td>
<td>113 (35.4)</td>
<td>128 (40.1)</td>
</tr>
<tr>
<td>Moderate Frequency</td>
<td>10 (3.1)</td>
<td>45 (14.1)</td>
</tr>
<tr>
<td>Low Frequency</td>
<td>3 (1)</td>
<td>3 (0.9)</td>
</tr>
<tr>
<td>Total</td>
<td>126 (39.5)</td>
<td>176 (55.2)</td>
</tr>
</tbody>
</table>

Note. $N = 319$. MCK = Metacognitive Knowledge; CRSU = Cognitive Reading Strategy Use; ( ) = percentage.

Majority (40.1%) of the participants who were categorized as high in metacognitive knowledge (an average score of 3.5 and above) were moderate (an average score of 3.4 – 2.5) in their cognitive reading strategy use. However, seven participants were classified
as low (an average score of 2.4 and below) in metacognitive knowledge levels with three of them being high (an average score of 3.5 and above) in cognitive reading strategy use.

### 4.6.2 Predictive Values of Metacognitive Knowledge and Cognitive Reading Strategy Use in Predicting Reading Comprehension Performance in English

The fourth objective of the study was to determine the predictive values of metacognitive knowledge and cognitive reading strategy use in predicting reading comprehension performance. The fourth null hypothesis stated that metacognitive knowledge and cognitive reading strategy use have no significant predictive values in predicting reading comprehension performance in English. To make this hypothesis more testable, the following supplementary null hypotheses were advanced:

- **H04.1**: Global reading strategy use has no significant predictive value in predicting students’ reading comprehension performance.
- **H04.2**: Problem solving reading strategy use has no significant predictive value in predicting students’ reading comprehension performance.
- **H04.3**: Support reading strategy use has no significant predictive value in predicting students’ reading comprehension performance.
- **H04.4**: Person knowledge has no significant predictive value in predicting students’ reading comprehension performance.
- **H04.5**: Task knowledge has no significant predictive value in predicting students’ reading comprehension performance.
H_{0.6}: Strategy knowledge has no significant predictive value in predicting students’ reading comprehension performance.

### 4.6.3 Hypothesis Testing

To test the supplementary null hypotheses, the researcher conducted two sets of regular multiple regression analysis. This was to predict students’ reading comprehension performance based on the sub scales of cognitive reading strategy use and metacognitive knowledge. The three sub scales of cognitive reading strategies were included in the first set, while the three sub scales of metacognitive knowledge were included in the second set of multiple regression analysis. The results are presented in Table 28, Table 29 and Table 30.

Table 4.28

*Adjusted $R^2$ of Cognitive Reading Strategy Use*

<table>
<thead>
<tr>
<th>R</th>
<th>Adjusted $R^2$</th>
<th>Std. Error of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.28</td>
<td>.071</td>
<td>3.24</td>
</tr>
</tbody>
</table>

As presented in Table 4.28, the regression equation for predicting reading comprehension performance from the use of cognitive reading strategies sub scales explains 7.1% of variance of the model ($R^2 = .071$). A significant regression equation was found ($F = 9, 16, p < .05$), with $R^2$ of .071.
Table 4.29

*Predicting Reading Comprehension Performance based on Cognitive Reading Strategy*

**Use Sub Scales**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>β</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>4.68</td>
<td>1.26</td>
<td>3.71</td>
<td>.00</td>
</tr>
<tr>
<td>GRSU</td>
<td>.80</td>
<td>.34</td>
<td>.14</td>
<td>2.35</td>
</tr>
<tr>
<td>PSRSU</td>
<td>.49</td>
<td>.21</td>
<td>.13</td>
<td>2.33</td>
</tr>
<tr>
<td>SRSU</td>
<td>.58</td>
<td>.30</td>
<td>.11</td>
<td>1.94</td>
</tr>
</tbody>
</table>

*Note. N = 319. Dependent Variable Reading comprehension; GRSU = Global Reading Strategy; PSRSU = Problem Solving Reading Strategy; SRSU = Support Reading Strategy; SE = Standard Error.*

From Table 4.29, the resultant equation for predicting reading comprehension performance from the use of cognitive reading strategies sub scales was:

\[
y = 4.68 + .14 \text{ (GRSU)} + .13 \text{ (PSRSU)} + .11 \text{ (SRSU)} \quad (i)
\]

Where \(y\) = predicted reading comprehension performance; GRSU = Global Reading Strategy use; PSRSU = Problem Solving Reading Strategy use; SRSU = Support Reading Strategy use.

Equation (i) suggested that students’ reading comprehension performance increased by .14, .13 and .11 points for every standard deviation increased in global reading strategy use, problem solving reading strategy use and support reading strategy use respectively.

Use of all the three sub scales of cognitive reading strategies: global reading strategy use
(\(\beta = .14, t = 3.71, p < .05\)) problem solving reading strategy use strategies (\(\beta = .13, t = 2.33, p < .05\)), support reading strategy use: (\(\beta = .11, t = 1.94, p < .05\)), were positive significant predictors of reading comprehension performance. This means that cognitive reading strategy use in all the sub scale should be taught to the students to help them improve their reading comprehension performance. Global reading strategy use was found to be the best predictor of the three sub scales of cognitive reading strategy use. This suggests that, global reading strategy use such as skimming, scanning and general previewing of the text before embarking on reading should be emphasized, as this may lead to even better reading comprehension performance.

The second set of multiple regression analysis was conducted to evaluate whether the three sub scales of metacognitive knowledge had significant predictive values in predicting students’ reading comprehension performance. The results were presented in Table 4.30.
Table 4.30

*Predicting Reading Comprehension Performance Based on Metacognitive Knowledge Sub Scales*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>$t$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>$SE$</td>
<td>$\beta$</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>6.70</td>
<td>1.59</td>
<td>4.21</td>
<td>.00</td>
</tr>
<tr>
<td>PK</td>
<td>1.72</td>
<td>.44</td>
<td>.26</td>
<td>3.88</td>
</tr>
<tr>
<td>TK</td>
<td>-.19</td>
<td>.30</td>
<td>-.04</td>
<td>-.64</td>
</tr>
<tr>
<td>SK</td>
<td>-.33</td>
<td>.35</td>
<td>-.06</td>
<td>-.96</td>
</tr>
</tbody>
</table>

*Note.* $N = 319$. SK = Strategy Knowledge; PK = Person Knowledge; TK = Task Knowledge; $SE$ = Standard Error.

The resultant equation was:

$$\hat{y} = 6.70 + .26 \text{ (PK)}$$  \hspace{1cm} (ii)

Where $\hat{y} =$ predicted reading comprehension performance, PK = person knowledge.

Person knowledge was found to have a positive significant predictive value ($\beta = .26, t = 3.88, p < .05$) in predicting students’ reading comprehension performance. Equation (ii) suggested that students’ reading comprehension performance improved by .26, points for every standard deviation increased in person knowledge. This suggests that when a student is aware of their ability as a reader, in terms of how they comprehend best, they are likely to have a better reading comprehension performance. Task knowledge (\(\beta = -.
.04, $t = - .64, p = .52$) and strategy knowledge ($\beta = - .19, t = - .06, p = .34$) were found to have negative insignificant predictive values in predicting students’ reading comprehension performance.

The Adjusted $R^2$ for metacognitive knowledge sub scale is presented in Table 4.31.

Table 4.31

*Adjusted $R^2$ of Metacognitive Knowledge Sub Scales*

<table>
<thead>
<tr>
<th>R</th>
<th>Adjusted $R^2$</th>
<th>Std. Error of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.28</td>
<td>.041</td>
<td>3.24</td>
</tr>
</tbody>
</table>

The results in Table 4.31 indicated that the regression model for predicting reading comprehension performance using the three sub scales of metacognitive knowledge explains 4.1% of the model (Adjusted $R^2 = .041$).

Metacognitive knowledge and cognitive reading strategy use were analyzed separately and then jointly to determine their predictive value on reading comprehension performance.
Table 4.32

*Beta Coefficients for Metacognitive Knowledge*

<table>
<thead>
<tr>
<th></th>
<th>Standardized</th>
<th>sig.</th>
<th>Adjusted R squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.567</td>
<td>.00</td>
<td>.02</td>
</tr>
<tr>
<td>Metacognitive Knowledge (MCK)</td>
<td>.022</td>
<td>.00</td>
<td></td>
</tr>
</tbody>
</table>

From Table 4.32, equation (iii) was identified.

\[
\hat{y} = 1.567 + .022 \text{ (MCK)} \quad p < .05 \quad (R^2 = .02) \quad (iii)
\]

Where \( \hat{y} \) = predicted reading comprehension performance, MCK - metacognitive Knowledge score. According to Equation (iii), metacognitive knowledge had a positive significant predictive value on students’ reading comprehension performance (\( \beta = .022, p = .00 \)). The \( R^2 \) value was .02 which implied that, the amount of variation in reading comprehension explained by metacognitive knowledge is 2 percent. Further, cognitive reading strategy use scores were analyzed and the results were presented in Table 4.33.
Table 4.33

*Beta Coefficients for Cognitive Reading Strategy Use*

<table>
<thead>
<tr>
<th></th>
<th>Standardized</th>
<th>sig.</th>
<th>Adjusted R squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.245</td>
<td>.00</td>
<td>.07</td>
</tr>
<tr>
<td>Cognitive Reading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy Use (CRSU)</td>
<td>.024</td>
<td>.00</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* N = 319.

From Table 4.33, equation (iv) was identified.

\[
\hat{y} = 1.25 + .024 \text{ (CRSU)} \quad p < .05 \quad (R^2 = .07) \quad (iv)
\]

Where \( \hat{y} \) = predicted reading comprehension performance, CRSU – Cognitive Reading Strategy Use Score.

Equation (iv) shows that cognitive reading strategy use was found to have a positive and significant predictive value on reading comprehension performance (\( \beta = .24, \ p = .00 \)). The adjusted \( R^2 \) was .07 which implied that 7 percent of the variance in students’ reading comprehension performance is explained by use of cognitive reading strategies.

The findings in equation (iii) and (iv) show that, when analyzed separately, cognitive reading strategy use accounted for a larger variance in secondary school students’ reading comprehension performance as compared to the students’ metacognitive
knowledge. The two independent variables were however investigated jointly using multiple regression analysis. The results are presented in Tables 4.34 and 4.35.

Table 4.34

*Beta Coefficients for Metacognitive Knowledge and Cognitive Reading Strategy Use*

<table>
<thead>
<tr>
<th>Model</th>
<th>Standardized</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.622</td>
<td>.00</td>
</tr>
<tr>
<td>Metacognitive Knowledge</td>
<td>.25</td>
<td>.00</td>
</tr>
<tr>
<td>Cognitive Reading Strategy Use (CRSU)</td>
<td>.27</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note. N = 319. Dependent variable: Reading comprehension performance.*

Table 4.35

*Adjusted R^2 of Metacognitive Knowledge and Cognitive Reading Strategy Use*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.28</td>
<td>.07</td>
<td>3.2</td>
</tr>
</tbody>
</table>

*Note. N = 319.*

From Tables 4.34 and 4.35, the prediction equation for reading comprehension performance from metacognitive knowledge (MCK) and cognitive reading strategy use (CRSU) was significant (*F* = 13.93, *p* < .05) with *R^2* = .07. The fourth null hypothesis was therefore rejected. It was concluded that metacognitive knowledge and cognitive
reading strategy use had significant predictive value in predicting the form three students’ reading comprehension performance. The specific prediction equation from Tables 4.35 and 4.36 is as shown in equation (v).

\[ \hat{y} = 1.622 + .25(MCK) + .27(CRSU) \quad (R^2 = .07) \quad p < .05 \]  

Equation (v) suggested that cognitive reading strategy use had the highest significant predictive value on reading comprehension performance (\( \beta = .27, p < .05 \)) as compared to metacognitive knowledge (\( \beta = .25, p < .05 \)). Jointly, metacognitive knowledge and cognitive reading strategy use were found to account for 7% of students’ reading comprehension performance.

4.6.4 Discussion of Results

The current study hypothesized that cognitive reading strategy use and metacognitive knowledge had no significant predictive value in predicting reading comprehension performance. From the results of multiple regressions, global reading strategy use, problem solving strategy use and support reading strategy use had significant predictive value in predicting reading comprehension performance. The results indicated that, person knowledge sub scale of metacognitive knowledge had significant predictive value (\( \beta = .26, t = 3.88, p < .05 \)) on reading comprehension performance with the other two metacognitive knowledge sub scales having insignificant predictive value knowledge (\( \beta = -.04, t = -.64, p = .52 \)) task knowledge and strategy knowledge (\( \beta = -.19, t = -.06, p = .34 \)). The findings also indicated that jointly metacognitive knowledge and
cognitive reading strategy use were positive predictors of reading comprehension performance: $\hat{y} = 1.622 + .25 (MCK) + .27 (CRSU) \ (R^2 = .07) \ p < .05$.

Separately, however, cognitive reading strategy use was the better predictor of reading comprehension performance: $\hat{y} = 1.245 + .024 (CRSU) \ p < .05 \ (R^2 = .07)$.

The findings concur with the findings of Anastasiou and Griva, (2009) and Mwaniki, (2015) who reported that reading strategy use was a significant predictor of reading comprehension. This was expected because according to metacognition theory by Flavell (1979) which guided this study, the mere knowledge of the existence of the reading strategies available cannot improve reading comprehension. The reader has to use the strategies while reading to be successful in reading comprehension. It is therefore of paramount importance that teachers of English train their students on how and when to apply reading strategies.

On the other hand, the findings that task knowledge had no significant predictive value on reading comprehension performance, contradict an earlier study by Kulo et al., (2014) which reported that background knowledge of the task had a significant predictive value on reading comprehension performance. The contrasts in the findings suggest that students’ cognitive reading strategy use and metacognitive knowledge may differ due to differences in age, grade level, educational experiences and cultural backgrounds. According to Brown (1987), compared with features of knowledge about cognition, regulation of cognition was considered to be age independent. The findings that metacognitive knowledge significantly predicted reading comprehension
performance contrasted with the findings of Khonamri (2009) who reported that metacognitive knowledge had no significant predictive value in reading comprehension performance. This contrast could be as result of differences in educational background.

The $R^2$ value ($R^2 = .071$) which is the multiple coefficient of determination, indicated that 7.1% of the total variation of the students’ reading comprehension performance is determined by cognitive reading strategy use. While $R^2$ value ($R^2 = .041$), indicated that 4.1% is explained by metacognitive knowledge. A large percentage of students’ reading comprehension performance may be explained by other factors. These factors may include environmental factors, motivation and attitude, (Mwaura, 2014; & Mwaniki, 2015).

4.7 Observed Data Analysis
The second and the third objectives of the study were re-investigated using data collected using observation checklist in regard to cognitive reading strategy use. These were:

$H_{02}$: There is no significant relationship between cognitive reading strategy and reading comprehension performance.

$H_{03}$: There is no significant gender difference in cognitive reading strategy.

This was in attempt to verify the findings from the cognitive reading strategy use questionnaire. The researcher carried out observations to examine the subjective components related to cognitive reading strategy use. The observation checklist which was adopted from survey of reading strategies (SORS) by Sheorey and Mokhtari (2002)
was used. The researcher included only the overt reading strategies in the observation checklist. Thirty two students from the eight selected schools were involved. This section outlines the observed data analysis which includes both descriptive and inferential analysis.

4.7.1 Description of Observed Cognitive Reading Strategy Use

The observed cognitive reading strategy use score was analyzed to find the mean, range, minimum and maximum score, standard deviation and skewness. The results are presented in Table 4.36.

Table 4.36

Descriptive Statistics of Observed Cognitive Reading Strategy Use

<table>
<thead>
<tr>
<th>Reading strategies</th>
<th>N</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
<th>SK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OGSU</td>
<td>32</td>
<td>1.00</td>
<td>1.00</td>
<td>2.00</td>
<td>1.69</td>
<td>.47</td>
<td>-.85</td>
</tr>
<tr>
<td>OPSRSU</td>
<td>32</td>
<td>2.00</td>
<td>1.00</td>
<td>3.00</td>
<td>2.25</td>
<td>.57</td>
<td>.00</td>
</tr>
<tr>
<td>OSRSU</td>
<td>32</td>
<td>3.00</td>
<td>.00</td>
<td>3.00</td>
<td>.83</td>
<td>.60</td>
<td>1.78</td>
</tr>
</tbody>
</table>

Note. N = 319. Min = Minimum; Max = Maximum; SD = Standard Deviation; SK = Skewness; OGSU = Observed Global Strategy Use; OPSRSU = Observed Problem Solving Reading Strategy Use; OSRSU = Observed Support Reading Strategy Use.

Support strategy use had a range of 3.00 while problem solving reading strategy use and global reading strategy use had a range of 2.00 and 1.00 respectively. The minimum score in support reading strategy use was 0.00 with maximum of 2.80 out of the possible 4, while in both global reading strategy use and problem solving reading strategy use minimum score 1 and maximum of 2.00 and 3.00 out of the possible 2.00 and 1.00
respectively. Problem solving reading strategy use had a mean of 2.25 while global strategy use and support strategy had 1.69 and .83 respectively. Support reading strategy use had the highest standard deviation of .60.

The observed cognitive reading strategy use score was also used to classify the students into high, moderate and low in terms of using cognitive reading strategies. The results are presented in Table 4.37.

Table 4.37

<table>
<thead>
<tr>
<th>Levels of Observed Cognitive Reading Strategy Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Cognitive reading strategies</td>
</tr>
<tr>
<td>Level</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*Note. N = 32. GRSU = Global Reading Strategy Use; PSRSU = Problem Solving Reading Strategy Use; SRSU = Support Reading Strategy Use; ( ) = Percentage; (-) lack of data.*

The results showed that no students were found to use cognitive reading strategies at high frequency in any of the three sub-scales observed. This contrasted the findings from the questionnaire data which showed that 125 (39.3%) students used cognitive reading strategies at high frequency. It was also found that no student used global reading strategies at any level. Ten students (31.2%) and twenty two students (68.8%) used problem solving reading strategies at moderate and low level respectively. Two students
(6.2%) and thirty students (93.8) were found to be using support reading strategies at moderate and low level respectively.

The score of performance in reading comprehension was also analyzed to find the mean, range minimum and maximum score, standard deviation skewness and kurtosis. The findings were presented in Table 4.38.

Table 4.38

<table>
<thead>
<tr>
<th>COMP</th>
<th>N</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
<th>Sk.</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32</td>
<td>8.00</td>
<td>6.00</td>
<td>14.00</td>
<td>9.8</td>
<td>2.9</td>
<td>.21</td>
<td>-1.417</td>
</tr>
</tbody>
</table>

Note. N = 32. Min = Minimum; Max = Maximum; Sk = skewness; Kur = Kurtosis; SD = Standard Deviation; COMP = Comprehension scores.

The range was 8.00 while the minimum score was 6 and maximum scores 14 out of the possible 20. The mean score was 9.8 with a standard deviation of 2.9. The skewness was 0.21 meaning the data was fairly symmetrical.

4.7.2 Relationship between Observed Cognitive Reading Strategy Use and Reading Comprehension Performance in English

The score for reading comprehension performance and the score of the observed use of each sub scale of cognitive reading strategies were correlated to find out the relationship
of the observed use of cognitive reading strategies and reading comprehension performance. The resultant correlational matrix was presented in Table 4.39.

Table 4.39

*Correlational Matrix of the Sub scales of Cognitive Reading Strategy Use and Reading Performance*

<table>
<thead>
<tr>
<th></th>
<th>Comprehension</th>
<th>OGSU</th>
<th>OPSRU</th>
<th>OSRSU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OGSU</td>
<td>.27</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPSRU</td>
<td>.31</td>
<td>.18</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>OSRSU</td>
<td>.06</td>
<td>.45**</td>
<td>.39*</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. N = 32. OGSU = Observed Global Strategy Use; OPSRSU = Observed Problem Solving Reading Strategy Use; OSRS = Observed Support Reading Strategy Use; **Correlation is significant at the 0.01 level (2-tailed).*

The findings showed that there was no significant relationship between reading comprehension performance and use of all the sub scales of cognitive reading strategies. These findings contradict the findings that were obtained from analysis of Cognitive Reading Strategy Use Questionnaire which revealed that all the three sub scale of cognitive reading strategy use had positive and significant correlation with performance in reading comprehension. This implies that the participants’ may have overrated themselves on the questionnaire items of cognitive reading strategy use. It may also imply that students may be aware of the reading strategies but did not use them frequently.
4.7.3 Gender Differences in Observed Cognitive Reading Strategy Use

The scores of the observed use of all the sub scales of cognitive reading strategies were analyzed to find out the mean and the standard deviation of boy and girls. The results are presented in Table 4.40.

Table 4.40

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSRSU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>18</td>
<td>.92</td>
<td>.72</td>
</tr>
<tr>
<td>Girls</td>
<td>14</td>
<td>.71</td>
<td>.38</td>
</tr>
<tr>
<td>OPSRSU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>18</td>
<td>2.38</td>
<td>.61</td>
</tr>
<tr>
<td>Girls</td>
<td>14</td>
<td>2.07</td>
<td>.47</td>
</tr>
<tr>
<td>OGSU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>18</td>
<td>1.67</td>
<td>.49</td>
</tr>
<tr>
<td>Girls</td>
<td>14</td>
<td>1.71</td>
<td>.47</td>
</tr>
</tbody>
</table>

Note. \( N = 32 \). OGSU = Observed Global Strategy Use; OPSRSU = Observed Problem Solving Reading Strategy Use; OSRS = Observed Support Reading Strategy Use; SD = Standard Deviation.

As shown in the Table 4.40, boys had a higher mean than girls in observed support \( (M = .92, SD = .72) \) and problem solving reading strategy use \( (M = 2.38, SD = .61) \). This disagreed with the findings obtained from the data analysis of cognitive reading strategy use questionnaire where girls had higher means in both categories. Girls had a higher mean \( (M = 1.71, SD = .47) \) than boys \( (M = 1.67, SD = .49) \) in global reading strategy use. This contradicts the findings obtained from the analysis of questionnaire data which
showed no differences in boys and girls global reading strategy use means. The boys had a higher standard deviation than girls in all the categories which imply that their scores were spread out over a wider range of values than those of girls. This concurred with the findings from the cognitive reading strategy use questionnaire data analysis.

To establish whether there was a significant gender difference in observed cognitive reading strategies, an independent sample t-test was carried out. The findings from independent samples t-test are presented in Table 4.41.

Table 4.41

*Independent Sample t-test for Gender Differences in Sub Scales of Observed Cognitive Reading Strategy Use*

<table>
<thead>
<tr>
<th>Variable</th>
<th>t</th>
<th>df</th>
<th>sig.(2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSRSU</td>
<td>.018</td>
<td>30</td>
<td>.299</td>
</tr>
<tr>
<td>OPSRSU</td>
<td>.134</td>
<td>30</td>
<td>.107</td>
</tr>
<tr>
<td>OGRSU</td>
<td>.575</td>
<td>30</td>
<td>.781</td>
</tr>
</tbody>
</table>

*Note.* $N = 32$. OGSU = Observed Global Strategy Use; OPSRSU = Observed Problem Solving Reading Strategy Use; OSRS = Observed Support Reading Strategy Use.

Results show that there was a positive but insignificant gender difference in all sub scales of observed cognitive reading strategy use. This may mean that the boys had overrated themselves in the problem solving items of the questionnaire as a gender
difference in problem solving reading strategy use was found which was in favor of the boys.

4.7.4 Discussion of Findings
While no student was found to be using cognitive reading strategies at high level in the observation, 125 (39.2%) students were report to be using cognitive reading strategies at high level from questionnaire analysis. Majority of the students observed used cognitive reading strategies at low level. This contradicted the findings from the questionnaire which reported that majority of the students (55.8%) used cognitive reading strategies moderately.

From the observation, there were no significant gender differences in the use of all the sub scales of cognitive reading strategies. This disagreed with the findings from the questionnaire analysis which reported that boys were better than girls in the use of problem solving reading strategies.

The findings from the observation reported that there was no significant relationship between reading comprehension performance and use of any of the sub scales of cognitive reading strategies. This did not agree with the findings from the questionnaire analysis which reported positive, significant relationship between reading comprehension performance and use of all the subscales of cognitive reading strategies. The findings from the observed data revealed that there was no significant relation between cognitive reading strategy use and reading comprehension performance in
English. The findings also showed that there were no significant gender differences in cognitive reading strategy use.

In line with the studies reviewed, the findings that none of the observed cognitive reading strategy use had a significant correlation with reading comprehension agree with the findings of Molla (2015) which revealed that there was no relationship between reading strategy use and reading comprehension among Ethiopians EFL learners. They also concur with the findings of Shang (2011) who reported a weak correlation between these two variables among Taiwanese university students. The samples used by Molla (2015) and Shang (2011) were drawn from college students from the East, unlike the sample of the current study which was drawn from form three students in Kenya. Irrespective of these differences, the findings are similar. This may imply that age and socio-cultural differences may not necessarily be a key factor in determining the relationship of the two variables.

However, the findings did not support the findings of Clarisse (2011) who reported that among Filipino college students, reading comprehension had a positive significant correlation with use of problem solving reading strategies. Similarly, Rastakhiz and Safari (2014) reported that, EFL learners who used support reading strategies had better reading comprehension.

The findings that there were no significant gender differences in observed cognitive reading strategy use are supported by the findings of Munsakorn (2012) who reported
that there were no statistically significant differences in use of reading strategies between males and females. This study involved first year university students in Bangkok. The findings are also supported by those of Yarahmadi (2011) who reported a non-significant difference in the use of reading strategies between male and female university students in Iran.

However, the findings are discordant with the findings of Li and Yangtze (2008) which reported significant gender differences in use of global, support and problem solving reading strategies. This was among senior middle school level students in China. Similarly, Griva, et al., (2011) reported that sixth grade girls in Greece used reading strategies better than the boys. These differences could be due to age, education system and socio-cultural and home background which could be different in Kenya and in the East.

The differences in the findings from the two sets of data could be as a result of subjectivity introduced by self report from the Cognitive Reading Strategy Use Questionnaire. While filling the questionnaire, the respondents may have over rated themselves.
CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction
This chapter covers summary of the study findings, the conclusions based on the findings of the study and lastly policy and further research suggestions are given.

5.2 Summary
The main aim of the current study was to examine how metacognitive knowledge and cognitive reading strategy use correlate with reading comprehension performance in English among secondary school students in Kiambu County. The study also sought to investigate gender differences in the students’ metacognitive knowledge and cognitive reading strategy use. The predictive value of metacognitive knowledge and cognitive reading strategy use in determining reading comprehension performance in English were also investigated.

In line with the first research objective, among the three variables of metacognitive knowledge, task knowledge and strategy knowledge were found to have positive but insignificant correlation with reading comprehension performance. Person knowledge on the other hand had a moderately positive significant correlation with reading comprehension performance.

After analysis of the second research objective, it was found that use of the three sub scales of cognitive reading strategies were positively and significantly correlated with performance in reading comprehension. Global reading strategy use and support reading
strategy use had the highest correlation with reading comprehension performance. This was different from the finding from observation which found that, none of the three metacognitive knowledge sub scale was significantly correlated to reading comprehension performance.

In line with the third research objective, gender differences were tested. The finding showed no significant gender difference in global and support reading strategy use sub scales. Problem solving reading strategy use was the only sub scale of cognitive reading strategy use that had significant gender differences in which boys were found to be using problem solving strategies more than the girls. This was different in the findings from observation, where none of the three sub scale had significant gender differences. This may suggest that boy may have over rated themselves in the problem solving reading strategy use.

The fourth objective of this study was to test the predictive values of metacognitive knowledge and cognitive reading strategy use in determining reading comprehension performance in English. Given the three subscales of cognitive reading strategy use and the three sub scales of metacognitive knowledge as the predictors in this study, significant predictive equations were found. Equation (i) involved predicting reading comprehension performance from cognitive reading strategy use of its three sub scales. In this equation, all the three sub scales were found to be significant predictors of the learners’ reading comprehension performance. Global reading strategy use was found to have the highest predictive value.
Equation (ii) predicted reading comprehension performance from the three sub scales of metacognitive knowledge. In this equation, only person knowledge was found to be a positive significant predictor of reading comprehension performance.

From the analysis of the observed data, although use of all the three cognitive reading strategies sub scales had a positive correlation with reading comprehension performance, none of them was significant. No significant gender differences were found in all the sub scales of the observed cognitive reading strategy use. Neither boys nor girls were found to be using cognitive reading strategies in a significantly different way.

5.3 Conclusions
The first objective of this study was to find out the relationship between metacognitive knowledge and reading comprehension performance in English. When the three sub scales of metacognitive knowledge were analyzed, task knowledge and strategy knowledge were found to have positive but insignificant correlation with reading comprehension performance. Person knowledge was the only metacognitive knowledge sub scale that had a moderately positive correlation with reading comprehension performance. It can be concluded that, when faced with a reading task, students who have a better understanding of themselves as readers are more likely to perform better in reading comprehension. There is therefore need for students to understand their strengths and weaknesses as readers.
The second objective of the study was to determine the relationship between cognitive reading strategy use and reading comprehension performance. Uses of all the sub scales of cognitive reading strategies which include: global reading strategies, support reading strategies and problem solving reading strategies, were positively and significantly correlated with reading comprehension performance. Therefore, students who use cognitive reading strategies more frequently while reading a text may perform better in reading comprehension than those who do not.

The third objective of this study was to investigate gender differences in metacognitive knowledge and cognitive reading strategy use. The findings revealed no significant differences in all the sub scales of metacognitive knowledge of boys and girls. With regard to cognitive reading strategy use, there were no significant gender differences in global reading strategy use and support reading strategy use. However, gender differences were found in problem solving reading strategy use, in favour of boys. These findings may suggest that boys use problem solving strategies more than girls. Teachers should give more training to girls to assist them improve their problem solving skills for better reading comprehension performance.

The forth objective of this study was to test for predictive value of metacognitive knowledge and cognitive reading strategy use in predicting reading comprehension performance in English. Among the three metacognitive sub scales, person knowledge accounted for the largest amount of variance in performance of reading comprehension
performance and was found to be the best predictor of performance in reading comprehension.

However while combined, the three sub scales accounted for more variance in predicting performance in reading comprehension. Therefore, the three variables should be considered important and teachers should assist students to develop more knowledge in the three metacognitive knowledge sub scales to help improve performance in reading comprehension and academic achievement in general. Students should be helped to understand: themselves as readers (their weaknesses and strengths), type of texts terms its purpose and demands and also to understand the strategies available in solving the reading task at hand.

Among the three cognitive reading strategies sub scales, global strategy use was found to be the best predictor of performance in reading comprehension. Global reading strategies include strategies such as: predicting and previewing the text to be read. It can therefore be concluded that, students who take time to read the title and the sub titles of a text, check the length and the structure of the text and predict the subject matter of the text are more likely to perform better in reading comprehension tasks than those who do not. Teachers of English should ensure that their students understand the importance of previewing a text to get the gist and structure.
5.4 Recommendations
In line with the findings of the present study, the researcher made the following recommendations for policy and further research:

5.4.1 Policy Recommendations
i. The first objective of the study was to find out whether there is a significant relationship between metacognitive knowledge and reading comprehension performance. Findings revealed that Person knowledge has a positive and significant correlation with performance in reading comprehension, therefore, teachers and other stakeholders in education such as curriculum developers should ensure that students are assisted in discovering and understanding themselves as readers. Curriculum developers should develop training materials to help teachers train students on metacognitive knowledge. This may ensure that each student understands themselves in terms of their abilities as readers and their weaknesses as readers.

ii. The teachers should be given training that will help them assist students in understanding themselves as readers to enhance their reading comprehension performance. Therefore curriculum developers for teacher training should consider developing relevant training materials for teacher training colleges.

iii. The third objective of the study was to determine whether there are significant gender differences in metacognitive knowledge and cognitive reading strategy use. The findings revealed that boys were better than girls in problem solving
reading strategy use. Interventional measures to help girls improve their use of problem solving reading strategies should be introduced in schools. This may help reduce the gender differences found in problem solving reading strategy use.

iv. The fourth objective of the study was to find out the predictive value of cognitive reading strategy use and metacognitive knowledge in predicting reading comprehension performance. Global strategy use was found to be the best predictor of reading comprehension performance. Therefore teachers of English should lay more emphasis on teaching and use of these reading strategies by encouraging students to always preview the text before embarking on reading. Teachers should make follow up to ensure this is done.

5.4.2 Recommendations for Further Research

The following recommendations for further research were made:

i. This study used questionnaires and observational method to investigate the relationship between metacognitive knowledge and cognitive reading strategy use. Further research should be done to investigate the same variables using different tools such as interviews, focused discussion groups or think-aloud approach to see whether the findings will concur.

ii. The findings of this study show that metacognitive knowledge of person and use of all the three sub scales of cognitive reading strategies had positive and
significant predictive value on students’ performance in reading comprehension in English. However, the study did not investigate other determinants such as: multilingualism, vocabulary, home and school environments. Therefore, further research on such variables needs to be conducted to see how they predict reading comprehension.

iii. This study covered a small sample which was drawn from form three students in one sub County in Kiambu County. Generalization of the findings from this study should therefore be done with caution. The study should also be replicated in other sub counties and Counties and with students from different educational levels for more conclusive findings.

iv. The findings of this study revealed that among the three sub scales of cognitive reading strategy use, only problem solving had gender differences. Boys were found to use problem solving strategies more than girls. These findings disagree with studies by other researchers in developed countries. Further research is, therefore, recommended for more conclusive findings.

v. There were no significant gender differences in all the sub scales of metacognitive knowledge. There is, therefore, need to replicate this study with a different population to examine whether significant gender differences in metacognitive knowledge exist among them.
vi. Although metacognition develops with age, further research with participants of different ages is recommended to see whether there are any age differences in metacognitive knowledge.

vii. In this study, reading comprehension performance was measured using the scores students obtained from two reading comprehension tests given in class by their teacher of English. Further research using standardized comprehension test is recommended to see whether its correlation with metacognitive knowledge and cognitive reading strategy use would be different.

viii. The study investigated only performance in reading comprehension. Further research may be done to investigate other aspects of language such as: writing, listening and vocabulary size that contribute to enhanced comprehension and school learning.

ix. The findings of this study were based on a sample from secondary school students. Further research to investigate metacognitive knowledge and cognitive reading strategy use among participants from primary schools, middle level colleges and universities in other subjects is recommended. This is informed by the fact that metacognition is developmental therefore the findings from high school student cannot be generalized to other levels of education.
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analysis. Author.

County Education Office Kiambu (2014). *Kiambu County KCSE 2013 results analysis*. Author.


Memis, A., & Bozkurt, M. (2013). The relationship of reading comprehension success with metacognitive awareness, motivation and reading levels of fifth


publications/7021/


APPENDIX I

LETTER OF INFORMED CONSENT FOR STUDENTS

Dorothy Wangari Mwathi
Department of Educational Psychology
Kenyatta University,
P.O Box, 43844,
Nairobi.

Dear student,

I am a Ph.D. student at the Department of Educational Psychology of Kenyatta University. I am undertaking a research involving form three students in Kiambu County. The research will consist of questionnaires with statements about your knowledge about reading and the reading techniques/strategies that you use while reading. It will also involve a reading comprehension task. The information you give will be treated with utmost confidentiality. Do not write your name on the questionnaires so as to ensure confidentiality. The information you give will only be used for the purposes of this study.

You have been chosen to participate since you’re a form three student in Kiambu County. Please note that you are free to choose to or not to participate in this study. If you agree to participate and in the course of the study you wish to discontinue, feel free to do so. The findings of this study will be shared with all the participants once the study is concluded. If you agree to participate, please sign below.

Thank you.
Signature……………………………………………….. (I agree to participate in the research)
APPENDIX II

METACOGNITIVE KNOWLEDGE QUESTIONNAIRE (MCKQ) FOR STUDENTS (Adapted from Metacognitive Awareness Inventory by Scrawl & Sperling, 1994)

PART A: BACKGROUND INFORMATION

Boy ☐ Girl ☐

AGE…………………….. (in years)

PART B:

Listed below are activities that students engage in as they read text books or comprehension passages. Each statement is followed by never, occasionally, sometimes, usually and always. Tick one for each statement. Do not answer how you think you should be or how other people do, but how you do your reading. There is no right or wrong answer to these statements.

Tick (√) to show how often you use each of the reading strategies below

I. Person knowledge

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I know what I am good at and what I am not good at in reading.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I know what kind of information is most important to learn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am good at identifying and grouping related information.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I know what the teacher expects me to learn from a given text.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am good at remembering information read from a text.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I have control over how well I understand what I read.

I can tell how well I understand what I read.

I learn best when I know something about the topic.

I can motivate myself to learn when I need to.

### II. Strategy Knowledge

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I try to use reading methods that have worked in the past</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have a specific purpose for each reading method I use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am aware of which reading methods I use when reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I find myself using helpful reading methods automatically</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### III. Task Knowledge

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I learn best when I know something about the topic.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use different methods on depending on what I am reading.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I learn more when I am interested in the topic.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use what I am good at to compensate for what I am not good at.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Appendix III

COGNITIVE READING STRATEGIES QUESTIONNAIRES (CRSQ) FOR STUDENTS (adapted from Survey of Reading Strategies by Mokhtari & Sheorey, 2002)

The statements below state what students know about themselves concerning reading of textbooks or comprehension passages in school. Each statement is followed by Strongly Agree, Agree, Not Sure, Disagree, and Strongly Disagree. Tick to show the degree to which you agree or disagree with each statement. Do not answer how you think you should be or how other people do, but how you do your reading. There is no right or wrong answer to these statements.

- Always means “I do this all the time”
- Sometimes means “I do this.” (about 50% of the time).
- Occasionally means “I do this only occasionally.”
- Never means “I never or almost never do this.”

Tick (√) to show the degree to which you agree or disagree with each statement

1. Global Reading Strategies

How often do you:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Never</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Peruse through the reading material to have an idea of its length, structure and the subject matter?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Choose the information to read in details and the information to read without much concentration?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td>---</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Use what you already know about the subject to understand the text?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Use tables, figures and pictures in the text to understand what is in the text?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Make use of charts, pictures and sentences surrounding unknown words to help get their meaning?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Make use of bolded words and italicized words to identify key information?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Try to guess what the text is about when you read?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Try to find merits and faults in information presented in the text than just accept everything?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
II. Problem-solving Reading Strategies

**How often do you:**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Never</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Try to picture or visualize information (create mental picture) to help you remember what you read?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Re read (to go back and read again) when the reading becomes difficult to increase your understanding of the text?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. Support Reading Strategies

**How often do you:**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Never</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Note the main phrases and points as you read to assist you in understanding what you read?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Underlining or circling key points in the text to help me remember them?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Use reference materials (e.g. dictionary) to help you understand what you are reading?

4. Paraphrase (re-state main points in your own words) for better understanding of the text?

5. Keep going back to the previous read paragraphs so as to establish relationships among ideas?

6. Formulate/come up with questions you would like clarified in the text?
APPENDIX IV

READING COMPREHENSION TASK FOR STUDENTS

SMELLY FEET

Few smells are as offensive as foot odour, but not to everybody—at least not to mosquitoes! “They love it. This explains why most Anopheles mosquitoes tend to bite the lower leg,” says Prof Ahmed Hassanali, an expert in insect communication at the International Centre of Insect Physiology and Ecology (ICIPE). The new findings expected to generate interesting debate among scientists are significant and could lead to development of a bait for mosquitoes similar to that used to catch tsetse flies.

Apart from using foot odour as a signal for short range host location, the mosquito makes sure it feeds from as far from the hand as possible otherwise it would be swatted before it has finished taking its meal. In addition to this mosquitoes have adapted to feeding at night when humans are least active.

Professor Hassanali’s research aims at identifying chemicals from humans that make them attractive to mosquitoes. His research has shown that while some human beings may be repellant to mosquitoes, there are others with individual variations in the level of attractiveness. The most attractive are eight times as potent as the least attractive. However, says the researcher, “no human foot has been found to be repellant to mosquitoes.”

Prof Hassanali says that apart from foot odour, there are other chemicals that are emitted by the human body that are potent mosquito attractants. This he says includes carbon dioxide, which we breathe out. “Human breath also contains other molecules that attract mosquitoes. In total, the human body emits about 400–500 molecules of odour,” says the Professor.

Without the benefit of a nose and other senses that human beings have such as touching, insects have feelers which they use to smell and locate hosts for feeding. The feelers tend to be more sophisticated in the female mosquitoes since they feed on blood. The males which feed on plant sugars have less sophisticated antennae.

The Professor says that his research and research of other groups studying mosquito behavior have narrowed down to active chemicals from human odours to between 40–50 which he says is still a wide range. “Recently we used an advanced technique known as electro–antennography to narrow down the active chemical even further,” says the research. The mosquito antenna is a million times more sensitive than the human nose when it comes to distinguishing various odours. The technique involves attracting the antennae to an electric apparatus that creates an electric signal whenever an attractive odour is passed through the antenna. By using electro–antennography, the odours range has been narrowed down to a group of eleven chemical, some of which have never been identified as mosquito attractants before. “I can now say with confidence that we are getting there as far as mosquito attractants are concerned and we are excited by the results of our research,” says Hassanali. Once all chemicals have been identified, they
can be used to attract mosquitoes to artificial baits laced with chemicals from where they can be killed.

Another approach that Professor Hassanali and his group of researchers are working on is the use of plant chemicals to repel mosquitoes. Plants have over the years evolved mechanisms to ward off insects that feed on them. While these may not have been directed against the mosquitoes in particular, they include a whole array of chemicals, some of which are effective in keeping mosquitoes at bay. Traditional methods have been used to identify such plants. Some communities hung some plants around their beds and use them to ward off mosquitoes. Ethnobotanical methods have been used to identify such plants.

In addition to ethnobotany, researchers are using a branch of science known as chemotaxonomy to identify these repellent plants. “When we identify a plant that is repellent we screen closely related species to find out whether they also have the properties,” he says. Using these approaches several plants have been found to be potent mosquito repellents. These plants can be used easily in the rural communities as supplements to insecticide treated nets in malaria control.

Professor Hassanali singles out the simplicity and cheapness of these methods as what makes them attractive. “Compared to other mosquito control methods, ours are simple and easily adaptable to rural communities.” (Adapted from New Integrated English book three)

**Comprehension Questions**

1. What do mosquitoes feed on? (2marks)

2. Why do Anopheles mosquitoes like to bite the lower leg? (2marks)

3. How do mosquitoes locate their host for feeding? (2 marks)

4. What are the safety measures taken by the Anopheles mosquitoes while feeding? (2marks)
5. Identify three scientific approaches researchers are using to find ways of controlling mosquitoes. (3 marks)

6. How do some people in the rural communities ward off mosquitoes? (2 marks)

7. What is the reason given by Prof. Hassanali for plants popularity as supplements to insecticide-treated nets among the rural communities? (2 marks)

8. Give the meaning of the following words and phrases as used in the context. (5 marks)
   i. Bait-
   ii. Attractants-
   iii. Repellent-
   iv. Emitted-
   v. Short range host
APPENDIX V

PRO FORMA SUMMARY OF STUDENT’S PERFORMANCE IN READING COMPREHENSION

Participants’ code ____________________________

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Total</th>
<th>Marks</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comprehension II</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


## APPENDIX VI

### OBSERVATIONAL CHECKLIST FOR STUDENTS

#### I. Global Strategy

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previewing (check whether students run through the text to know about its length organization and main idea)</td>
<td></td>
</tr>
</tbody>
</table>

#### II. Problem Solving Strategy

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rereading (going back to read again when the reading becomes difficult)</td>
<td></td>
</tr>
</tbody>
</table>

#### III. Support Strategy

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension monitoring (going back and forth in the text to find relationships among ideas)</td>
<td></td>
</tr>
<tr>
<td>Underlining (underlining information in the text to help them remember it)</td>
<td></td>
</tr>
<tr>
<td>Note-taking (writing key expressions and ideas while reading.)</td>
<td></td>
</tr>
<tr>
<td>Summarizing (writing down the key idea of the text in a summary form)</td>
<td></td>
</tr>
</tbody>
</table>

## APPENDIX IX

**Lari Sub County Performance in English**
### KCSE English Performance 2012 - 2016

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lari</td>
<td>3.823 D+</td>
<td>4.940 C-</td>
<td>5.344 C-</td>
<td>5.431 D+</td>
<td>4.271 D+</td>
</tr>
</tbody>
</table>

Source: Kiambu County Education Office

### APPENDIX X

Lari Sub County Performance in KCSE
**KCSE Overall Performance 2012 - 2014**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lari</td>
<td>3.304</td>
<td>3.304</td>
<td>3.107</td>
<td>2.84</td>
<td>2.27</td>
</tr>
<tr>
<td>Limuru</td>
<td>3.733</td>
<td>4.169</td>
<td>3.769</td>
<td>3.51</td>
<td>3.45</td>
</tr>
<tr>
<td>Kikuyu</td>
<td>3.676</td>
<td>4.090</td>
<td>3.874</td>
<td>3.72</td>
<td>3.65</td>
</tr>
</tbody>
</table>

Source: Kiambu County Education Office
APPENDIX XI: Map of Lari Sub-County
KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43544, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

DATE: 11th April, 2016

Our Ref: E83/20528/2010

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 50623-00100
NAIROBI

Dear Sir/Madam,

RFS: RESEARCH AUTHORIZATION FOR MWATHI DOROTHY WANGARI—REG. NO. E83/20528/2010

I write to introduce Ms. Mwathi Dorothy Wangari who is a Postgraduate Student of this University. She is registered for Ph.D degree programme in the Department of Educational Psychology.

Ms. Mwathi intends to conduct research for a Ph.D Proposal entitled, “Metacognitive Knowledge and Reading Strategy Use as Determinants of English Reading Comprehension among Form Three Students in Kiambu County, Kenya”.

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR DEAN, GRADUATE SCHOOL
OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT
COUNTY COMMISSIONER, KIAMBU

Telephone: 066-2022799
Fax: 066-2022644
E-mail: countycommissionerkiambu@yahoo.com
When replying please quote

Ref.No: ED.12/1/VOL.IV/37 12th July, 2016

Dorothy Wangari Mwathi
Kenyatta University
P.O BOX 43844 - 00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Reference is made to National Commission for Science, Technology and Innovation letter Ref No. NACOSTI/P/16/48494/11297 of 8th June, 2016.

You have been authorized to conduct research on "Metacognitive knowledge and reading strategy use as determinants of English reading comprehension among from three students in Kiambu County, Kenya". The data collection will be carried out in Kiambu County for a period ending 7th June, 2017.

You are requested to share your findings with the County Education Office upon completion of your research.

Denis K. Mue
FOR: COUNTY COMMISSIONER
KIAMBU COUNTY

Cc
County Director of Education
KIAMBU COUNTY

National Commission for Science, Technology and Innovation
P.O. Box 30623-00100
NAIROBI

All Deputy County Commissioners (For information and record purposes)
KIAMBU COUNTY

"Our Youth, Our Future. Join us for a Drug and Substance free County."
MINISTRY OF EDUCATION SCIENCE & TECHNOLOGY
State Department of Education

Telephone: Kiambu (office) 020-2044686
FAX NO. 020-2090948
Email: directoreducationkiambu@yahoo.com
When replying please quote
KBU/CDE/HR/4/11/ (98)

COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY
P. O. Box 2390
KIAMBU
12th July, 2016

Dorothy Wangari Mwathit
Kenyatta University
P.O. Box 43844 - 00100
NAIROBI

RE: RESEARCH AUTHORIZATION

Reference is made to the National Commission for Science, Technology and Innovation letter Ref. No. NACOSTI/P/16/48494/11297 dated 8th June, 2016.

Authority has been granted to you to do research on “Metacognitive knowledge and reading strategy use as determinants of English reading comprehension among form three students in Kiambu County, Kenya” for a period ending 7th June 2017.

Please accord him the necessary assistance.

MURIUKI HARRISON
COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY
APPENDIX XV

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-323-3471, 2281359, 3310171, 2293920
Fax: +254-20-318345, 318349
Email: cj@nacost.go.ke
Website: www.nacost.go.ke
when replying please quote

Ref. No: 8th Floor, Uhuru House
NACOST/P/16/48494/11297

Dorothy Wangari Mwathi
Kenyatta University
P.O. Box 43844-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on
“Metacognitive knowledge and reading strategy use as determinants of
English reading comprehension among form three students in Kiambu
County, Kenya,” I am pleased to inform you that you have been authorized to
undertake research in Kiambu County for the period ending 7th June, 2017.

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

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

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kiambu County.

The County Director of Education
Kiambu County.
APPENDIX XV

RESEARCH PERMIT

THIS IS TO CERTIFY THAT:

MISS. DOROTHY WANGARI MWATHY

OF KENYATTA UNIVERSITY, 0-002

HAS BEEN PERMITTED TO CONDUCT

RESEARCH IN KIAMBU COUNTY

ON THE TOPIC: METACOGNITIVE

KNOWLEDGE AND READING STRATEGY

USE AS DETERMINANTS OF ENGLISH

READING COMPREHENSION AMONG

FORM THREE STUDENTS IN KIAMBU

COUNTY, KENYA

FOR THE PERIOD ENDING:

7TH JUNE, 2017

DIRECTOR GENERAL

National Commission for Science,
Technology & Innovation

Signature

Applicant's

Permit No.: NACOSTI/P/16/48494/11297
Date of Issue: 8TH JUNE, 2016