ACADEMIC MINDSETS AND LEARNING STRATEGIES AS PREDICTORS OF ACADEMIC ACHIEVEMENT AMONG FORM THREE STUDENTS IN NAIROBI COUNTY, KENYA

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

SEPTEMBER, 2018
DECLARATION

I confirm that this research thesis is my original work and has not been presented in any other university/institution for consideration. The thesis has been complemented by referenced works duly acknowledged. Where text, data, graphics, pictures or tables have been borrowed from other works, including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

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DEDICATION

This thesis is dedicated to my parents; Josiah (late) and Sarah for inspiring and educating me and to my husband Zakaria and children-Lynn, Faith and Joshua for their encouragement and the much needed support.
ACKNOWLEDGEMENTS

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## ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>GPA</td>
<td>Grade Point Average</td>
</tr>
<tr>
<td>KCPE</td>
<td>Kenya Certificate of Primary Education</td>
</tr>
<tr>
<td>KCSE</td>
<td>Kenya Certificate of Secondary Education</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>MSLQ</td>
<td>Motivated Strategies for Learning Questionnaire</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science, Technology, and Innovation</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific, Cultural Organization</td>
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<td>USA</td>
<td>United States of America</td>
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ABSTRACT

In Kenya, academic achievement especially in the Kenya Certificate of Secondary Education has been declining over the years (2014-2017). Poor academic achievement poses a threat to the educational sector, which is an important pillar in the realization of vision 2030. Studies on motivational factors in learning have been done especially in Western Countries. However, little has been done in Kenya on how academic mindsets and learning strategies predict academic achievement. The purpose of this study was to examine how academic mindsets and learning strategies predict academic achievement among secondary school students in Kenya. In particular, the relationship between academic mindsets, learning strategies and academic achievement were examined. Sex differences and the predictive weight of academic mindsets and learning strategies on academic achievement were also examined. The study was guided by Social Cognitive Theory of Motivation and Personality and Social Cognitive Theory of Learning. Explanatory sequential mixed methods design was adopted. The target population was form three students in public secondary schools in Nairobi County in 2016. Purposive, stratified, and simple random sampling procedures were used. A sample of 488 participants was selected from 10 public secondary schools. A pilot study using 50 students from one secondary school was conducted to check on the validity and reliability of the instruments. Quantitative data was collected through self-report questionnaires which comprised of adapted scales for Academic Mindsets and Learning Strategies. The quantitative data was further cross-checked through interviews conducted with 40 participants purposefully selected from those who had filled the questionnaires. Academic achievement was inferred from student’s academic records. Quantitative data were mainly analyzed using Pearson’s Product Moment Correlation Coefficient, t-test for independent samples, and multiple regression. Qualitative data were analyzed thematically. The study found a non-significant positive correlation between students’ academic mindsets and academic achievement ($r (486) = .05, p > .05$) and a positive significant correlation between learning strategies and academic achievement ($r (486) = .20, p < .01$). There were significant sex differences in academic mindset scores ($t (486) = -2.47, p < .05$). No significant sex differences in learning strategies were found ($t (486) = -1.56, p > .05$). The equation for predicting academic achievement from both academic mindsets and learning strategies was significant ($F (2, 485) = 11.23, p < .05$). Hence, all the subscales of academic mindsets and learning strategies had a significant predictive weight on academic achievement. The qualitative findings were in agreement with the quantitative results. In conclusion, the significant predictive weight of both academic mindsets and learning strategies imply their importance in the teaching learning process. Therefore, the study recommended that, teachers, parents and all stakeholders in education should create an enhancing environment to foster the development of academic mindsets and learning strategies among secondary school students.
CHAPTER ONE
INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction
This chapter discusses the background to the study, statement of the problem, purpose of the study, objectives of the study, research hypotheses, significance of the study, limitations and delimitations of the study, and assumptions of the study. It also presents the theoretical and conceptual framework. Finally, it provides operational definition of terms.

1.2 Background to the Study
Worldwide, education has always emphasized on academic achievement which in most cases, is seen by many as the key determinant of success. No country can achieve sustainable economic development without substantial investment in human capital. Education is also expected to provide an all-round development of its recipients to enable them overcome prevailing challenges and therefore play effective roles in their immediate society (Education Sector Report, 2016). However, according to Matseke (2011), when learners do not obtain the cut-off grade for admission to join colleges and higher institutions of learning, there is always disappointment and frustration. Parents suffer a lot of stress and the number of the unemployed in the society also increases. In support of this, Uys (2011) adds that under-achievement has various implications for adolescents, like school dropout, loss of focus and hope.
Because of these reasons, poor academic achievement is an issue of concern in the whole world. In the United States of America, McWilliams (2015) reported that, despite the many initiatives and reform measures the government and schools take, a good number of students do not perform well academically. The study further reported that, among the factors that may influence academic achievement of learners include student self-belief systems, classroom management and relationships with teachers and peers. Similarly, Obrentz (2012) asserted that, although they have been studied for decades, factors predicting academic achievement require continuous research because student populations are constantly changing and the criteria for academic success also varies from institution to institution. Moreover, awareness of the variables that predict academic achievement allows for shaping instructional delivery and designing support programs that foster student success and increase retention (Obrentz, 2012).

In the same vein, P’Pool (2012) stressed on the importance of identifying specific factors that contribute to student academic achievement in order to assist educators to create and utilize effective teaching methods which will consequently enhance academic achievement. Mushtaq and Khan (2012) conducted a study in Pakistan and argued that, the social and economic development of the country was directly linked with student academic achievement. The study cited communication, learning facilities and family stress as key factors affecting academic achievement.

In Africa, poor academic achievement has been reported in many countries. For instance, in Nigeria, Nuze (2011) reported that, there was a general worry about the
poor quality of education outputs at all levels. More specifically the study reported that, the educational system in Nigeria was far from achieving the desired educational goals and objectives as there were noticeable evidences of decline in the standard and quality of students especially at the secondary school level. In South Africa, Matseke (2011) stated that, the search for factors that could improve the low academic achievement by learners and the declining standards in institutions of learning was necessary. In addition, Robertson (2012) argued that, the knowledge of factors that influence and predict academic achievement of learners had powerful implications for their academic success.

In Kenya, a report by Education Overview Centre for Education Innovations (2014) indicated that, more than 50% of the pupils had failed in the 2013 KCPE examinations due to problems of overcrowded classrooms, low teaching standards, and substandard examination content. Similar problems were also reported about KCSE examinations results. Although the number of students taking these examinations had increased, there was poor academic achievement, with only 28% achieving a C+ or above which is the minimum requirement for university entrance. This report was consistent with the annual report by UNESCO (2014) on the educational status in the country. Part of the report stated that, the overall performance of candidates in the 2013 KCSE examination remained relatively at the same level when compared to that of 2012 because about 27% of the candidates obtained the minimum entry qualification of C+ compared to about 28% candidates in 2012.
In the years 2014, 2015 and 2016, there has also been an increase in candidature in the KCSE examinations from 486,412 to 577,253. The number of female candidates increased from 225,139 to 274,502 while males increased from 261,273 to 302,751. Despite this increase in candidature, poor academic achievement has been registered, with the highest drop noted in those who had obtained between grade D and E rising from 25.62% in 2015 to 51.73% in 2016. This implied that, more than half of the candidates (51.7%) scored grades of D and below. In 2017, the overall number of candidates with minimum university qualification of C+ and above was 70,073 (11.38%) compared to 88,929 (15.41%) in 2016. Among the 47 counties in Kenya, Nairobi County is one of the counties that have taken the same downward trend in academic achievement (Ministry of Education, State Department of Basic Education, 2017).

Statistics obtained from the County Director of Education’s office Nairobi (2017) showed that, over the years 2014 and 2015, Nairobi County registered a mean of 5 points respectively in the KCSE examinations while in 2016 this mean went down to 4 points. In addition, the overall performance of students obtaining below C+ in 2014 and 2015 was 68.62% and 67.79% respectively, while 2016 had the highest number of students (79.63%) obtaining below C+. Moreover, those who obtained between D and E in Nairobi County increased from 35.88% in 2015 to 58.09% in 2016. This increase in the number of those who obtain low grades would trigger the question, what makes some students perform well while others do not. Is it something to do with the students themselves, or is it the school, the home or the government?
According to Dweck, Walton, and Cohen (2011), students have a very important role in learning. More specifically, they emphasize on the motivation that students carry with them in the form of mindsets and skills. According to the social cognitive theory of learning, Bandura (1986, 1989, 2003), the path a person’s life takes is determined by the reciprocal interplay between personal, behavioral and environmental factors. In other words, people are actual producers of their life paths (Bandura, 2003). Therefore, despite the external influence of the teachers and the parents, the learner has a central role to play in determining his or her academic success. This study focused on two motivational factors of the learner that may have a great impact on academic achievement: academic mindsets and learning strategies.

People may have different mindsets in different domains but this study specifically focused on mindsets as they relate to intelligence and academic achievement. Academic mindsets are beliefs or ways of perceiving oneself in relation to learning and academic achievement (Farrington et al., 2012). Moreover, Dweck et al. (2011) asserts that, the most important concern about students’ belief in their ability is the sustainability of their self-efficacy and especially when they encounter inevitable challenges and setbacks in schools. Therefore, the major issue in this study is not just the self-efficacy belief but how sustainable is this self-efficacy and this is the student’s mindset about intelligence (Dweck & Leggett, 1988).

According to Dweck (2000), for students to be successful, they must love learning, seek challenges, value effort, and persist in the face of obstacles. Therefore, when one
encounters challenges, his or her mindset determines their level of persistence. Dweck identifies two types of mindsets in relation to intelligence. They include fixed and malleable mindsets. With fixed mindset, intelligence is a constant, inherent trait, and nothing can be done about it. Fixed mindset is also referred to as entity theory. With malleable academic mindset, while intelligence may be naturally different among individuals, it can be developed through learning. Malleable mindset is also referred to as growth mindset or incremental theory (Dweck, 2000).

According to Ormrod (2015), learning involves the formation of mental representations or associations. This is the view of cognitive psychologists who believe that, for learning to take place there must be an internal mental change unlike the behaviorists who emphasize on external behavior change. Therefore, learning strategies are a series of deliberate behaviors, thoughts and actions that the learner engages in during learning to influence the encoding process (Ormrod, 2015). While learners may employ different learning strategies, in view of the current study, learning strategies are contextualized as those strategies that are directly involved with the encoding and retrieval of information in the long term memory (Pokay & Bloomfield, 1990). There are several cognitive learning strategies that affect long-term memory storage including selection, rehearsal, meaningful learning, elaboration, organization, and visual imagery (Ormrod, 2015).

Many researchers have categorized these strategies into two. These include surface level strategies and deep processing strategies (Zusho & Pintrich, 2003; Pokay & Bloomfield, 1990). The surface level strategy includes rehearsal learning strategy which focuses on
memorization and recall of facts. The deeper processing strategies include elaboration learning strategy and organization learning strategy. The elaboration learning strategy focuses on extracting meaning, summarizing or paraphrasing. It also involves using knowledge acquired earlier on to interpret and expand on new material (Ormrod, 2015).

The organization learning strategy involves finding connections and interrelationships within a body of new information for long-term memory storage. This involves creating an outline of the major topics and ideas or creating a graphic representation of the information to be learned for example use of maps, flow charts or pie charts.

The majority of the studies on how academic mindsets and learning strategies predict academic achievement have been done in the developed countries. More specifically these studies have focused on factors influencing academic achievement such as students’ academic mindsets, classroom management, learning strategies, students’ relationship with teachers and peers (Aditomo, 2015; Dahl, Bals, & Turi, 2005; Lackey, 2014; McWilliams, 2015; Stump, Husman, & Corby, 2014; Wei-Wen & Yi-Lee, 2015). Findings from these studies cannot be generalized to the Kenyan context and therefore a need for a further study to examine how academic mindsets and learning strategies predict academic achievement. These studies have also suggested further studies on academic mindsets and learning strategies to be done in other settings using different methodologies, research designs, and population in order to compare the findings.

Locally, there are no empirical studies that have directly examined the relationship between students’ academic mindsets and learning strategies and how they predict
academic achievement. The majority of the related studies have examined learner factors like: academic resilience, academic motivation, self-regulated learning, and academic anxiety (Mukolwe, 2015; Mutweleli, 2014; Mwangi, 2015). Thus, there is dearth of local data on how academic mindsets and learning strategies predict academic achievement. Therefore, in the current study, the researcher examined how academic mindsets and learning strategies predict academic achievement among form three students in Nairobi County, Kenya. The study also sought to establish if there were sex differences in students’ academic mindsets and learning strategies.

1.3 Statement of the Problem
Poor academic achievement among students in KCSE examination in Nairobi County has been declining over the years (2014 – 2016). For instance, in 2016, those who obtained between grade D and E were 58.09%. These candidates with low grades do not have many options given the tight race for professional courses and employment. In addition, the overall performance of Nairobi County has been below the national average. When students fail, the parent’s levels of stress go a notch higher as they try to cope with the increasing economic demands in finding alternative courses for their children’s lives. Furthermore, poor academic achievement is a threat to the educational sector in Kenya which is an important pillar in the realization of the objectives of vision 2030 with regard to attainment of socio-economic and political development of the country. Therefore, there was a need to further study some of the factors that may predict academic achievement among secondary school students.
Based on the background to the study, the majority of the studies done in developed countries have found that, academic mindsets and learning strategies predict academic achievement (Aditomo, 2015; Dahl, Bals, & Turi, 2005; Lackey, 2014; McWilliams, 2015; Stump, Husman, & Corby, 2014; Wei-Wen & Yi-Lee, 2015). In addition to being done in countries with different systems of education and backgrounds, these studies focused on university and college students with few studies focusing on secondary school students. Therefore, there was a gap at the secondary school level on how these variables predict academic achievement within African contexts. Moreover, a majority of these previous studies were correlational and experimental in nature and none examined academic mindsets and learning strategies in relation to academic achievement in one study. Thus, the current study deviated from the previous ones by using an explanatory sequential mixed method design and in considering how academic achievement was jointly predicted by academic mindsets and learning strategies.

In Kenya, related studies on factors predicting academic achievement have looked at learner factors like: academic resilience, academic motivation, self-regulated learning, academic anxiety, self-handicapping and defensive pessimism (Mukolwe, 2015; Mutweleli, 2014; Mwangi, 2015; Wawire, 2010). Thus, little has been done if any on how academic mindsets and learning strategies predict academic achievement. Therefore, the central problem of this study was to establish the extent to which academic mindsets and learning strategies predict academic achievement among form three students in Nairobi County, Kenya.
1.4 Purpose of the Study

The purpose of this study was to establish whether academic mindsets and learning strategies predicted academic achievement among form three students in Nairobi County, Kenya. The results obtained from this study may be useful in guiding students to adopt malleable academic mindset and learning strategies. It also sought to establish whether there are sex differences in students’ academic mindsets and learning strategies. This was important as it could shed more light into measures aimed at reducing gender parities in academic achievement of boys and girls.

1.5 Objectives of the Study

The study was guided by the following objectives:

i. To determine the relationship between academic mindsets and academic achievement.

ii. To establish the relationship between learning strategies and academic achievement.

iii. To establish sex differences in students’ academic mindsets and learning strategies.

iv. To determine the predictive weight of academic mindsets and learning strategies on academic achievement.
1.6 Research Hypotheses

The study was guided by the following research hypotheses:

$H_{a1}$: There is a significant relationship between academic mindsets and academic achievement.

$H_{a2}$: There is a significant relationship between learning strategies and academic achievement.

$H_{a3}$: There are significant sex differences in students’ academic mindsets and learning strategies.

$H_{a4}$: Academic mindsets and learning strategies have a significant predictive weight on students’ academic achievement.

1.7 Assumptions of the Study

In this study, it was assumed that, learners provided accurate information concerning their academic mindsets and learning strategies. This was because the study had assumed that, the participants had developed malleable academic mindset and learning strategies. It was also assumed that the academic records provided by teachers were valid measures of students’ academic achievement. The instruments used in the current study were also assumed to be valid measures of students’ academic mindsets, learning strategies and academic achievement.

1.8 Limitations of the Study

One of the limitations of this study was that, it only involved a few selected secondary schools in Nairobi County. Owing to the fact that different counties in Kenya could be
experiencing different challenges, the results of this study may not be generalizable to the whole Kenyan secondary school population. The problem of academic mindsets and learning strategies may be impacting other counties differently. Another limitation of the study was that, the current study relied on participants’ self-reports and interviews which may have introduced subjectivity. In addition, the study employed explanatory sequential mixed method design which requires triangulation of data. Although this design is comprehensive in explaining the results in-depth, it may not explain the cause effect relationships among the study variables.

1.9 Delimitations of the Study
This study was delimited to form three students in 10 public secondary schools in Nairobi County. This was because earlier studies had reported poor academic achievement among public secondary school students. Furthermore, although there could be many factors that could predict academic achievement, this study only focused on students’ academic mindsets and learning strategies. This was due to the fact that, there was limited local data on how these variables predict academic achievement.

1.10 Significance of the Study
The findings of this study may enable educational stakeholders to help students adopt malleable academic mindset and learning strategies. This could be done by incorporating messages that enhance use of academic mindsets and learning strategies as they teach in order to nurture their development among students. The government may use the findings to initiate interventions that would enhance academic mindsets and
learning strategies use. The findings may also be used by parents and teachers to provide a conducive home and school environment that may promote the development of malleable academic mindsets and learning strategies in order to promote learning. In addition, the study findings may inform teachers and parents in coming up with ways of addressing sex differences in academic mindsets and learning strategies among secondary school students. The findings may also contribute to the existing body of knowledge on the role that academic mindsets and learning strategies play in predicting academic achievement.

1.11 Theoretical Framework

Social cognitive theory of motivation and personality (Dweck & Leggett, 1988) and social cognitive theory of learning (Bandura, 1989) formed the basis of this study. In the following sections, the two theories are summarized in the context of the current study.


This theory comprises of beliefs (Implicit theories) that learners hold on the nature of intelligence and learners’ goal orientation. The current study was based on the implicit theory of intelligence which is the specific belief in one’s intelligence. People’s beliefs about their intelligence form the core of individuals’ belief systems and work as a framework for shaping achievement motivation (Dweck, 2000). These belief systems form the mindsets that influence how students approach challenges especially when they encounter obstacles in their academic work. Dweck (2000) identified two types of academic mindsets that students may hold. These are fixed mindset and malleable
mindset. A fixed mindset student is the one who believes that, his or her intelligence is innate and there is nothing that can be done to change it while a malleable mindset student believes that his or her intelligence can be developed overtime. Moreover, a fixed mindset student avoids situations in which they might struggle or fail because according to them these experiences undermine their sense of intelligence. In contrast, a malleable mindset student views challenges as a way of increasing their abilities, hence this student seeks challenging learning experiences (Claro, Paunesku, & Dweck, 2016).

According to Dweck and Leggett (1988), implicit theories of intelligence influence the way students approach learning and achievement situations, the kind of goals they adopt, their effort and persistence and their achievement. Those students with fixed mindsets mainly focus on obtaining good grades in order to document to themselves or others the adequacy of their ability. Such students pursue performance goals which lead them to minimize their effort expenditure, to give up easily when faced with challenges or setbacks, and generally to avoid difficult tasks. Conversely, those with malleable mindsets mainly focus on improving their competence and acquiring new knowledge. They pursue mastery goals which lead them to expend more effort, seek challenging tasks and to persist whenever they encounter setbacks.

McWilliams (2015) conducted an exploratory study to find out whether low academic achievement among the ninth grade students was a consequence of self-efficacy, implicit theory of intelligence and goal orientation. The study was based on Dweck’s theory on motivation and more specifically on implicit theories of intelligence. The
researcher used a sample of 120 ninth grade students and found that, the beliefs that students held influenced their academic achievement. Consistent findings were reported by Blackwell et al. (2007) who reported a significant relationship between theories of intelligence and academic achievement. Those students who held the belief that intelligence was malleable posted an upward trend over the two years of junior high school while those with fixed mindset did not show any improvement.

Different findings were however reported by P’pool (2012) who used Dweck’s theory of motivation to determine how students’ view of intelligence affects their overall academic achievement in a school located in the South Central Region of the United States. The study found no significant relationship between fixed and malleable mindset students in regard to academic achievement. Similar findings were reported by Rudig (2014) who used Dweck’s theory to examine implicit theories of intelligence and learning mathematics. The study reported that, the participants’ incremental or entity theories of intelligence did not elicit different patterns of studying behavior in learning a new mathematics task.

b. Socio-Cognitive Theory of Learning (Bandura, 1989)

According to Bandura (1989), the path a person’s life takes is shaped by the interplay between personal factors, behavioral and environmental factors in a reciprocal fashion. First is the person-behavior reciprocal causation in which the interaction between thought, affect and action influences the way people behave. These behaviors according to Zusho and Pintrich (2003) include choice of activities, level and quality of task
engagement, persistence, and performance. Therefore, the way students think of themselves, their interest in the task, plays a very important role in influencing the learning strategies they adopt. The second segment is the environment-person reciprocal causation which is based on the interaction between personal and environmental influences. In this segment, social influences help develop and modify a person’s expectations, beliefs, emotions and cognitions. Third, is the behavior-environment segment causation which represents the interaction between behavior and environment where appropriate behavior may influence the environment where it occurs. In addition, this theory asserts that, behavior is also affected by external influences through cognitive processes. It is the cognitive factors which partly determine the environmental factors to be observed, the meaning accorded to them, their effects, emotional impact and their motivating power, and how the information they convey will be organized for future use (Bandura, 1989).

Therefore, according to this theory, students function as contributors of their own motivation, behavior, and development within a network of reciprocally interacting influences (Bandura, 2006). Moreover, students need to take charge of their own actions in order for them to succeed in their academic work. This is because according to McWilliams (2015), if there is no core belief that one’s actions are the key to accomplishing a task, then success will continue to be elusive. There is empirical evidence that, this theory has been found to be applicable in studies on strategy use. Framed upon this theory, a study by Zusho and Pintrich (2003) in the USA on the role of motivation and cognition in the learning of college chemistry reported a significant
relationship between learning strategies and academic achievement. Similarly, Mutweleli (2014) conducted a study in Kenya on academic motivation and self-regulated learning based on the theory and found a significant relationship between learning strategies and academic achievement.

The two theories used in the current study were complementary in their explanation on the role of students in the learning process. The beliefs that students hold about the nature of their intelligence (academic mindsets) influences the learning strategies they are likely to adopt. For example, when a student gets a low score in a test (an environmental factor), this will influence their mindset. Consequently, it is this mindset that will influence their behavior that is, which learning strategies to use in order to improve their performance. Research has shown that, students with a fixed mindset are likely to resort to rehearsal learning strategies while those with a malleable mindset are likely to resort to deep learning strategies such as elaboration and organization (Duperyat & Marine, 2005). In addition, Blackwell et al. (2007) adds that motivational constructs such as learning strategies should be taken into account when discussing the theories of intelligence.
1.12 Conceptual Framework

Figure 1.1 outlines the hypothesized relationships among the study variables. The predictor variables were academic mindsets and learning strategies. Academic mindsets were at two levels: fixed academic mindset and malleable academic mindset. Learning strategies included rehearsal learning strategy, elaboration learning strategy, and organization learning strategy. The criterion variable was academic achievement, with sex (male, female) as an intervening variable. The anticipated relationship and interrelationship between variables are indicated in the diagram. Source: Researcher’s conceptualization, 2018.
strategies were at three levels: rehearsal learning strategy, elaboration learning strategy and organization learning strategy. The criterion variable was academic achievement. Sex was the intervening variable. Academic mindsets and learning strategies were hypothesized to be correlated with academic achievement. In addition, they were both expected to have a predictive weight on academic achievement. It was also hypothesized that there were sex differences in academic mindsets and learning strategies.
1.13 Operational Definition of Terms

**Academic Achievement**: The standardized mean T-score obtained by students in form three, end of term one and end of term two 2016 examinations.

**Academic Mindset**: One’s intelligence beliefs in relation to academic work. They include fixed mindset and malleable mindset.

**Elaboration Learning Strategy**: Summated score of responses to the items on elaboration subscale of MSLQ.

**Fixed Mindset**: Summated score of responses obtained at interval level by students on fixed academic mindset subscale of academic mindset questionnaire.

**Learning Strategies**: The total score obtained by students in the MSLQ on learning strategies. They include; Rehearsal, elaboration and organization. They were measured at interval level of measurement.

**Malleable Mindset**: Summated score of responses obtained at interval level by students on malleable academic mindset subscale of academic mindset questionnaire.

**Organization Learning Strategy**: Summated score of responses to the items on the organization subscale of MSLQ.

**Rehearsal Learning Strategy**: Summated score of responses to the items on the rehearsal subscale of MSLQ.
CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In this chapter, related literature to this study was reviewed. Studies on the relationship between academic mindsets and learning strategies in predicting academic achievement were reviewed. Further, studies to establish whether there were sex differences in students’ academic mindsets and learning strategies were reviewed. Finally, a summary of literature review and the identified gaps were presented.

2.2 Relationship between Academic Mindsets and Academic Achievement

Empirical research has produced mixed results on the relationship between students’ academic mindsets and academic achievement. Blackwell et al. (2007) conducted a longitudinal study on whether implicit theories of intelligence predict academic achievement among public secondary school students in New York City. This study followed four waves of students entering junior high school and measured their implicit theories and then assessed their achievement outcomes for four years. The sample was 373 students (198 females, 175 males) in one public secondary school. The participants filled a motivational questionnaire which assessed theory of intelligence, goals, beliefs about effort, and learning versus mastery oriented responses to failure at the beginning and end of every year for four years. Results revealed that students who endorsed a fixed mindset did not show improvement in grades. On the contrary, those who endorsed a malleable mindset showed great improvement in grades over the four years.
This longitudinal study was conducted in the USA, a different context from that of Kenya and in one public secondary school. Results from one study could not be generalized to other schools. The current study used an explanatory sequential mixed method design and 10 public secondary schools in Kenya to find out how academic mindsets predict academic achievement.

Similarly, Chen and Wong (2015) conducted a study on Chinese Students academic mindset. Specifically, the study examined the relationship between theories of intelligence and goal orientations, and academic achievement. The study utilized a correlational research design and a sample of 418 (192 males, 226 females) university students in Hong Kong. Data were collected through a survey and analyzed using structural equation modeling. Results revealed that malleable academic mindset was associated with high academic achievement and such students endorsed more mastery goals and performance approach goals than their fixed mindset counterparts. This study was done in Asia, a different set up from Kenya and used university students. The current local study in Kenya used public secondary school students in Nairobi County Kenya to compare the results.

In another study, Lacky (2014) carried out an exploratory study to find out how motivation, self-efficacy, mindsets, attributions, and learning strategies influence academic achievement at Illinois State University. One of the objectives of the study was to find out if there were significant correlations between motivation, self-efficacy, mindsets, attributions, learning strategies and academic achievement. Using a sample of
153 (103 females, 50 males) education students, results revealed that, there was a significant relationship between academic mindsets and academic achievement. Furthermore, the study found that those students with malleable mindsets had high opinions of their academic potential and performed better than those who endorsed a fixed mindset. This study utilized a correlational research design and used university students. The current study utilized an explanatory sequential mixed method design with secondary school students to compare the findings.

Similar results were obtained by Paunesku, Romero, Yeager, Walton, and Dweck (2012) in their study on changing mindsets to raise achievement in the United States. Using an experimental research design and a sample of 1594 students from 13 high schools, students in the treatment group were made to read an article that described how the brain grows and how it is able to reorganize itself. This intervention strategy was designed to help motivate students to realize the importance of hard work in order to improve their ability. These students showed a 14% rise in performance, while no improvement was observed in the control group. This study was done in the United States and utilized an experimental research design. Therefore, the current study in Kenya used a sequential mixed method design and public secondary school students to find out how students’ academic mindsets predict academic achievement.

Further, Aditomo (2015) conducted a study on students’ response to setbacks in a university in Indonesia. The study utilized a correlational research design and a sample of 123 (100 females, 23 males) university students. A path analysis indicated that,
malleable mindset students adopted mastery of goals and effort attribution, which buffered against demotivation in the face of academic set back, which in turn led to higher academic achievement. In relation to this, Shen, Miele, and Vasilyeva (2016) argued that, when fixed mindset students experience difficulties or receive a negative feedback about their performance, they interpret this experience as an indication that they lack the ability needed to be successful. And, because they believe their intelligence is fixed, hard work to them is a waste of time and may lead to further embarrassment. On the other hand, those with a malleable mindset interpret difficulties or negative feedback as a need for them to work even harder. The more time and effort they spend, the more their ability will improve.

In another study, Furnham, Premuzic, and McDougall (2003) investigated personality, cognitive ability and beliefs about intelligence at a University College of London. In a longitudinal study and a sample of 93 (70 females, 23 males) university students, academic performance for each participant was recorded throughout two academic years in student’s files. In the study, it was hypothesized that, beliefs about intelligence were significantly related to academic achievement. A series of hierarchical regressions were conducted and it emerged that, beliefs about intelligence were not significantly related to academic achievement. This study involved university students from one university college and was also done in the West. The current local study in Kenya used public secondary school students to compare the findings.
P'Pool (2012) conducted a study to determine students’ view of intelligence in United States. The study sought to find out if there were significant differences regarding academic achievement and success between fixed and malleable mindset students. Using a correlational research design and a sample of 118 high school junior and senior students from a public high school established for gifted and talented, results showed no significant difference between fixed mindset and malleable mindset students in relation to academic achievement. This study utilized gifted and the talented public high school students in the United States. The current local study in Kenya used public secondary school students to compare the findings.

Locally, studies on the relationship between academic mindsets and learning strategies are not readily available but this can be inferred from related studies. Mwangi (2015) carried out a study on academic resilience among secondary school students in Kiambu County, Kenya. The study aimed to explore both external and internal protective factors that could predict resilience among students in order to survive academic challenges. Using an *ex post facto* research design and a sample of 390 (192 females, 198 boys) form three students, results revealed a positive and significant relationship among the external and internal protective factors and academic resilience. In addition, there was a significant and positive relationship between academic resilience and academic achievement. This study utilized an *ex post facto* research design. In addition, it was done in Kiambu County. The current study was done in Nairobi County and utilized an explanatory sequential mixed method design to compare the findings.
In another study in Kenya, Mukolwe (2015) carried out a study on some selected correlates of examination anxiety and academic achievement in Khwisero Sub-county in Kakamega County. More specifically, the study sought to find out whether academic procrastination, locus of control and academic resilience had a relationship with examination anxiety and the overall relationship between exam anxiety and academic achievement. Using a correlational research design and a sample of 359 (156 females, 203 males) form four students, results revealed a weak and negative and insignificant correlation between academic resilience and exam anxiety. The researcher further found a positive and insignificant relationship between academic resilience and academic achievement. According to Dweck (2007), academic resilience is a characteristic of a malleable mindset student who in the face of failure increases effort and looks for new learning strategies. This study was done in Kakamega County and used a correlational research design. The current study was carried out in Nairobi County and used an explanatory sequential mixed method design to find out the extent to which academic mindsets predict academic achievement.

2.3 Relationship between Learning Strategies and Academic Achievement

Studies examining the relationship between learning strategies and academic achievement have reported inconsistent results. Simsek and Balaban (2010) investigated learning strategies at Anadolu University in Turkey. The aim of the study was to assess the most commonly used learning strategies by undergraduate students and how these learning strategies were related to their academic achievement. Using a correlational research design and a sample of 278 undergraduate students, correlations were
conducted among rehearsal, elaboration and organization learning strategies. Results revealed a significant positive correlation between the use of learning strategies and academic achievement. More students were reported to use more of elaboration and organization learning strategies than rehearsal learning strategies. This study was done in Turkey using university students to find out the learning strategies they preferred most. The current local study in Kenya used secondary school students to find out the extent to which they are able to use these learning strategies.

Kadioglu and Uzuntiryaki (2014) investigated learning strategies and goal orientations among high school students in Turkey. Using a correlational research design and a sample of 1157 (620 females, 537 males) high school students, results revealed a positive relationship between goal orientation and learning strategies. Furthermore, the students who gave importance to developing new skills used elaboration learning strategies more than rehearsal and organization learning strategies. This study was done in Turkey, a country with a different educational background from Kenya and only addressed the relationship among variables without relating them to an outcome variable like academic achievement. The current local study specifically linked learning strategies (rehearsal, elaboration and organization learning strategies) and academic achievement using public secondary school students to find out if there was a relationship between learning strategies and academic achievement.

In a more recent study, Lee, Makara, Fishman, and Teasly (2017) explored how the relationship between college students’ learning strategies and their grade point average
differs across culturally different institutions. Using a survey, a sample of 621 students at a South Korean University and 824 students at a university in the USA were used to assess four types of learning strategies: Motivation related, assignment task related, planning/time related and cognition related strategies. More specifically the cognition related strategies were rehearsal learning strategy, elaboration learning strategy and organization learning strategy. A hierarchical multiple regression was performed to determine the predictive power of the four factors on students’ GPA at each university. Results revealed that the cognition related factors (rehearsal learning strategy, elaboration learning, and organization learning strategy) were the strongest predictors of GPA for Korean students, but it was unrelated to the USA students. The sample of this study comprised university students from Korea and USA and there was variation in the learning strategies they used. The current study in Kenya used public secondary school students to compare the findings.

Kivinen (2003) assessed motivation and learning strategy use in three international schools in Finland. The study utilized a correlational research design and a sample of 198 (105 females and 93 males) students from three secondary schools which were deliberately chosen. Data was collected using MSLQ self-report questionnaire which included items concerning student motivation, use of learning strategies and management of effort. Results revealed that 40 percent of the students used learning strategies (rehearsal, elaboration and organization learning strategies). This study utilized a correlational research design and the results were based on findings of only three secondary schools. The current study utilized an explanatory sequential mixed
method design and increased the number of schools and the sample size in order to find out whether there was a relationship between these learning strategies and academic achievement.

In another study, Matseke (2011) investigated the influence of learning strategies on learners’ self-efficacy and academic achievement in a selected primary school in Black Township in Guateng Province, South Africa. One of the objectives of the study was to determine if there was a relationship between learning strategies (rehearsal, elaboration, and organization learning strategies) and academic achievement. The study utilized a quasi-experimental design and a sample of 152 (4th - 7th) grade pupils. Data on learning strategies use was collected using MSLQ. Results showed that training learners on strategy use had an incremental effect and found a significant relationship between learning strategies (rehearsal, elaboration and organization) and academic achievement.

This study utilized a quasi-experimental design and involved one primary school posing a challenge of generalizability of the results. The current study utilized explanatory sequential mixed methods design and public secondary school students from ten schools to find out if there is a relationship between the specific learning strategies (rehearsal, elaboration, and organization learning strategies) and academic achievement.

However, inconsistent results were found by Keklik and Keklik (2013) who studied motivation and cognitive learning strategies in two public secondary schools in Turkey. The study aimed to find out which motivation and learning strategies predicted academic achievement. Data was collected using a Personal Information Form (PIF)
and MSLQ. Stepwise regression analysis was used as the data analytic procedure. Using a correlational survey study and a sample of 440 (182 females, 258 males) public secondary school students, results showed a low and positive correlation between organization learning strategy and academic achievement ($r = .317$) while elaboration and rehearsal learning strategies did not predict academic achievement. This study was done in Turkey and involved only two public secondary schools. Results from two schools could not be generalized to the rest of the schools in Turkey. In addition, the researcher cited the limitation of using self-reports as the only data collection instruments. The current study in Kenya increased the number of schools and used self-reports to collect quantitative data and interviews to cross check the quantitative results.

Similarly, Zusho and Pintrich (2003) studied motivation and cognition in the University of Michigan USA. The study investigated the role of certain motivational components and their relationship with learning strategies and academic achievement. Students’ motivation and learning strategy use were assessed at three time points over the course of one semester. The study utilized a correlational research design and a sample of 458 (243 females, 215 males) university students. Data on learning strategy use was collected using the MSLQ. The researchers expected rehearsal learning strategies to be negatively related to academic achievement and use of elaboration and organization learning strategies to lead to high academic achievement. Contrary to their expectation, the use of rehearsal and elaboration learning strategies declined while the use of organization learning strategy increased overtime. This study was done in the USA and used university students. This study in Kenya used public secondary school students to
find out how learning strategies (rehearsal, elaboration and organization) predict academic achievement.

Robertson (2012) investigated learning styles and learning strategies in the University of Pretoria, South Africa. The study utilized a correlational research design and a sample of 172 (147 females, 25 males) university students. The study hypothesized that, deep learning strategies (elaboration and organization learning strategy) and metacognitive learning strategies would significantly predict academic achievement while surface learning strategy (rehearsal learning strategy) would negatively predict academic achievement. Results revealed that rehearsal learning strategy predicted academic achievement while elaboration, organization and metacognitive learning strategies were found to have no meaningful relationship with academic achievement. This study involved university students in South Africa and used a correlational research design. The current study in Kenya used an explanatory sequential mixed method design and public secondary school students to compare the results.

In Kenya studies on the relationship between the specific learning strategies (rehearsal, elaboration and organization learning strategies) are not readily available. This can be inferred from related studies. Mutweleli (2014) investigated academic motivation and self-regulated learning in Kenya. One of the objectives of the study was to find out if there was a relationship between self-regulated learning strategies and academic achievement. The study utilized a correlational research design and a sample of 938 (394 females, 544 males) form three students from public secondary schools in Nairobi
County. Data was collected using a self-report questionnaire which comprised demographic information of the participants, Academic Motivation Scale and Self-regulated Learning Scale. Among all the self-regulated learning strategies studied, memory strategy (rehearsal learning strategy) and organization learning strategy were found to have a positive relationship with academic achievement. This study utilized a correlational research design and data were collected using questionnaires. The current study specifically adopted an explanatory sequential mixed method design which requires the researcher to first collect quantitative data, analyze and then crosscheck the results using interviews.

### 2.4 Sex Difference in Academic Mindsets and Learning Strategies

#### 2.4.1 Sex Differences in Academic Mindsets

Empirical research has presented mixed results with regard to sex differences in students’ academic mindsets. One such study was done by Rudig (2014) who studied implicit theories of intelligence at the University of Naveda, Las Vegas. The study investigated the role theories of intelligence play in understanding mathematics. The study hypothesized that, respondents who believe intelligence is a malleable trait would engage more in finding solutions to problems than their fixed mindset counterparts. The study comprised two experiments using a sample of 92 and 130 students respectively. Results revealed significant sex differences in students’ academic mindsets. More boys than girls endorsed a fixed mindset, while there were no significant sex differences in malleable mindset.
These results were however inconsistent with those of Matheson (2013) who conducted a study on students’ beliefs about learning and intelligence in Southeastern Ontario Canada. Using an exploratory research design and a sample of 243 (116 females, 127 males) secondary school students from one rural school, results showed no significant difference between males and females in implicit theories of intelligence. Similar results were obtained by Furnham et al. (2003) in their study on personality, cognitive ability, and beliefs about intelligence at a university college in London. Utilizing a correlational research design and a sample of 93 (70 females, 23 males) British university students, results revealed that correlations of beliefs about intelligence with academic achievement were not affected by gender. This inconsistency in findings made the current study necessary using secondary school students to establish sex differences in students’ academic mindsets.

2.4.2 Sex Differences in Students’ Learning Strategies

Studies have presented mixed results regarding sex differences in learning strategies use. One such study was done by Simsek and Balaban (2010). The study investigated learning strategies use at Anadolu University in Turkey. One of the objectives of the study sought to establish if there were significant sex differences in learning strategies use of undergraduate students. An independent samples t-test was conducted and results revealed that, female participants were more effective in selection and use of appropriate learning strategies. These findings were consistent with those by Ghiasvand (2010) on the relationship between learning strategies and academic achievement of high school students in Iran. The study sought to compare learning strategies use
between under achieving students and upper achieving students. The study utilized a correlational research design and a sample of 501 from grade 1 to 3 in Qazvin Province. Data was collected using Learning and Study Strategies Inventory. An independent samples t-test revealed that, upper achievers used more learning strategies than lower achievers. More specifically, girls used more learning strategies than boys.

The findings among African samples tend to concur with those reported among university and high school students in Turkey and Iran. In Nigeria, a study by Anyachie and Anyodike (2012) investigated the effects of self-instructional learning strategy on secondary school students’ academic achievement. Using a quasi-experimental research design and a sample of 131 (66 females, 65 males) secondary school students, the study found that self-instructional strategy increased students’ problem solving skills which lead to high academic achievement. However, the effect of gender on achievement was not significant, although a significant interaction effect was observed between gender and learning strategy use. The male participants in the experimental group significantly performed better than their female counterparts. However, it is important to note that, in the control group that was not trained on strategy use, girls performed better than boys from the pre-test to post-test. This study utilized a quasi-experimental research design while in the current study, an explanatory sequential mixed method design was used to compare the results.

A study in South Africa by Robertson (2012) in the University of Pretoria came up with similar findings. It investigated learning styles and learning strategies among university
students. One of the study objectives hypothesized that, there were no significant sex differences between male and female students in learning strategies use. The study found no significant sex differences between male and female students in relation to academic achievement. However, some significant sex differences were reported between males and females in relation to learning strategies. More specifically, female participants used organization learning strategies more than male participants. The results of this study could not be generalizable to other populations since they were based on only one university. The current study addressed this concern involving 10 public secondary schools in Nairobi County to establish if there were sex differences in learning strategies.

Available Kenyan studies had inconsistent findings. For example, in the study by Mutweleli (2014) among public secondary school students in Nairobi County, significant sex differences with respect to rehearsal and organization learning strategies were reported. Specifically, more boys than girls endorsed use of rehearsal and organization learning strategies. However, Dinga (2011) in a study on cognitive strategy use with a sample of 785 primary school pupils in class five and seven in Kisumu Municipality found no significant sex differences with regard to cognitive strategy use. These inconsistent findings made the current study necessary to establish if there were sex differences in students’ learning strategies among public secondary school students in Nairobi County.
2.5 Predictive weight of Students’ Academic Mindsets and Learning Strategies on Academic Achievement

Studies investigating the predictive weight of academic mindsets and learning strategies have been done mostly in the developed countries. Duperyat and Marine (2005) investigated the relationship between implicit theories of intelligence, goal orientation, cognitive engagement and academic achievement at a university in France. The study utilized a correlational research design and a sample of 76 (45 females, 31 males) French adult learners who had enrolled for a one year pre-university diploma course. Their mean age was 31 years ranging from 20 to 49 years. A correlation matrix was first performed to establish the relationship among the study variables. In addition, a path analysis was done by running a multiple hierarchical regression analyses to determine the predictive weights of implicit theories, goal orientation and cognitive engagement on academic achievement. More specifically data on implicit theories of intelligence were collected using academic mindset scale while that on cognitive engagement in learning was collected using the MSLQ.

Results revealed a non-significant predictive weight of academic mindsets on academic achievement and a significant predictive weight between cognitive engagement (rehearsal, elaboration, and organization learning strategies) on academic achievement. When the subscales of implicit theories of intelligence were entered in the regression model singly, fixed academic mindset had a negative significant predictive weight ($\beta = -0.23$, $p < .05$) on academic achievement while malleable academic mindset had positive significant predictive weight ($\beta = 0.30$, $p < .01$) on academic achievement. This study
was done in one university in France and used adult learners. Results from one institution cannot be generalized to other institutions. The study also did not directly examine how academic mindsets and learning strategies predict academic achievement. The current study addressed this concern by using 10 public secondary schools to examine whether academic mindsets and learning strategies predict academic achievement in Nairobi County, Kenya.

Similar results were obtained by Stump, Husman, and Corby (2014). The study examined engineering students’ intelligence beliefs and their perceived use of learning strategies and course grades at Arizona State University. The study utilized a correlational research design and a sample of 377 (65 females, 312 males) engineering students. A bivariate correlation was used to examine the relationship between the study variables while multiple regression analysis was used to examine the predictive ability of the predictor variables on course grades. Findings revealed that, intelligence beliefs alone were not predictive of course grades. When used singly, malleable academic mindset scores had a positive and significant predictive ability on academic achievement while fixed academic scores had a negative and significant predictive ability on academic achievement. Learning strategies had a positive and significant predictive ability on academic achievement. This study utilized a correlational research design and involved university students in one university in the USA. There was need to compare the findings with data obtained using an explanatory sequential mixed method design and public secondary school students in Kenya.
In another study, Dahl et al. (2005) examined students’ knowledge beliefs and the actual learning process with reference to learning strategy use in comprehension reading. The study utilized a correlational research design and a sample of 81 (60 females, 21 males) fourth year Norwegian university students. Their mean age was 22.6 years. Data on students’ knowledge beliefs was collected using Schommer’s Epistemological Questionnaire while that on learning strategies was collected using the MSLQ. Results revealed that students’ beliefs about knowledge had a positive and significant with learning strategies use. More specifically, results from regression analysis revealed that, students’ knowledge beliefs positively and significantly predicted the learning strategies they used. This study sought to establish whether students’ knowledge beliefs predicted learning strategies use and not how the two variables interact to predict academic achievement. This was the interest of the current study which sought to find out whether students’ academic mindsets and learning strategies predicted academic achievement in public secondary schools in Kenya.

These results corroborate those of Lackey (2014) who studied the relationship between motivation, self-efficacy, mindsets, attributions, and learning strategies and how they influence academic achievement at Illinois State University. Using a correlational research design and a sample of 153 (103 females, 50 males) education students, correlations were conducted between the variables, motivation, self-efficacy, mindsets, attributions, and learning strategies. A significant positive relationship between students’ academic mindsets and learning strategies was reported. This study did not establish whether the two variables predicted academic achievement or not. This study
involved university students and was done in the USA. The current local study in Kenya used public secondary school students to find out whether academic mindsets and learning strategies predict academic achievement.

Nevertheless, inconsistent results were found by Rudig (2014) who examined implicit theories of intelligence and learning a novel mathematics task at the University of Nevada, Las Vegas. The study utilized an experimental research design and a sample of 98 (44 females, 48 males) university students. Their mean age was 20.47 years. Results revealed that, participants’ incremental or entity theories of intelligence did not elicit different patterns of studying behavior in learning a new mathematics task. Owing to these findings, the researcher suggested a further study using participants outside of the university population to establish whether academic mindsets and learning strategies predict academic achievement. This concern was addressed in the current study.

From the reviewed studies in the developed countries, mixed findings have been reported on the predictive weight of students’ academic mindsets and learning strategies in predicting academic achievement. Majority of these studies have also not directly investigated academic mindsets and learning strategies but have studied them with other variables such as achievement goal orientation, self-efficacy, attributions, and motivation. In Africa, studies on the predictive weight of students’ academic mindsets and their learning strategies are not readily available. Therefore, the current study sought to establish whether academic mindsets and learning strategies predict academic achievement among public secondary school students in the Kenyan setup.
2.6 Summary of Literature Reviewed and Gap Identification

From the literature reviewed, the majority of the studies have indicated a relationship between students’ academic mindsets and learning strategies in predicting academic achievement. In relation to sex differences, majority of these studies have also showed positive and significant sex differences in students’ academic mindsets and learning strategies in predicting academic achievement. Moreover, reviewed studies have presented the influence of both academic mindsets and learning strategies in predicting academic achievement. However, most of these studies were done in the developed countries and they investigated students’ academic mindsets and learning strategies with other variables. Furthermore, these studies were based on university, college and elementary school students. Only few studies focused on secondary school students. In addition, these studies presented methodological gaps and the results were inconsistent and inconclusive. In the African educational set up and more specifically in Kenya, none of the reviewed studies had examined how students’ academic mindsets and learning strategies predict academic achievement using the triangulation method. Therefore, this study used an explanatory sequential mixed method design to find out the extent to which academic mindsets and learning strategies predict academic achievement among public secondary school students in Nairobi County, Kenya.
CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used in the study. It discusses the research design, research variables, and the location of the study. The target population, sampling techniques, sample size, pilot study and the research instruments are also discussed. Data collection and analysis techniques as well as logistical and ethical considerations are also described.

3.2 Research Design

The researcher adopted an explanatory sequential mixed method design. This design involves two phases of data collection and analysis. In the first phase, quantitative data was collected and analyzed, with an intention of first addressing the study objectives. It was then followed by a second phase which involved collection and analysis of qualitative data in order to explain in more detail the quantitative results (Creswell, 2018). For the quantitative data, the researcher used predictive correlational research design which is a form of correlational research design. According to Fraenkel, Wallen, and Hyun (2015), a correlational research design describes the degree to which two or more quantitative variables are related and there is no manipulation of such variables hence its suitability for the current study. In predictive correlational research design, the administrations of the instrument and obtaining of the criterion scores may not be at the same time (Fraenkel et al., 2015). For the qualitative data, in-depth interviews were
conducted on a purposively selected number of participants in order to get personal perspectives of the participants regarding academic mindsets and learning strategies. The purpose of the qualitative phase was to explain further the earlier obtained quantitative results. Therefore, explanatory sequential mixed method research design was considered suitable for this study since it allows the exploration of relationships between variables in depth.

3.2.1 Research Variables

In this study, the predictor variables were academic mindsets and learning strategies while the criterion variable was academic achievement. The two predictor variables were considered suitable for this study because, according to Dweck and Sorich (1999) in Stump et al. (2015), students’ academic mindsets have been shown to produce variations in their orientations to learning, efforts to learn, learning strategies to use and reactions to failure. The academic mindsets which included fixed and malleable academic mindsets were measured at interval level of measurement. The learning strategies which comprised rehearsal learning strategy, elaboration learning strategy and organization learning strategy were also measured at interval level of measurement. Sex was the intervening variable which was considered as the link between the predictor variable and criterion variable.

Academic achievement was the criterion variable. This was also measured at interval level of measurement. It was obtained from averaging the scores obtained in end of term one and two form three examination results in the year 2016. The mean scores
were converted into standard Z-scores then into T-scores. A T-score is a standard score with a mean of 50 and a standard deviation of 10. The T-score value was obtained by converting the mean scores into standard Z-scores. The Z-scores were then transformed into T scores using the formula \( T = 10 \times (Z) + 50 \) (see Appendix D) for comparison across the sampled schools.

3.2.2 Location of the Study

The study was carried out in Nairobi County which is one of the 47 counties of Kenya. It has an area of 694.85 sq km. It is the capital city and has a cosmopolitan urban population of about 3 million people (2009 census). Nairobi County was selected as an area of focus on the basis of its declining academic performance. According to the 2014, 2015 and 2016 KCSE statistics obtained from the County Director of Education’s office (2017), Nairobi County has been registering a mean of approximately 5 points in 2014 and 2015. In 2016, this mean dropped to 4 points.

The statistics also revealed that, only 20.37% of the candidates in Nairobi County managed a mean grade of C+ and above in the year 2016 which is the minimum requirement for admission at the university. This implied that, 79.63% scored below C+ and out of these, 58.09% scored between grade D and E. This massive failure of public secondary school students in Nairobi County seemed worrying and therefore, there was a need for a study to find out some of the underlying causes of this poor academic achievement in Nairobi County. This prompted the choice of the location for the current study.
In addition, related studies in Nairobi County on factors predicting academic achievement have identified factors such as academic motivation and self-regulation, self-worth protection strategies (Mutweleli, 2014; Wawire, 2010). Therefore, not much has been done on how academic mindsets and learning strategies predict academic achievement in Nairobi County. Understanding the role of the learner in the learning process could help stakeholders enhance these factors in learners. For example, learners who endorse a malleable academic mindset understand the importance of effort, persist in the face of setbacks and are able to utilize effective learning strategies (Blackwell et al., 2007). This could lead to improved academic achievement in the county. The summary of Nairobi County is as presented in Table 3.1.
Table 3.1

*Summary of Nairobi County KCSE Performance (2014 – 2016)*

<table>
<thead>
<tr>
<th>Grade</th>
<th>2014 Entry (22231)</th>
<th>2015 Entry (23307)</th>
<th>2016 Entry (25258)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>465</td>
<td>372</td>
<td>41</td>
</tr>
<tr>
<td>A-</td>
<td>1197</td>
<td>1189</td>
<td>622</td>
</tr>
<tr>
<td>B+</td>
<td>1240</td>
<td>1341</td>
<td>1025</td>
</tr>
<tr>
<td>B</td>
<td>1218</td>
<td>1379</td>
<td>1069</td>
</tr>
<tr>
<td>B-</td>
<td>1380</td>
<td>1549</td>
<td>1159</td>
</tr>
<tr>
<td>C+</td>
<td>1475</td>
<td>1681</td>
<td>1229</td>
</tr>
<tr>
<td>C</td>
<td>1773</td>
<td>1975</td>
<td>1414</td>
</tr>
<tr>
<td>C-</td>
<td>2332</td>
<td>2423</td>
<td>1722</td>
</tr>
<tr>
<td>D+</td>
<td>2927</td>
<td>3035</td>
<td>2304</td>
</tr>
<tr>
<td>D</td>
<td>3693</td>
<td>3916</td>
<td>3712</td>
</tr>
<tr>
<td>D-</td>
<td>3832</td>
<td>3811</td>
<td>7744</td>
</tr>
<tr>
<td>E</td>
<td>699</td>
<td>636</td>
<td>3217</td>
</tr>
<tr>
<td>Mean Score</td>
<td>5.2594</td>
<td>5.3045</td>
<td>4.0078</td>
</tr>
</tbody>
</table>

Source: County Director of Education Office, 2017
3.3 Target Population

The target population comprised of 25,690 (13,388 boys and 12,302) form three students in public secondary schools in Nairobi County in 2016. The accessible population of this study was all form three students from 79 public secondary schools. Form three students were used as participants of this study because in form three, subject choices are made with regard to career planning (Mutweleli, 2014). It was also expected that at this level, the students have already had two years in secondary school and have therefore developed academic mindsets and learning strategies in preparation for their KCSE examinations. It is also at this level when necessary measures can be taken to address underachievement of learners and help them improve before the examination year.

3.4 Sampling Techniques and Sample Size

3.4.1 Sampling Techniques

Three sampling techniques; purposive sampling, stratified sampling and simple random sampling were utilized in the current study. Purposive sampling was used to select Nairobi County, public secondary schools and form three students, as it relies on researcher’s expertise or expert judgment to select units that are representative or typical of the population (Orodho, 2009). Stratified sampling was used to stratify the schools into five categories and to ensure equal number of boys and girls in the study. In this technique, the population is divided into homogeneous groups each constituting subjects with similar characteristics (Cohen, Manion, & Keith, 2017). More specifically proportionate stratified sampling was used to ensure each stratum was
proportionate to the population size and had the same sampling fraction (Stangor, 2014). Hence, each of the five categories comprised these schools; 2 boys’ boarding, 1 boys’ day, 2 girls’ boarding, 1 girls’ day and 4 co-educational day making a total of ten secondary schools that participated in the study. Proportionate stratified sampling was also used to ensure that equal number of boys and girls participated in the study. Simple random sampling was used to ensure that each participant had an equal and an independent chance of being selected (Cohen et al., 2017).

One criterion for selecting schools to participate in the study was to ensure that the school had had KCSE candidates for the last three years and had above 50 form three students for the single sex secondary schools. For the co-educational day secondary schools, the researcher ensured that each school had more than 25 boys and 25 girls in form three per school. The researcher visited the selected schools prior to data collection and obtained the class lists of the form three students. Guided by the number of students in the lists, the researcher made paper folds with 50 written ‘yes’ and others blank for the single sex schools. For the co-educational day secondary schools, the researcher made paper folds with 25 written ‘yes’ for the boys’ group and 25 written ‘yes’ for the girls’ group.

In each of the schools that participated in the study, the researcher organized with the school principals to have all the form three students assemble in the entertainment hall or the dining hall at an agreed time. After a brief introduction, the researcher put the paper folds in a bowl and mixed them thoroughly. The students were instructed to pick
each one paper fold. Those who picked the ‘yes’ paper folds were requested to remain and those who picked blank paper folds were requested to go back to class. The researcher explained to the students the purpose of the study and the main variables were also explained. They were also assured of the confidentiality of the information they would provide. The researcher then instructed each of the students to write their admission numbers in the questionnaires. This was necessary to help the researcher identify the students from the academic records.

3.4.2 Sample Size Determination

Based on statistics obtained from the County Director of Education’s office (2016), there were 25,690 form three students in 2016 (13,388 boys and 12,302 girls). Simple random sampling was used to select 50 participants from each of the ten schools. Therefore, the total sample was 500 form three students (250 boys and 250 girls). This sample size was preferred because according to Gay (1999), when the target population is about N= 5000 and beyond, the population size is almost irrelevant and a sample size of 400 or 500 is adequate. This is as presented in Table 3.2.
Table 3.2

**Sample and Sampling Frame**

<table>
<thead>
<tr>
<th>Type of school</th>
<th>Total number of schools</th>
<th>% of the schools</th>
<th>Schools selected</th>
<th>Sample Number</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys’ Boarding</td>
<td>12</td>
<td>16</td>
<td>2</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Boys’ Day</td>
<td>8</td>
<td>11</td>
<td>1</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Girls’ Boarding</td>
<td>11</td>
<td>15</td>
<td>2</td>
<td>-</td>
<td>50</td>
</tr>
<tr>
<td>Girls’ Day</td>
<td>10</td>
<td>14</td>
<td>1</td>
<td>-</td>
<td>50</td>
</tr>
<tr>
<td>Co-edu. Day</td>
<td>32</td>
<td>43</td>
<td>4</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100%</td>
<td>10</td>
<td>250</td>
<td>250</td>
</tr>
</tbody>
</table>

*Note:* % = percentage of schools; B = boys; G = girls, Co-edu. Day = co-educational day
Source: County Director of Education Nairobi, 2016.

3.5 **Research Instruments**

Three research instruments were used in this study. They were a students’ questionnaire, a pro forma summary of students’ academic results and an interview schedule.

3.5.1 **Students’ Questionnaire**

This questionnaire comprised three parts (see Appendix B). Part I (Items 1-5) consisted of students’ demographic information, Part II consisted of (items 1-8) on academic mindsets and part III comprised (items 1-25) on learning strategies. It took 20-30
minutes to fill the questionnaire. An in-depth description of the academic mindset questionnaire and learning strategies questionnaire follows next.

**a) Academic Mindset Questionnaire**

Academic mindsets were assessed using an adapted scale from academic mindset questionnaire developed by Dweck (2000). The researcher sought permission from the author to use the instrument and gave her consent (see Appendix G). The scale was then adapted to suit the context and the participants of the current study. This questionnaire comprised (items 1-8) of students’ fixed and malleable academic mindsets. There were four items reflecting student’s fixed academic mindset like “I have a certain amount of intelligence and I cannot do much to change it”. There were also four items reflecting students’ malleable academic mindset like, “No matter who I am, I can significantly change my intelligence level”. Students’ responses were rated on a six point Likert scale ranging from between 1 (Strongly Agree) and 6 (Strongly disagree). Scores from malleable items were reversed so that strongly disagreeing with a fixed mindset item is similar to strongly agreeing with malleable mindset item. The scores ranged from 8 to 48 with a low score indicating strong endorsement of the constructs and high score indicating low endorsement of the constructs.

**b) Motivated Strategies for Learning Questionnaire (MSLQ)**

The researcher adapted scales from Motivated Strategies for Learning Questionnaire (MSLQ) to collect data on the participants’ learning strategies. Permission to use the instrument was sought from the developers and granted (see Appendix H). The MSLQ
was developed by Pintrich, Smith, Garcia, and Mckeachie (1991). It is a self-report instrument which measures students’ motivational beliefs and strategy use. This instrument is completely modular as it allows the researcher to use the scales together or individually depending on the specific needs. Hence, in the current study, three subscales of learning strategies were used which included: rehearsal learning strategy, elaboration learning strategy and organization learning strategy. The questionnaire comprised (items 1-25) of students’ learning strategies (see Appendix B). These 25 items were divided into three subscales. Rehearsal learning strategy was measured by the summed score of responses to the 8 items on the rehearsal subscale of MSLQ. Scores ranged from 8 to 40 with low score indicating high endorsement of the construct and high score indicating low endorsement of the construct. Elaboration learning strategy was measured by the summed score of responses to the 9 items on the elaboration subscale of MSLQ. The scores ranged from 9 to 45 with low score indicating high endorsement of the construct and vice versa. Organization learning strategy use was measured by the summed score of responses to the 8 items on the organization subscale of MSLQ. The scores ranged from 8 to 40 with the low score indicating high endorsement of the construct and vice versa. The three were based on a five point summed rating scale with responses ranging between 1 (not at all true of me) and 5 (very true of me) for positively worded items and vice versa for negatively worded items. Scores for the individual scales were computed by taking the mean of the items that made up the scale.
3.6 Pilot Study

The pilot study was carried out on a random sample of 50 form three students (25 boys and 25 girls) drawn from one co-educational day secondary school in Nairobi County. This school was not sampled for the main study. More specifically it helped to check on the appropriateness of statistical analysis and also helped modify the ambiguous or vague items in the questionnaire. For instance, item 1 of Academic Mindset Questionnaire, “Your intelligence is something very basic about you that you cannot change very much” was changed to “I have a certain amount of intelligence, and there is nothing much I can do to change it.” Further, item 18 of MSLQ, the statement, “have a clear picture of the content” was changed to “understand what I read”. In addition, an interview was also conducted on 10 students (5 boys and 5 girls) from the same group that had filled the questionnaires. This also helped modify the interview questions.

3.6.1 Validity of the Research Instruments

The pilot data was analyzed to check on the content validity of the items. Blackwell et al. (2007) conducted a longitudinal study among public secondary school students in New York City and reported evidence for content validity of the mindset questionnaire. Moreover, the researcher ensured adequate content validity of the questionnaire through peer review and consultations with experts in the area of motivation in the Department of Educational Psychology Kenyatta University to ensure the items represented the study constructs.
3.6.2 Reliability of the Research Instruments

In the current study, the reliability of the instrument was determined using the internal consistency method as it requires only one administration of test (Gay, 1999). This internal consistency was determined using the Cronbach’s alpha also referred to as coefficient alpha. Dweck, Chiu, and Hong (1995), reported high internal reliability of academic mindset scale across six studies with an alpha range of .94 to .98, and a test retest reliability over a 2-week interval of .80. Similarly, Dweck (2000) reported high internal consistency ranging from (.94 to .98) using Cronbach’s’ Alpha Values. Matheson (2013), in a study using 243 secondary school students in South Eastern Ontario, Canada reported Cronbach’s Alpha of .85 of the academic mindset scale. The pilot study data for the adapted mindset items had an internal consistency of .80 to .85. The overall internal consistency for all the items of the academic mindset questionnaire was .85. Therefore, this internal consistency was considered high enough to adopt the academic mindset questionnaire in the current study. This is as presented in Table 3.3.

Table 3.3

Reliability Coefficients for Academic Mindset Questionnaire

<table>
<thead>
<tr>
<th>Subscales of Academic Mindsets</th>
<th>Number of Items</th>
<th>Alpha Coefficients (Dweck, 2000)</th>
<th>Alpha Coefficients (Pilot Study)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAM</td>
<td>4</td>
<td>.86</td>
<td>.80</td>
</tr>
<tr>
<td>MAM</td>
<td>4</td>
<td>.89</td>
<td>.85</td>
</tr>
<tr>
<td>Overall Scale</td>
<td>8</td>
<td>-</td>
<td>.85</td>
</tr>
</tbody>
</table>

Note. N = 50; FAM = fixed academic mindset; MAM = malleable academic mindset
The internal consistency of the original MSLQ had alpha coefficient ranging from .53 to .93 (Pintrich et al., 1991). In a study, Pintrich et al. (1991) used a sample of 380 public university students to determine the reliability of MSLQ. Results revealed that, the majority of the Cronbach’s alphas for the individual scales were fairly robust (they were greater than .70). Simsek and Balaban (2010) in their study on unsuccessful university students reported Cronbach’s Alpha coefficient of the MSLQ as .93 with those of the specific subscales ranging from .72 to .85. The pilot data obtained from the three adapted sub scales of MSLQ had internal consistency ranging from 0.68 to 0.80 and therefore the instrument was adapted for use in the current study. This is as presented in Table 3.4.

Table 3.4

*Reliability Coefficients for Learning Strategies Subscales*

<table>
<thead>
<tr>
<th>Learning Strategies Subscales</th>
<th>Number of Items</th>
<th>Alpha Coefficients (Pintrich et al., 991)</th>
<th>Alpha Coefficients (Pilot Study)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REHLS</td>
<td>8</td>
<td>.69</td>
<td>.75</td>
</tr>
<tr>
<td>ELALS</td>
<td>9</td>
<td>.75</td>
<td>.80</td>
</tr>
<tr>
<td>ORGLS</td>
<td>8</td>
<td>.64</td>
<td>.68</td>
</tr>
<tr>
<td>Overall</td>
<td>25</td>
<td></td>
<td>.80</td>
</tr>
</tbody>
</table>

*Note.* N = 50; REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy.

As shown in Table 3.4, elaboration learning strategy had the highest reliability (.80). This was followed by rehearsal learning strategy (.75) while the lowest was
organization learning strategy (.68). These subscales had reliability coefficients higher than those reported by Pintrich et al. (1991). Based on these findings, the subscales were deemed appropriate for use in the current study.

3.7 Pro Forma Summary of Students’ Academic Results

Academic achievement was inferred from participants’ academic records. Through a pro forma table designed by the researcher (see Appendix C), form three results for end of term one and end of term two year 2016 were obtained from the respective teachers and the average scores for the two terms computed. These mean scores were converted to standard Z scores, and then transformed into T scores. This was done in order to make the results comparable across the schools that participated in the study.

3.8 Interview Schedule

An interview schedule was used to collect qualitative data on students’ academic mindsets and learning strategies (see Appendix E). Since the purpose of the qualitative data was to build on the quantitative results, interviews were conducted on 40 purposively selected participants. These were participants who had filled the quantitative questionnaires and had rated themselves very highly in fixed and malleable academic mindsets. They were then followed through the learning strategies they used and their academic achievement results. The researcher with the research assistants interviewed the students about their academic mindsets and learning strategies. They took notes on both verbal and non-verbal communication from the participants and video recorded the interview.
3.9 Data Collection Techniques

In this study, the data collection process involved two phases. The first phase involved collecting and analyzing quantitative data. The instrument was administered during the normal class hours or any other appropriate time depending on instructions from the school administration. The important aspects of the questionnaire like the study variables were explained to the participants. The participants were then given instructions on how to fill the questionnaires. It took 20-30 minutes to fill the questionnaires. The filled questionnaires were then collected by the researcher and the participants thanked for their participation. Academic achievement records were obtained from form three class teachers on prior request to provide the participants’ examination results for end of term one and two.

The second phase of data collection involved interviews. The participants were purposively selected from the participants who had filled the questionnaire. The researcher explained the purpose of the interviews to the participants. The participants were assured of the confidentiality of the information they provided. Pseudonyms were used. The interviews were transcribed verbatim and the transcripts were used for analysis.

3.9.1 Logistical and Ethical Considerations

An introduction letter was obtained from the graduate school (see Appendix J) after which, a research permit was obtained from the National Commission for Science, Technology, and Innovation (NACOSTI) and the Ministry of Education (MoE) (see
Furthermore, the researcher booked appointments with the heads of the sampled schools for briefing on the purpose of the study.

The researcher sought students’ informed consent through an introduction letter and an address to the students explaining the purpose of the study (see Appendix A). The students were informed that, participation was voluntary and they were free to withdraw from participation if they were not comfortable. Those willing to participate in the study signed the consent form. The participating students were assured that, high level of confidentiality would be observed and that pseudonyms would be used. The participants were also assured that their answers would only be used for the purposes of the current study.

3.10 Data Analysis Techniques

The raw data obtained from the questionnaires was coded, cleaned and scored for statistical analysis by the computer using Statistical Package for Social Sciences (SPSS). Both descriptive and inferential statistical procedures were used respectively. The descriptive statistics were specifically used to describe the sample. They included frequencies and percentages; measures of central tendency like the mean, mode and the median; measures of variability like the range, standard deviation and distribution shapes like skewness and kurtosis of a distribution. Inferential statistics were used to test the various study hypotheses using appropriate statistical tests. Therefore, the following null hypotheses were tested.
H₀₁: There is no significant relationship between academic mindsets and academic achievement. Statistical test: Pearson’s product moment correlation coefficient.

H₀₂: There is no significant relationship between learning strategies and academic achievement. Statistical test: Pearson’s product moment correlation coefficient.

H₀₃: There are no significant sex differences in students’ academic mindsets and learning strategies. Statistical test: t-test for independent samples.

H₀₄: There is no significant predictive weight of students’ academic mindsets and learning strategies on academic achievement. Statistical test: Multiple regression.

Academic achievement results were analyzed through a pro forma table. The mean scores were transformed into Z scores then into T scores. Qualitative data from the interviews was analyzed thematically. This process involved transcribing the interview scripts verbatim. The interview contents were analyzed using deductive coding method. From the coded content, major themes were picked.
CHAPTER FOUR
PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSIONS

4.1 Introduction
This chapter presents the findings of the study, interpretation and discussions in relation to the stated objectives and hypotheses. The chapter is divided into four sections: The first section is introduction, while the second section is participants’ general and demographic information. The third section presents the quantitative results of the study using both descriptive statistics and appropriate inferential statistics for the stated hypothesis. A discussion of the results and an exploratory analysis has been done in this section. Lastly, the fourth section presents the findings of the qualitative analysis of the earlier obtained quantitative results.

4.2 General and Demographic Information
In this section, the return rate of the research instruments and information on participants’ sex, age and type of school is presented.

4.2.1 Return Rate of the Research Instruments
The target return rate of the research instruments was 500 (250 girls, 250 boys) as shown in Table 4.1. The researcher visited the 10 schools sampled for the study, administered the questionnaires and gave clear instructions on how to fill the questionnaires. All the 500 questionnaires were collected, however during data coding and cleaning, the researcher discarded 12 of the questionnaires. The criteria used to
discard the questionnaires were; to begin with, 4 respondents had left some questions unanswered, 3 respondents had written wrong admission numbers and therefore, their academic records could not be found. In addition, 3 other respondents had ticked the questionnaires following a distinct pattern suggesting that they did not answer the questions honestly. Finally, the last 2 questionnaires were discarded because the respondents missed some exam papers so they did not have complete end of term 2 results. Therefore, the researcher analyzed responses from 488 (97.6 %) participants as shown in Table 4.1.

Table 4.1

_Return Rate of Research Instruments_

<table>
<thead>
<tr>
<th></th>
<th>Target Frequency</th>
<th>Actual Frequency</th>
<th>Return Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>250</td>
<td>245</td>
<td>98</td>
</tr>
<tr>
<td>Female</td>
<td>250</td>
<td>243</td>
<td>97</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>488</td>
<td>97.6</td>
</tr>
</tbody>
</table>

*Note. N = 488.*

### 4.2.2 Demographic Data of the Participants

Participants’ age and sex were cross tabulated and the results indicated that there were more females 34.2% in the age category of 15-17 years than males who were 30.9%. Interestingly there were more male students in the age category of 18-20 and 21-23 years respectively (16.6% and 2.7%) than the females who were 14.3% and 1.3% respectively. The results are presented in Table 4.2.
Table 4.2

Cross Tabulation of Participants’ Age by Sex

<table>
<thead>
<tr>
<th>Age Category in Years</th>
<th>15-17</th>
<th>%</th>
<th>18-20</th>
<th>%</th>
<th>21-23</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>151</td>
<td>30.9</td>
<td>81</td>
<td>16.6</td>
<td>13</td>
<td>2.7</td>
<td>245</td>
<td>50.2</td>
</tr>
<tr>
<td>Female</td>
<td>167</td>
<td>34.2</td>
<td>70</td>
<td>14.3</td>
<td>6</td>
<td>1.3</td>
<td>243</td>
<td>49.8</td>
</tr>
<tr>
<td>Total</td>
<td>318</td>
<td>65.1</td>
<td>151</td>
<td>30.9</td>
<td>19</td>
<td>3.9</td>
<td>488</td>
<td>100</td>
</tr>
</tbody>
</table>

Note. N = 488.

Moreover, participants’ age was tabulated with the type of school as shown in Table 4.3 in order to establish age categories among different schools.

Table 4.3

Participants’ Age and Type of School

<table>
<thead>
<tr>
<th>School Type</th>
<th>BB</th>
<th>BD</th>
<th>GB</th>
<th>GD</th>
<th>Co-ed.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Age (Years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-17</td>
<td>55</td>
<td>11.3</td>
<td>37</td>
<td>7.6</td>
<td>66</td>
<td>13.5</td>
</tr>
<tr>
<td>18-20</td>
<td>37</td>
<td>7.6</td>
<td>12</td>
<td>2.5</td>
<td>30</td>
<td>6.1</td>
</tr>
<tr>
<td>21-23</td>
<td>8</td>
<td>1.6</td>
<td>1</td>
<td>0.2</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>20.5</td>
<td>50</td>
<td>20.2</td>
<td>98</td>
<td>20.1</td>
</tr>
</tbody>
</table>

Note. N = 488. F = frequency; BB = boys’ boarding; BD = boys’ day; GB = girls’ boarding; GD = girls’ day; Co-ed. D = co-educational day.
The results in Table 4.3 indicated that, over half of the participants (65.2 %) across the categories of schools were in the age category of 15-17 years while 30.9% were in the age category of 18 -20 years. There were only 3.9% participants in the age category of 21-23 years. Data on participant’s sex and type of school were analyzed and the results are as shown in Table 4.4.

Table 4.4

*Participants Sex and Type of School Cross Tabulation*

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Boys’ Boarding</td>
<td>100</td>
<td>20.5</td>
<td>0</td>
</tr>
<tr>
<td>Boys’ Day</td>
<td>50</td>
<td>10.2</td>
<td>0</td>
</tr>
<tr>
<td>Girls’ Boarding</td>
<td>0</td>
<td>0.0</td>
<td>98</td>
</tr>
<tr>
<td>Girls’ Day</td>
<td>0</td>
<td>0.0</td>
<td>48</td>
</tr>
<tr>
<td>Co-ed Day</td>
<td>95</td>
<td>19.5</td>
<td>97</td>
</tr>
<tr>
<td>Total</td>
<td>245</td>
<td>50.2</td>
<td>243</td>
</tr>
</tbody>
</table>

*Note. N = 488. F = frequency; Co-ed Day = co-educational day*

The results in Table 4.4 indicated that 20.5% of the participants were from boys’ boarding schools, 10.2% were from boys’ day school while 20.1% and 9.8% participants were girls’ boarding schools and girls’ day school respectively. Furthermore, 39.3% of the participants were from co-educational day schools.
4.3 Results of the Study

This sub-section presents the findings of the study in line with the study objectives. First, the descriptive statistics for each study objective are presented. This is followed by the specific inferential statistics to test the null hypotheses. Then, a discussion of the findings is presented.

4.3.1 Relationship between Academic Mindsets and Academic Achievement

a. Description of Students’ Academic Mindsets and Academic Achievement

The descriptive statistics of participants’ academic mindset scores were determined and the findings presented in Table 4.5.

Table 4.5

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Range</td>
<td>Min</td>
<td>Max</td>
<td>M</td>
<td>SD</td>
<td>Sk</td>
<td>Kur</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>488</td>
<td>20.00</td>
<td>23</td>
<td>43</td>
<td>34.06</td>
<td>3.55</td>
<td>0.11</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Note. N = 488. Min = minimum; Max = maximum; M = mean; SD = standard deviation; Sk = skewness; Kur = kurtosis

The obtained results in Table 4.5 indicated that the minimum score was 23 while the maximum score was 43. The mean of the scores was 34.06 (SD = 3.55). The scores were negatively skewed with the coefficient of skewness as -0.11. This meant that most participants had rated themselves highly on the academic mindset scale. The Kurtosis of
the scores was .17 implying a slightly leptokurtic distribution as the majority of the scores were clustered around the mean.

The researcher conducted a further analysis to compute the levels of participants’ academic mindset scores. The participants were categorized as having either low, average or high academic mindset scores. Those categorized as low had a minimum score of 8 and a maximum score of 20. Those categorized as average had a minimum score of 21 and a maximum score of 34 while those categorized as high had a minimum score of 35 and a maximum score of 48. The results are as presented in Table 4.6.

Table 4.6

<table>
<thead>
<tr>
<th>Levels of Academic Mindset Scores</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Average</td>
<td>267</td>
<td>54.7</td>
</tr>
<tr>
<td>Valid</td>
<td>221</td>
<td>45.3</td>
</tr>
<tr>
<td>Total</td>
<td>488</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Note. N = 488*

As observed in Table 4.6, there were no participants with low level of academic mindset scores while more than half of the participants had average level of academic mindset. Those with a high level of academic mindset were more than a quarter.
Academic mindset comprised of two subscales: fixed academic mindset and malleable academic mindset. It was therefore necessary to conduct a descriptive analysis to find the mean, standard deviation, skewness, kurtosis, range, and minimum and maximum scores of the two subscales. The results are presented in Table 4.7.

Table 4.7

<table>
<thead>
<tr>
<th>Sub Scales</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>Mo</th>
<th>M</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAM</td>
<td>20</td>
<td>4</td>
<td>24</td>
<td>14.00</td>
<td>14.95</td>
<td>4.30</td>
<td>.37</td>
<td>-.72</td>
</tr>
<tr>
<td>MAM</td>
<td>20</td>
<td>4</td>
<td>24</td>
<td>22.00</td>
<td>19.10</td>
<td>3.78</td>
<td>-.98</td>
<td>.70</td>
</tr>
</tbody>
</table>

Note. N = 488. Min = minimum; Max = maximum; Mo = mode; M = mean; SD = standard deviation; Sk = Skewness; Kur = kurtosis; FAM = fixed academic mindset; MAM = malleable academic mindset

As observed in Table 4.7, the range for both fixed academic mindset and malleable academic mindset was 20 while the minimum and the maximum score was 4 and 24 respectively. Fixed academic mindset students had a mean of 14.95 (SD = 4.30) while malleable academic mindset students had a mean of 19.10 (SD = 3.78). The coefficient of skewness for the fixed academic mindset was (.37). This meant that participants had rated themselves low on fixed academic mindset. Malleable academic mindset scores were negatively skewed (-.98) meaning that the participants had rated themselves highly in the malleable academic mindset scale. This was also confirmed by the mode which was 14.00 for the fixed academic mindset subscale and 22.00 for the malleable academic mindset sub-scale. The kurtosis score for the fixed academic mindset was -.72.
implying a platykurtic distribution where scores are wide spread around the mean and the curve was more flat compared to a normal distribution curve. Moreover, the kurtosis score for MAM score was .70 implying a leptokurtic distribution where the scores were clustered around the mean. Having presented the descriptive statistics of student’s academic mindset subscales, the researcher performed a further analysis to find out whether the two subscales of academic mindset were related. A bivariate correlation analysis using Pearson product moment correlation coefficient was done and the results are as shown in Table 4.8.

Table 4.8
_Correlation Matrix of the Subscales of Academic Mindsets_

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.FAM</td>
<td>_</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.MAM</td>
<td>-.62**</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>3.AMS</td>
<td>-.55**</td>
<td>.31**</td>
<td>_</td>
</tr>
</tbody>
</table>

_Note. N = 488. FAM = fixed academic mindset; MAM = malleable academic mindset; AMS = academic mindset score. **P <.01._

As observed in Table 4.8, there was a significant negative correlation between fixed academic mindset and malleable academic mindset (r (486) = -.62, p < .01). This implied that, an increase in fixed academic mindset score led to a decrease in malleable academic mindset score. There was a significant negative correlation between fixed academic mindset and academic mindset score (r (486) = -.55, p < .01), while there was
a significant positive correlation between malleable academic mindset and academic mindset score \((r (486) = .31, p < .01)\). This meant that, fixed academic mindset affected the overall academic mindset score negatively.

Having presented the descriptive analysis of the individual subscales of students’ academic mindset scores, the following section presents a descriptive analysis of academic achievement of the participants. First, the participants’ end of term one and end of term two year 2016 average score was obtained. The researcher then computed the mean score for the two terms. These scores were then transformed to Z-scores and then into T-scores. The results are presented in Table 4.9.

Table 4.9

*Descriptive Statistics for Academic Achievement T-Scores*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acad. Ach.</td>
<td>488</td>
<td>63</td>
<td>26</td>
<td>89</td>
<td>50.00</td>
<td>10.00</td>
<td>0.30</td>
<td>-.16</td>
</tr>
</tbody>
</table>

*Note. N = 488. Min = minimum; Max = maximum; M = mean; SD = standard deviation; Sk = skewness; Kur = kurtosis, Acad. Ach. = academic achievement.*

As observed in Table 4.9, the range was 63 while the minimum score was 26 and the maximum score was 89. The mean and the standard deviation was 50 and 10 respectively implying that the scores had been transformed to T-scores. The coefficient of skewness was .30 meaning that most students did not perform very well. The Kurtosis for academic achievement T-scores was -.16 implying a platykurtic distribution where the scores are spread out from the mean.
Further, the researcher determined the levels of academic achievement of the participants. This was achieved by categorizing the participants as follows: those who had 40 and below were low in academic achievement. Those who had a score of between 41 and 59 were average in academic achievement while those who had a score of 60 and above were high in academic achievement. The results are presented in Table 4.10.

Table 4.10

*Levels of Academic Achievement*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>81</td>
<td>16.6</td>
</tr>
<tr>
<td>Average</td>
<td>323</td>
<td>66.2</td>
</tr>
<tr>
<td>High</td>
<td>84</td>
<td>17.2</td>
</tr>
<tr>
<td>Total</td>
<td>488</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Note. N = 488.*

Results in Table 4.10 showed that, less than a quarter of the participants were low in academic achievement. More than half of the participants were average in academic achievement while only 17.2% of the participants were high in academic achievement. This implies that majority of the participants were average in academic achievement.
b. Hypothesis Testing

The first null hypothesis of the study was stated as follows:

H$_{01}$: There is no significant relationship between students’ academic mindsets and academic achievement.

To test this hypothesis, a bivariate correlation analysis was performed by computing the Pearson product moment correlation coefficient. The results are presented in Table 4.11.

Table 4.11

<table>
<thead>
<tr>
<th>Academic Mindset Score</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.05</td>
<td>.27</td>
</tr>
</tbody>
</table>

Note. N = 488.

As observed in Table 4.11, the relationship between academic mindset scores and academic achievement was positive but not significant ($r$ (486) = .05, $p > .05$). Therefore, the null hypothesis was retained. It was, therefore, concluded that there is no significant relationship between students’ academic mindsets and academic achievement. This implied that when the two subscales of academic mindsets were combined, they were not related to academic achievement.
These findings prompted the researcher to conduct a further analysis to establish whether the two subscales of academic mindset had a significant relationship with academic achievement when correlated singly. To achieve this, two supplementary null hypotheses were formulated:

\( H_{01.1} \): There is no significant relationship between fixed academic mindset and academic achievement.

\( H_{01.2} \): There is no significant relationship between malleable academic mindset and academic achievement.

To test these hypotheses, academic scores for both fixed and malleable academic mindset were subjected to a bivariate correlational analysis using the Pearson product moment correlation coefficient. The results are as shown in Table 4.12.

Table 4.12

| Hypotheses Testing of the Two Subscales of Academic Mindset and Academic Achievement |
|----------------------------------|----------------------------------|
| Academic Achievement             |                                   |
| Fixed Academic Mindset           | Pearson Correlation: -.56**       |
|                                  | Sig. (2-tailed): .00              |
| Malleable Academic Mindset       | Pearson Correlation: .68**        |
|                                  | Sig. (2-tailed): .00              |

Note. \( N = 488 \)

**. Correlation is significant at \( P < .01 \) level (2-tailed).
As observed in Table 4.12, there was a significant negative relationship between fixed academic mindset and academic achievement \( (r (486) = -0.56, p < .01) \). Therefore, the first supplementary null hypothesis was rejected. It was therefore concluded that, there was a significant relationship between fixed academic mindset and academic achievement. This meant that fixed academic mindset led to low academic achievement. On the contrary, the relationship between malleable academic mindset and academic achievement was found to be positive and significant \( (r (486) = 0.68, p < .01) \). Thus, the second supplementary null hypothesis was rejected. It was therefore concluded that, there was a significant relationship between malleable academic mindset and academic achievement. This implied that, when respondents rated themselves highly in malleable academic mindset score, their academic achievement score increased.

Based on these findings, a further analysis on the levels of fixed and malleable academic mindset scores was conducted in order to establish their mean scores. First, the participants were categorized as having either low or high fixed or malleable mindset scores. Those with low fixed academic mindset scores had scores between 4 and 13 while those with high fixed academic mindset scores had scores between 14 and 24. Consequently, those with low malleable mindset scores had scores between 4 and 13 and those with high had 14 and 24 respectively. These results are shown in Table 4.13.
Table 4.13

Levels of Academic Mindset Subscales and Academic Achievement

<table>
<thead>
<tr>
<th>LACMS</th>
<th>Categories</th>
<th>Range</th>
<th>Frequency</th>
<th>Percent</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFAM</td>
<td>Low</td>
<td>4-13</td>
<td>199</td>
<td>40.8</td>
<td>54.23</td>
<td>9.04</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>14-24</td>
<td>289</td>
<td>59.2</td>
<td>47.07</td>
<td>9.59</td>
</tr>
<tr>
<td>LMAM</td>
<td>Low</td>
<td>4-13</td>
<td>44</td>
<td>9</td>
<td>38.61</td>
<td>5.82</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>14-24</td>
<td>444</td>
<td>91</td>
<td>51.13</td>
<td>9.61</td>
</tr>
</tbody>
</table>

Note. *N* = 488. LACMS = levels of academic mindsets; LFAM = levels of fixed academic mindset; LMAM = levels of malleable academic mindset; Min = minimum; Max = maximum; M = mean; SD = standard deviation

**P < .05

Interestingly as observed in Table 4.13, participants who were high in fixed academic mindset had a lower mean (\(M = 47.07, SD = 9.59\)) than those who were low in fixed academic mindset (\(M = 54.23, SD = 9.04\)). This meant that those participants who rated themselves very highly in fixed academic mindset performed poorer in their academic work than their counterparts. Moreover, those participants who rated themselves very highly in malleable academic mindset had a higher mean (\(M = 51.13, SD = 9.61\)) as compared to those who rated themselves lowly in malleable academic mindset (\(M = 38.61, SD = 5.82\)). This implied that, endorsement of a malleable academic mindset was associated with high academic achievement.

In order to establish the relationship between the two subscales of academic mindset and academic achievement, a correlation matrix was performed and the results are presented in Table 4.14.
Table 4.14

Correlation Matrix of the Subscales of Academic Mindset and academic Achievement

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FAM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. MAM</td>
<td>-.62**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ACAD.ACH.</td>
<td>-.56**</td>
<td>.68**</td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 488. FAM = fixed academic mindset; MAM = malleable academic mindset; ACAD.ACH. = academic achievement. **P < .01.

The results in Table 4.14 indicated that, there were significant correlations between the two sub scales of academic mindsets and academic achievement. A significant positive correlation was observed between malleable academic mindset and academic achievement ($r (486) = .68, p < .01$) meaning that, those participants who rated themselves highly in malleable academic mindset had high academic achievement. On the other hand, a significant negative correlation was observed between fixed academic mindset and academic achievement ($r (486) = -.56, p < .01$) implying that, those participants who rated themselves highly in fixed academic mindset had low academic achievement.

c. Discussions of the Findings

The first objective of the study sought to determine whether there was a relationship between academic mindsets and academic achievement. This study found a positive but a non-significant relationship between academic mindsets and academic achievement as
seen in Table 4.11. The researcher conducted a further analysis to establish if there was a significant correlation between the specific subscales of academic mindsets and academic achievement. The findings indicated a significant negative correlation between fixed academic mindset and academic achievement while there was a positive and significant correlation between malleable academic mindset and academic achievement.

The findings on the relationship between academic mindsets and academic achievement are in line with Dweck and Leggett’s (1988) theory of motivation and personality that, when students endorse a malleable academic mindset, their academic achievement improves. On the contrary, when students endorse a fixed academic mindset, there is a decline in academic achievement. This could be due to the fact that, when students believe that, their current performance can be improved through hard work, they are likely to improve in their performance, hence high academic achievement. On the other hand, if they believe that, they cannot improve even if they work hard, this may lead to low academic achievement.

The findings also concur with Blackwell et al. (2007) on a longitudinal study that followed four waves of students entering junior high school and measured their implicit theories of intelligence and then assessed their achievement outcomes for four years. Results revealed that, those students who endorsed a fixed academic mindset did not show an upward improvement in grades. On the other hand, those who endorsed a malleable academic mindset showed an upward improvement over the four years.
Similar findings were also reported by Chen and Wong (2015) in a study on Chinese University students to find out whether there was a relationship between theories of intelligence and goal orientations and academic achievement. This study revealed a significant positive relationship between malleable academic mindset and academic achievement and a significant negative relationship between fixed academic mindset and academic achievement.

The findings of this study were also in agreement with those reported by Lackey (2014) and Paunesku et al. (2012) who reported a significant positive relationship between malleable academic mindset and academic achievement and a significant negative relationship between fixed academic mindset and academic achievement. In the current study, those respondents who rated themselves very highly in malleable academic mindset performed very well, whereas, those who rated themselves very highly in fixed academic mindset performed very poorly (see Table 4.13). When students believe that their intelligence cannot change, they lose interest in their studies and to them, effort does not help.

Consistent results were reported by Aditomo (2015). The study investigated students’ responses in response to setbacks at a University in Indonesia. A path analysis using multiple regression was used to estimate the mediating roles of the motivational variables. The study reported that, malleable academic mindset students adopted mastery goals and effort attribution and this led to higher academic achievement. Similar findings were reported by Claro et al. (2016). Their study sought to find out
whether effects of poverty had an impact on students’ academic mindsets and its relationship with academic achievement. The study involved all 10th grade students in Chile. The results revealed a significant relationship between academic mindsets and academic achievement. More specifically, they reported that, those students with malleable mindsets achieved higher than those with fixed mindsets and that, poverty had a major impact on fixed mindset students than malleable mindset students. Socio-economic inequality can affect how students view their intelligence and their general response to academic challenges. When fixed mindset students are deprived of their physiological needs, lack of exposure to stimulating environments for example, this is likely to negatively affect their academic achievement.

However, contrasting results were reported by Furnham et al. (2003) whose study investigated personality, cognitive ability and beliefs about intelligence at a university college in London. The results revealed no significant relationship between beliefs about intelligence and academic achievement. Similarly, P’Pool (2012) in a study to determine students’ view of intelligence in the United States found no significant differences between fixed mindset and malleable mindset in relation to academic achievement. The findings on the relationship between academic mindsets and academic achievement also did not agree with results obtained by Stump et al. (2014). The study investigated undergraduate engineering students’ intelligence beliefs at Arizona State University. The researchers sought to find out if there was a significant predictive ability of students’ self-efficacy, active learning strategies and students’
academic mindsets on course grades. A multiple regression analysis revealed that neither fixed nor malleable mindset beliefs predicted academic performance.

In conclusion, irrespective of the different cultural contexts, methodologies and different samples from the current study, the current study in Kenya found a relationship between academic mindsets and academic achievement. More specifically, a significant positive relationship was found between malleable academic mindset and academic achievement while a significant negative relationship was found between fixed academic mindset and academic achievement. This implies that academic mindsets not only affect students in the western oriented cultures but also affects learners in developing countries like Kenya. Therefore, students’ academic mindsets play a very important role in their motivation and academic achievement. When students endorse a malleable mindset, they are able to persist in the face of obstacles and to them; these obstacles energize them to work even harder. On the contrary, when students endorse a fixed mindset, they fear challenges and they can easily give up in the face of obstacles (Blackwell et al., 2007).

4.3.2 Relationship between Learning Strategies and Academic Achievement

This sub-section presents the results of the second objective of the study. The first part of the descriptive analysis presents the relationship between learning strategies and academic achievement while the second part presents the respective inferential statistics.
a. Description of Learning Strategies and Academic Achievement

The descriptive statistics of the participants’ learning strategies scores were analyzed to find the range, the mean, standard deviation, skewness and kurtosis. The results are presented in Table 4.15.

Table 4.15

Descriptive Analysis of Learning Strategies Scores

<table>
<thead>
<tr>
<th>N</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>488</td>
<td>49.00</td>
<td>71.00</td>
<td>120.00</td>
<td>98.32</td>
<td>8.54</td>
<td>-0.19</td>
<td>-0.10</td>
</tr>
</tbody>
</table>

*Note. N = 488. Min = minimum; Max = maximum; M = mean; SD = standard deviation; Sk = skewness; Kur = kurtosis*

The results in Table 4.15 revealed that the range for learning strategies scores was 49 while the minimum and the maximum scores were 71 and 120 respectively. The mean of the learning strategies scores was 98.32 (SD = 8.54). The coefficient of skewness was -.19 implying that majority of the participants had rated themselves highly in learning strategies. The kurtosis was -.10 implying a platykurtic distribution where the scores are spread around the mean. The researcher further analyzed the levels of learning strategies of the participants. The participants were categorized as having either low, average or high in learning strategies. Those categorized as low had a score of between 25 and 57. Those categorized as average had a score of between 58 and 82 while those who scored very highly had a score of between 83 and 125. The results are as shown in Table 4.16.
Table 4.16

*Levels of Learning Strategies*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>00</td>
<td>0.0</td>
</tr>
<tr>
<td>Average</td>
<td>31</td>
<td>6.4</td>
</tr>
<tr>
<td>High</td>
<td>457</td>
<td>93.6</td>
</tr>
<tr>
<td>Total</td>
<td>488</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Note. N = 488.*

As presented in Table 4.16, more than three quarters of the participants scored very highly in learning strategies. Less than a quarter of the participants were average in learning strategies while no participants were low in learning strategies. This implied that, generally, all participants rated themselves well in learning strategies use.

Learning strategies had three subscales: rehearsal learning strategy, elaboration learning strategy and organization learning strategy. Table 4.17 presents a descriptive analysis of the individual subscales of learning strategies.
Table 4.17

Descriptive Statistics of the Subscales of Learning Strategies

<table>
<thead>
<tr>
<th>LS Subscales</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>REHLSS</td>
<td>27.00</td>
<td>13.00</td>
<td>40.00</td>
<td>31.15</td>
<td>5.13</td>
<td>-.54</td>
<td>.14</td>
</tr>
<tr>
<td>ELALSS</td>
<td>30.00</td>
<td>15.00</td>
<td>45.00</td>
<td>36.38</td>
<td>5.33</td>
<td>-.71</td>
<td>-.07</td>
</tr>
<tr>
<td>ORGLSS</td>
<td>26.00</td>
<td>14.00</td>
<td>40.00</td>
<td>30.77</td>
<td>4.87</td>
<td>-.42</td>
<td>.24</td>
</tr>
</tbody>
</table>

Note. N = 488. LS Subscales = learning strategies subscales; Min = minimum; SD = standard deviation; Sk = skewness; Kur = kurtosis; REHLSS = rehearsal learning strategy score; ELALSS = elaboration learning strategy score; ORGLSS = organization learning strategy score.

The results in Table 4.17 indicate that, the range for rehearsal learning strategy was 27 while that of elaboration and organization learning strategies was 30 and 26 respectively. The minimum and the maximum scores for rehearsal learning strategy was 13 and 40, while that of elaboration learning strategy and organization learning strategies scores were 15 and 45 and 14 and 40 respectively. Elaboration learning strategy had the highest mean 36.38 (SD = 5.33) followed by rehearsal learning strategy with a mean of 31.15 (SD = 5.13), while organization learning strategy had the lowest mean of 30.77 (SD = 4.87). The coefficient of skewness for the three subscales was negative implying that the participants rated themselves highly on these subscales with the elaboration learning strategy having the highest coefficient of skewness -.71.

Having presented the descriptive analysis of learning strategies subscales, it was necessary to perform a further analysis to establish if there was a relationship among the subscales of learning strategies and the total learning strategies score. To achieve this, a bivariate correlation analysis was done. The results are presented in Table 4.18.
Table 4.18

**Correlation Matrix of the Subscales of Learning Strategies**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. REHLS</td>
<td>_</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ELALS</td>
<td>.14**</td>
<td>_</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ORGLS</td>
<td>.33**</td>
<td>.28**</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>4. TLSTS</td>
<td>.59**</td>
<td>.59**</td>
<td>.80**</td>
<td>_</td>
</tr>
</tbody>
</table>

*Note. N = 488. REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy; TLSTS = total learning strategies score. **Correlation is significant at P < .01 level (2-tailed).*

As observed in Table 4.18, all the three subscales of learning strategies had a significant relationship. The highest significant correlation was found between rehearsal learning strategy and organization learning strategy ($r(486) = .33, p < .01$), this was followed by elaboration learning strategy and organization learning strategy ($r(486) = .28, p < .01$). The lowest correlation was observed between rehearsal learning strategy and elaboration learning strategy ($r(486) = .14, p < .01$). When the three subscales were correlated with the total learning strategies score, each of the three subscales had a significant correlation with the total learning strategies score. The highest correlation was observed between organization learning strategy and the total learning strategies score ($r(486) = .80, p < .01$).

b) **Hypotheses Testing.**

The second null hypothesis of this study was stated as follows:
H$_{02}$: There is no significant relationship between learning strategies and academic achievement.

To test this hypothesis, a bivariate correlation analysis was performed using the Pearson product moment correlation coefficient. The results are presented in Table 4.19.

Table 4.19

<table>
<thead>
<tr>
<th>Correlation between Learning Strategies and Academic Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Strategies Score</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
</tr>
</tbody>
</table>

Note. $N = 488$.
**. Correlation is significant at $P < .01$ level (2-tailed).

The results in Table 4.19 revealed a significant positive relationship between learning strategies and academic achievement ($r (488) = .20$, $p < .01$), therefore the second null hypothesis was rejected. It was therefore concluded that, learning strategies were significantly related with academic achievement. This meant that, the three learning strategies combined had a significant relationship with academic achievement. Based on these findings, the researcher conducted a further analysis to establish whether the individual subscales of learning strategies were significantly related with academic achievement. This was achieved by performing a bivariate correlation analysis using the Pearson product moment correlation coefficient. The results are presented in Table 4.20.
Table 4.20

*Correlations between the Subscales of Learning Strategies and Academic Achievement*

<table>
<thead>
<tr>
<th>Learning Strategy</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehearsal Learning Strategy</td>
<td>.34**</td>
<td>.00</td>
</tr>
<tr>
<td>Elaboration Learning Strategy</td>
<td>.68**</td>
<td>.00</td>
</tr>
<tr>
<td>Organization Learning Strategy</td>
<td>.04</td>
<td>.28</td>
</tr>
</tbody>
</table>

*Note. N = 488*

**. Correlation is significant at P < .01 level (2-tailed)

As observed in Table 4.20, all the three subscales of learning strategies had a correlation with academic achievement. The highest significant positive correlation was found between elaboration learning strategy and academic achievement ($r (486) = .68, p < .01$). This was followed by a significant positive correlation between rehearsal learning strategy and academic achievement ($r (486) = .34, p < .01$). The lowest non-significant correlation was found between organization learning strategy and academic achievement ($r (486) = .04, p = .28$). This meant that those respondents who scored very highly on elaboration learning strategy performed better as compared to those on rehearsal learning strategy and organization learning strategy. This could be because elaboration learning strategy has more to do with understanding of the learned material other than just recall of the learned material. It is worth noting that organization
learning strategy was not often used by respondents could be because they were not trained on its meaning and application.

Based on the results obtained in Table 4.20, the researcher conducted a further analysis on rehearsal and elaboration learning strategies subscales in order to find out which of the two learning strategies was associated with higher academic achievement. The researcher also wanted to ascertain the general trend in academic achievement of those participants who endorsed rehearsal learning strategy and those who endorsed elaboration learning strategy. The researcher categorized the participants as having either low or high rehearsal learning strategy or either low or high elaboration learning strategy. Those categorized as low in the use of rehearsal learning strategies had scores between 8 and 23 while those categorized as high in rehearsal learning strategies had scores between 24 and 40. Those categorized as low in the use of elaboration learning strategy had scores between 9 and 26 while those categorized as high in elaboration learning strategies had scores between 27 and 45. The results are presented in Table 4.21.

The results in Table 4.21 revealed that, participants who scored high in rehearsal learning strategy had a mean of 54.83 ($SD = 9.94$) which was higher than those who were low in the use of rehearsal learning strategy $M = 49.56$ ($SD = 9.42$). Therefore, rehearsing the learned material, contributes to high academic achievement. Moreover, those participants who scored high in elaboration learning strategy $M = 50.58$ ($SD = 9.42$) performed better compared to those who rated themselves low in elaboration...
learning strategy \( M = 38.86 \) (\( SD = 5.29 \)). This concurs with the findings presented in Table 4.19.

Table 4.21

Levels of Rehearsal, Elaboration Learning Strategies and Academic Achievement

<table>
<thead>
<tr>
<th>LLS</th>
<th>Categories</th>
<th>Range</th>
<th>Frequency</th>
<th>Percent</th>
<th>( M )</th>
<th>( SD )</th>
</tr>
</thead>
<tbody>
<tr>
<td>REHLS</td>
<td>Low</td>
<td>8-23</td>
<td>41</td>
<td>8.4</td>
<td>49.56</td>
<td>9.42</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>24-40</td>
<td>447</td>
<td>91.6</td>
<td>54.83</td>
<td>9.94</td>
</tr>
<tr>
<td>ELALS</td>
<td>Low</td>
<td>9-26</td>
<td>23</td>
<td>4.7</td>
<td>38.86</td>
<td>5.29</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>27-45</td>
<td>465</td>
<td>95.3</td>
<td>50.58</td>
<td>9.42</td>
</tr>
</tbody>
</table>

*Note. \( N = 488 \). M = mean; SD = standard deviation; LLS = levels of learning strategies; REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy*

In order to determine the relationship between each of the three subscales of learning strategies and academic achievement, a bivariate correlation analysis using Pearson product moment correlation coefficient was performed. The results are presented in Table 4.22.

As observed in Table 4.22, the largest positive significant correlation was observed between elaboration learning strategy and academic achievement \( (r (488) = .68, p < .01) \). This was followed by a significant positive correlation between rehearsal learning strategy and academic achievement \( (r (488) = .34, p < .01) \). There was a weak and non-significant correlation between organization learning strategy and academic achievement. Therefore, elaboration learning strategy had the strongest significant
relationship with academic achievement as most students seemed to understand its use in learning.

Table 4.2

Correlation Matrix of Subscales Learning Strategies and Academic Achievement

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. REHLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ELALS</td>
<td>.14**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ORGLS</td>
<td>.33**</td>
<td>.28**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. ACAD.ACH.</td>
<td>.34**</td>
<td>.68**</td>
<td>.04</td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 488. REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy; ACAD.ACH. = academic achievement.

**. Correlation is significant at P < .01 level (2-tailed).

c. Discussion of the Results

The second objective of this study sought to establish the relationship between learning strategies and academic achievement. Findings revealed a significant positive correlation between learning strategies and academic achievement. The researcher further sought to establish whether there was a significant relationship between the individual subscales of learning strategies and academic achievement as seen in Table 4.20. Results revealed a significant positive correlation between rehearsal learning strategy and academic achievement. Moreover, there was a significant positive relationship between elaboration learning strategy and academic achievement. On the contrary, there was a non-significant positive relationship between organization learning
strategy and academic achievement. Therefore, from among the three learning strategies, elaboration learning strategy was the most used learning strategy as most learners seemed to understand how to take short notes as they also underlined the most important areas. This was followed by rehearsal learning strategy. Respondents seemed to understand the importance of rehearsing the learned material as this enhances retention.

The findings on the relationship between learning strategies and academic achievement corroborate the study by Simsek and Balaban (2010). The study assessed the commonly used learning strategies of undergraduate students at Anadolu University in Turkey and how these learning strategies were related to academic achievement. Correlations were performed among rehearsal learning strategies, elaboration learning strategies and organization learning strategies and academic achievement. A significant positive relationship was found between learning strategies and academic achievement. Similar findings were reported by Kadioglu and Uzintrayati (2014). The study examined the relationship between learning strategies and goal orientations and their relationship with academic achievement among Turkish high school students. A positive relationship was reported between learning strategies and academic achievement. Moreover, the students who gave importance to developing new skills used elaboration learning strategy more than rehearsal and organization learning strategy. This concurs with findings as seen in Table 4.21.
These findings are also in line with those by Lee et al. (2017). The study explored how the relationship between college students’ learning strategies and their GPA differed across culturally different institutions. Results revealed a significant positive relationship between cognitive related strategies (rehearsal, elaboration and organization learning strategies) and academic achievement. Consistent findings were also reported by Kivinen (2003) on motivation and learning strategy use in three international schools in Finland. Results revealed that 40% of the students used learning strategies (rehearsal, elaboration, and organization learning strategies). Consequently, this led to a higher academic achievement. These results concur with those by Matseke (2011). The study evaluated how learning strategies affected learner’s self-efficacy and academic achievement in a primary school in the Black Township of Gauteng Province, South Africa. A significant positive relationship was found between learning strategies (rehearsal learning strategy, elaboration learning strategy, and organization learning strategy) and academic achievement. Therefore, learners need to be taught these learning strategies as they play a very important role in understanding the learned material.

However, the study findings were inconsistent with those reported by Keklik and Keklik (2011). The study sought to establish which motivation and learning strategies predicted academic achievement of secondary school students. Results showed a low and positive correlation between organization learning strategy and academic achievement while elaboration and rehearsal learning strategies did not predict academic achievement. Similar findings had been reported by Pintrich and Zusho
(2003) in the University of Michigan, USA. The role of certain motivational components and their relationship with learning strategies and academic achievement was assessed at three time points over the course of one semester. Results revealed that rehearsal and elaboration learning strategy use declined while the use of organization learning strategy increased over time.

In Africa, inconsistent findings were reported by Robertson (2011). The study had hypothesized that, deep learning strategies (elaboration and organization learning strategy) would significantly predict academic achievement while surface learning strategy (rehearsal learning strategy) would negatively predict academic achievement. Contrary to their expectations, rehearsal learning strategy predicted academic achievement while elaboration and organization learning strategy were found to have no meaningful relationship with academic achievement.

In Kenya, different findings from the current study were reported by Mutweleli (2014) whose study investigated academic motivation and self-regulated learning among form three students in Nairobi County. Among all the self-regulated learning strategies studied, rehearsal and organization learning strategies were found to have positive relationship with academic achievement while elaboration learning strategy was not. It is worth noting that, despite the mixed findings, a significant positive relationship was found between learning strategies and academic achievement. Meaning that, students of all cultures, backgrounds and levels require the knowledge of learning strategies in order to enhance their academic achievement.
4.3.3 Sex Differences in Students’ Academic Mindsets and Learning Strategies

This sub-section presents the results of the third objective of the study. A descriptive statistics of the two predictor variables is presented. First is a descriptive statistics of sex differences in student’s academic mindsets and learning strategies. Secondly, the appropriate inferential statistics are presented.

a. Description of Sex Differences and Academic Mindsets

The respondents’ scores in academic mindsets were analyzed to find their mean and the standard deviation. The results are as presented in Table 4.23.

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>245</td>
<td>4.20</td>
<td>0.45</td>
</tr>
<tr>
<td>Female</td>
<td>243</td>
<td>4.30</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Note. \( N = 488 \). M = mean; SD = standard deviation.

The results in Table 4.23 indicated that female respondents had a higher academic mindset score mean (\( M = 4.30, SD = 0.42 \)) than their male counterparts (\( M = 4.20, SD = 0.45 \)). This implied that girls had rated themselves highly in academic mindsets. As seen in Table 4.6, academic mindset scores had been categorized into three levels as follows: low, average and high academic mindset scores. Since there were no participants with low academic mindset scores, the average and high levels of academic mindset scores were cross tabulated with sex and the results are presented in Table 4.24.
Table 4.24

Levels of Academic Mindsets by Sex of the Respondents

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>LAM</td>
<td>Average</td>
<td>144</td>
<td>29.5</td>
<td>123</td>
<td>25.2</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>101</td>
<td>20.7</td>
<td>120</td>
<td>24.6</td>
</tr>
<tr>
<td>Total</td>
<td>245</td>
<td>50.2</td>
<td>243</td>
<td>49.8</td>
<td>488</td>
</tr>
</tbody>
</table>

Note. N = 488; LAM = levels of academic mindsets.

The results in Table 4.24 revealed that more than half of the respondents were average in academic mindset with more boys (29.5%) than girls (25.2%) in the average category. Interestingly, there were more girls (24.6%) than boys (20.7%) in the high level category. This implied that majority of the respondents, both boys and girls did not rate themselves very highly in academic mindsets. A further analysis was done to establish whether there were sex differences between the two subscales of academic mindsets. The results are shown in Table 4.25.
Table 4.25

*Sex Differences in the Subscales of Academic Mindset*

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>245</td>
<td>14.58</td>
<td>4.12</td>
</tr>
<tr>
<td>Female</td>
<td>243</td>
<td>15.32</td>
<td>4.45</td>
</tr>
<tr>
<td>MAM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>245</td>
<td>19.08</td>
<td>3.81</td>
</tr>
<tr>
<td>Female</td>
<td>243</td>
<td>19.13</td>
<td>3.76</td>
</tr>
</tbody>
</table>

*Note. N = 488. FAM = fixed academic mindset; MAM = malleable academic mindset; M = mean; SD = standard deviation.*

The results in Table 4.25 showed that, girls had a higher mean ($M = 15.32, SD = 4.45$) in fixed academic mindset subscale than boys ($M = 14.58, SD = 4.12$). Interestingly, girls had also a higher mean ($M = 19.13, SD = 3.76$) in malleable academic mindset subscale than boys ($M = 19.08, SD = 3.81$).

**b. Sex Differences and Learning Strategies**

The respondents’ scores in learning strategies use were analyzed to find the mean and the standard deviation of the scores. The results are presented in Table 4.26.

Table 4.26

*Sex Differences and Learning Strategies Score Mean*

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Strategies Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>245</td>
<td>3.90</td>
<td>0.39</td>
</tr>
<tr>
<td>Female</td>
<td>243</td>
<td>3.96</td>
<td>0.41</td>
</tr>
</tbody>
</table>

*Note. N = 488. M = mean; SD = standard deviation.*
The results in Table 4.26 revealed that, female respondents had higher learning strategies score mean ($M = 3.96, SD = 0.41$) than their male counterparts ($M = 3.90, SD = 0.39$). As presented in Table 4.17, learning strategies scores had been categorized into three levels as follows: low, average and high. Having no respondents low in learning strategies use, the average and high levels of learning strategies used were cross tabulated with sex and the results are presented in Table 4.27.

Table 4.27

*Levels of Learning Strategies by Sex of the Respondents*

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$N$</td>
<td>%</td>
<td>$N$</td>
<td>%</td>
<td>$N$</td>
<td>%</td>
</tr>
<tr>
<td>LLS</td>
<td>Average</td>
<td>13</td>
<td>2.7</td>
<td>18</td>
<td>3.7</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>232</td>
<td>47.5</td>
<td>225</td>
<td>46.1</td>
<td>457</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>245</td>
<td>50.2</td>
<td>243</td>
<td>49.8</td>
<td>488</td>
</tr>
</tbody>
</table>

*Note.* $N = 488$; LLS = levels of learning strategies.

The results in Table 4.27 indicated that more than three quarters of the respondents were in the high level category in learning strategies used with more girls (3.7%) than boys (2.7%) in the average category. There were more boys (47.5%) than girls (46.1%) in the high level category.
Having presented the levels of learning strategies, a further analysis was done to establish whether there were sex differences among the three subscales of learning strategies: rehearsal learning strategy, elaboration learning strategy and organization learning strategy. The results were as presented in Table 4.28.

Table 4.28

Sex Differences in the Subscales of Learning Strategies

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>REHLS</td>
<td>Male</td>
<td>245</td>
<td>31.02</td>
<td>5.22</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>243</td>
<td>31.30</td>
<td>5.05</td>
</tr>
<tr>
<td>ELALS</td>
<td>Male</td>
<td>245</td>
<td>36.17</td>
<td>5.69</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>243</td>
<td>36.60</td>
<td>4.94</td>
</tr>
<tr>
<td>ORGLS</td>
<td>Male</td>
<td>245</td>
<td>30.41</td>
<td>4.68</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>243</td>
<td>31.13</td>
<td>5.04</td>
</tr>
</tbody>
</table>

*Note. N = 488. M = mean; SD = standard deviation; REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy.*

As presented in Table 4.28, girls had a higher mean \((M = 31.30, SD = 5.05)\) in rehearsal learning strategy than boys \((M = 31.02, SD = 5.02)\). Interestingly, girls had a higher mean in both elaboration learning strategy and organization learning strategy respectively \((M = 36.06, SD = 4.94; M = 31.13, SD = 5.04)\) than boys \((M = 36.17, SD = 5.69; M = 30.41, SD = 4.68)\).
c. Hypothesis Testing on Sex Differences in Students’ Academic Mindsets and Learning Strategies

The third hypothesis sought to establish whether there were significant sex differences in students’ academic mindsets and learning strategies. To achieve this, the third null hypothesis was advanced:

\[ H_{03} \]: There are no significant sex differences in students’ academic mindsets and learning strategies.

In order to test this hypothesis, two supplementary null hypotheses were formulated as follows:

\[ H_{03.1} \]: There are no significant sex differences in students’ academic mindsets.
\[ H_{03.2} \]: There are no significant sex differences in students’ learning strategies use.

c. i. Testing the First Supplementary Null Hypothesis

\[ H_{03.1} \]: There are no significant sex differences in students’ academic mindsets.

In order to test this hypothesis, descriptive analyses of the respondents’ academic mindset scores by sex were analyzed to find the mean and the standard deviation. The results are presented in Table 4.29.
Table 4.29

**Descriptive Statistics of Academic Mindset Scores by Sex**

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Academic Mindset Score</td>
<td>Male</td>
<td>245</td>
<td>4.20</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>243</td>
<td>4.30</td>
<td>0.42</td>
</tr>
</tbody>
</table>

*Note. N = 488. M = mean; SD = standard deviation*

The results in Table 4.29 revealed that girls had a higher academic mindset score mean ($M = 4.30$, $SD = .42$) than boys ($M = 4.20$, $SD = .45$). To test whether these mean differences were statistically significant, an independent samples t-test for students’ academic mindset scores was performed. The results are presented in Table 4.30.

Table 4.30

**Independent Samples t-test for Academic Mindset Scores**

<table>
<thead>
<tr>
<th></th>
<th>$t$</th>
<th>df</th>
<th>Sig.(2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Mindset Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>-2.47</td>
<td>486</td>
<td>.01</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-2.47</td>
<td>484.42</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note. N = 488. *
* $P < .05$

The results in Table 4.30 indicated that, there were significant sex differences in academic mindset scores ($t (486) = -2.47, p < .05$). The first supplementary null
hypothesis was therefore rejected. It was therefore concluded that, there were significant sex differences in students’ academic mindsets. This confirmed the results as presented in Table 4.29 that, girls were better than boys in academic mindset scores. This according to Rudig (2014) could have been contributed by the fact that girls with fixed mindset may perform as well as those with malleable mindset so as to prove their ability.

The researcher then focused on establishing whether there were significant sex differences between the individual subscales of students’ academic mindsets. An independent samples t-test of the individual subscales of academic mindset was performed. The results are presented in Table 4.31.

Table 4.31

Independent Samples t-test of the Subscales of Students’ Academic Mindsets

<table>
<thead>
<tr>
<th>Subscale</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>MD</th>
<th>SED</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAM</td>
<td>-1.91</td>
<td>486</td>
<td>.05</td>
<td>-.74</td>
<td>.38</td>
</tr>
<tr>
<td>MAM</td>
<td>-.13</td>
<td>486</td>
<td>.89</td>
<td>-.04</td>
<td>.34</td>
</tr>
</tbody>
</table>

*Note. N = 488. df = degrees of freedom; MD = mean difference; SED = standard error of the difference; FAM = fixed academic mindset; MAM = malleable academic mindset.*

As observed in Table 4.31, statistically significant sex differences were found in fixed academic mindset (t (486) = -1.91, p < .05). This meant that more girls than boys endorsed a fixed academic mindset implying that, girls give up easily especially when
they are not able to perform a task. On the contrary, there were no significant sex difference between boys and girls on malleable academic mindset ($t (486) = - .13, p > .05$). This meant that, despite the fact that more girls than boys endorsed a malleable mindset, their mean differences were not statistically significant. These findings concur with those by Rudig (2014) among university students who reported significant sex differences in students’ fixed academic mindset. However, there were no statistically significant sex differences in malleable academic mindset. Girls and boys who believed in effort expenditure performed almost the same. The findings of this study were however inconsistent with those of (Matheson, 2013; Furnman et al., 2003) who found that beliefs about intelligence were not affected by sex.

c. ii. Testing the Second Supplementary Null Hypothesis

The second supplementary null hypothesis was stated as follows:

$H_{03.2}$: There are no significant sex differences in learning strategies use.

A descriptive analysis of learning strategies by sex was performed in order to obtain the mean and the standard deviation. The results are presented in Table 4.32.
Table 4.32

*Descriptive Statistics of Learning Strategies Scores by Sex*

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Learning Strategies</td>
<td>Male</td>
<td>245</td>
<td>3.90</td>
</tr>
<tr>
<td>Score</td>
<td>Female</td>
<td>243</td>
<td>3.96</td>
</tr>
</tbody>
</table>

*Note. N = 488. M = mean; SD = standard deviation*

The findings in Table 4.32 indicated that girls had a higher learning strategies score mean ($M = 3.96$, $SD = 0.41$) than boys ($M = 3.90$, $SD = 0.39$).

To test whether these mean differences were statistically significant, an independent samples t-test for students’ learning strategies use was performed. The results are presented in Table 4.33.

Table 4.33

*Independent Samples t-test for Learning Strategies Scores*

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances</td>
<td>-1.56</td>
<td>486</td>
<td>.11</td>
</tr>
<tr>
<td>assumed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances not</td>
<td>-1.56</td>
<td>483.97</td>
<td>.11</td>
</tr>
<tr>
<td>assumed</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 488*

*$P < .05$*
As observed in Table 4.33, there were no significant sex differences in learning strategies scores ($t (486) = -1.56, p > .05$). The supplementary null hypothesis was retained. It was therefore, concluded that, there were significant sex differences in learning strategies use. This implied that, despite the fact that girls attained a higher mean than boys in learning strategies scores, these differences were not statistically significant. These findings prompted the researcher to perform a further analysis to find out if there were statistically significant sex differences among the subscales of learning strategies. To achieve this, an independent samples t-test was performed. The results are presented in Table 4.34.

Table 4.34

Independent Samples t-test of the Subscales of Learning Strategies

<table>
<thead>
<tr>
<th>LSTRS</th>
<th>$T$</th>
<th>$df$</th>
<th>Sig. (2-tailed)</th>
<th>$MD$</th>
<th>$SED$</th>
</tr>
</thead>
<tbody>
<tr>
<td>REHLS</td>
<td>-.60</td>
<td>486</td>
<td>.05</td>
<td>-.28</td>
<td>.46</td>
</tr>
<tr>
<td>ELALS</td>
<td>-.88</td>
<td>486</td>
<td>.03</td>
<td>-.42</td>
<td>.48</td>
</tr>
<tr>
<td>ORGLS</td>
<td>-1.65</td>
<td>486</td>
<td>.09</td>
<td>-.72</td>
<td>.44</td>
</tr>
</tbody>
</table>

*Note. N = 488. df = degrees of freedom; MD = mean difference; SED = standard error of the difference; LSTRS = learning strategies score; REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy.*

As observed in Table 4.34, there were significant sex differences in rehearsal learning strategy ($t (486) = -.60, p < .05$) and elaboration learning strategy ($t (486) = -.88, p < .05$) respectively. However, there were no statistically significance sex differences observed in organization learning strategy ($t (486) = -1.65, p > .05$). This confirms the
results as presented in Table 4.32 that, girls had higher means than boys in learning strategies mean scores. Therefore, despite the fact that no significant sex differences were found in learning strategies use as seen in Table 4.34, some significant sex differences were found in the subscales of learning strategies and more specifically on rehearsal and elaboration learning strategies. Girls were found to endorse use of these learning strategies than boys.

These findings concur with those of Simsek and Balaban (2010) who reported that female participants were more effective in selection and use of appropriate learning strategies. Similarly, Anyachie and Anyodike (2012) reported that, even though the effect of sex was not significant, when participants were trained on strategy use, males in the experimental group significantly performed better than their female counterparts. However, they pointed out that, female participants in the control group performed better than their male counterparts from the pre-test to post test. This again implies that girls embraced use of learning strategies than boys. These findings are also aligned to those by Robertson (2012) who reported no significant sex differences in learning strategies use, but found some significant sex differences between males and females in relation to the subscales of learning strategies. More specifically, female participants endorsed use of organization learning strategies than their male counterparts.

Contrary to the findings of this study, Mutweleli (2014) reported significant sex difference in rehearsal and organization learning strategies. More boys than girls endorsed use of rehearsal and organization learning strategies. Inconsistent results were
also reported by Dinga (2011) who found no significant sex difference with regard to cognitive strategy use.

Further, the researcher got interested in finding out whether there were significant sex differences in the criterion variable (academic achievement) although it was not an objective of the study. A descriptive analysis of academic T-scores by sex was performed to find the mean and the standard deviation. The results are shown in Table 4.35.

Table 4.35

*Sex Differences in Academic Achievement*

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acad. Ach.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>245</td>
<td>50.30</td>
<td>10.14</td>
</tr>
<tr>
<td>Female</td>
<td>243</td>
<td>40.70</td>
<td>9.86</td>
</tr>
</tbody>
</table>

*Note. N = 488. M = mean; SD = standard deviation; Acad. ach. = academic achievement.*

As observed in Table 4.35, boys had a higher mean ($M = 50.30, SD = 10.14$) than girls ($M = 40.70, SD = 9.86$) in academic achievement. As seen in Table 4.27, more girls than boys endorsed a fixed academic mindset and this could have led to more boys performing better than girls since fixed academic mindset is associated with low academic achievement. In order to establish whether these mean differences were significant or not, an independent samples t-test of academic achievement was conducted. The results are shown in Table 4.36.
Table 4.3

*Independent Samples t-test of Sex Differences in Academic Achievement*

<table>
<thead>
<tr>
<th></th>
<th>( t )</th>
<th>( df )</th>
<th>( \text{Sig. (2-tailed)} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Achievement</td>
<td>.66</td>
<td>486</td>
<td>.50</td>
</tr>
</tbody>
</table>

*Note. \( N = 488 \).*

The results in Table 4.36 indicated that there were no significant sex differences in academic achievement \( t (486) = .66, p > .05 \). These findings were in line with those of Mutweleli (2014) who found no significant sex difference in academic achievement. These findings could imply that, the girl child is gradually picking due to the much attention that she has been given in Kenya. Therefore, given similar conditions, girls are likely to perform just like the boys.

### 4.3.4 Predictive Weight of Students’ Academic Mindsets and Learning Strategies on Academic Achievement

This sub-section presents the results of the fourth objective of the study which sought to determine the predictive weight of students’ academic mindsets and learning strategies on academic achievement. First, a descriptive analysis of students’ academic mindsets and learning strategies was performed. This was followed by a correlation matrix of students’ academic mindsets, learning strategies and academic achievement. Finally, appropriate inferential statistics to test the hypothesis were conducted.
a. **Descriptive Analysis of Students’ Academic Mindsets and Learning Strategies**

A descriptive analysis of these predictor variables was performed in order to obtain the range, mean, standard deviation, skewness and kurtosis of the variables. The results are presented in Table 4.37.

Table 4.37  
*Descriptive Analysis of Students’ Academic Mindsets Scores and Learning Strategies*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Sk</th>
<th>Kur</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAMS</td>
<td>488</td>
<td>20</td>
<td>23</td>
<td>43</td>
<td>34.06</td>
<td>3.55</td>
<td>-.11</td>
<td>.17</td>
</tr>
<tr>
<td>TLSTS</td>
<td>488</td>
<td>65</td>
<td>60</td>
<td>125</td>
<td>98.32</td>
<td>10.12</td>
<td>-.27</td>
<td>.11</td>
</tr>
</tbody>
</table>

*Note. N = 488. Min = minimum; Max = maximum; M = mean; SD = standard deviation; Sk = skewness; Kur = kurtosis; TAMS = total academic mindset score; TLSTS = total learning strategies score.*

As observed in Table 4.37, the range for the total academic mindset score was 20 while that of total learning strategies score was 65. The minimum score for the total academic mindset score and total learning strategies score was 23 and 60 respectively while the maximum score was 43 and 125 respectively. The mean score for the total academic mindset score was \( M = 34.06, \ SD = 3.55 \) while that of total learning strategies score was \( M = 98.32, \ SD = 10.32 \). The coefficient of skewness for total academic mindset score and total learning strategies score was -.11 and -.27 respectively. This negative skewness meant that the respondents had rated themselves highly in academic mindsets.
and learning strategies scores. The kurtosis for the total academic mindset score was .17 while that of total learning strategies score was .11, hence a leptokurtic distribution for both variables meaning that the scores were clustered around the mean.

Having presented the descriptive analysis of the two predictor variables, a bivariate correlation analysis using the Pearson product moment correlation coefficient was done. The results are presented in Table 4.38.

Table 4.38

*Correlation Matrix of Students’ Academic Mindsets, Learning Strategies and Academic Achievement*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FAM</td>
<td>_</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. MAM</td>
<td>-.62**</td>
<td>_</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. REHLS</td>
<td>.32**</td>
<td>.30**</td>
<td>_</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. ELALS</td>
<td>-.36**</td>
<td>.49**</td>
<td>.14**</td>
<td>_</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. ORGLS</td>
<td>.00</td>
<td>.04</td>
<td>.33**</td>
<td>.28**</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>6. AC.ACH</td>
<td>-.56**</td>
<td>.68**</td>
<td>.34**</td>
<td>.68**</td>
<td>.04</td>
<td>_</td>
</tr>
</tbody>
</table>

*Note. N = 488. FAM = fixed academic mindset; MAM = malleable academic mindset; REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy; AC.ACH = academic achievement.**. Correlation is significant at *P < .01* level (2-tailed).*

As observed in Table 4.38, positive and negative significant correlations were found among the study variables except between fixed academic mindset and organization
learning strategy where there was no correlation. It is important to note that when a student endorsed a fixed academic mindset, it was difficult for such a student to utilize learning strategies like organization learning strategy which requires more cognitive involvement by the learner. Moreover, a strong negative and significant correlation was found between fixed academic mindset and academic achievement ($r (486) = -0.56, p < .01$). This meant that, fixed academic mindset led to low academic achievement. However, a strong significant positive correlation was found between malleable academic mindset and academic achievement ($r (486) = 0.68, p < .01$). Therefore, malleable academic mindset led to high academic achievement.

There was a moderate significant positive correlation between rehearsal learning strategy and academic achievement ($r (486) = 0.34, p < .01$). This showed the importance of rehearsal among learners as it enhances retention of the learned material hence high academic achievement. There was a strong significant correlation between elaboration learning strategy and academic achievement ($r (486) = 0.68, p < .01$). This meant that, elaboration learning strategy was the most preferred learning strategy by majority of the learners. It involves mostly writing short notes and underlining or highlighting the most important areas to enhance understanding.

On the contrary a positive and non-significant correlation was found between organization learning strategy and academic achievement ($r (486) = 0.04, p > .05$). Organization learning strategy is a deeper learning strategy which involves making connections between the learned materials. Irrespective of its importance in learners, the
respondents did not seem to understand how to use it hence the low correlation with academic achievement. Therefore, there is need to train students on different learning strategies as this will enhance academic achievement.

b. Hypothesis Testing of the Predictive Weight of Students’ Academic Mindsets and Learning Strategies on Academic Achievement.

The fourth objective of this study sought to establish the predictive weight of students’ academic mindsets and learning strategies on academic achievement. Therefore, the null hypothesis was stated as follows:

\[ H_{04} : \text{There is no significant predictive weight of students’ academic mindsets and learning strategies on academic achievement.} \]

This hypothesis comprised the two predictor variables and the criterion variable. To make it more testable, the following supplementary null hypotheses were advanced:

\[ H_{04.1} : \text{There is no significant predictive weight of students’ academic mindsets on academic achievement.} \]

\[ H_{04.2} : \text{There is no significant predictive weight of learning strategies use on academic achievement.} \]
b.i. Testing the First Supplementary Null Hypothesis

$H_{04.1}$: There is no significant predictive weight of students’ academic mindsets on academic achievement.

To test this hypothesis, a multiple regression analysis of the individual subscales of students’ academic mindset was performed to establish the extent to which students’ academic mindsets predict academic achievement. The results are shown in Table 4.39.

Table 4.39

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adj. $R^2$</th>
<th>SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.50a</td>
<td>.25</td>
<td>.25</td>
<td>9.99</td>
</tr>
</tbody>
</table>

Note. $N = 488$. Adj.$R^2 = \text{adjusted } r^2$; SEE = standard error of the estimate

a. Predictors: (Constant), total mindset score.

Findings in Table 4.39 indicated that the adjusted $R^2$ value of academic mindsets was ($R^2 = .25$). This implied that students’ academic mindsets explained 25% of the variations in academic achievement. These findings prompted the researcher to perform a further analysis to establish whether students’ academic mindsets predicted academic achievement significantly or not. To achieve this, a simple linear regression was performed. The results are presented in Table 4.40.
Table 4.40

*Regression Analysis of Students’ Academic Mindsets on Academic Achievement*

<table>
<thead>
<tr>
<th>Model</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>119.55</td>
<td>1</td>
<td>119.55</td>
<td>1.19</td>
<td>.27b</td>
</tr>
<tr>
<td>Residual</td>
<td>48580.44</td>
<td>486</td>
<td>99.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48700.00</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 488. SS= sum of squares; df = degrees of freedom, MS = mean square; F = critical value of F.*

a. Dependent Variable: academic achievement

b. Predictors: (Constant), total academic mindset score

As observed in Table 4.40, students’ academic mindsets were not a significant predictor of academic achievement \(F(1,486) = 1.19, p > .05\). This was because, as presented in Table 4.38, fixed academic mindset had a negative relationship with academic achievement while malleable academic mindset had a positive relationship with academic achievement. Therefore, this inverse correlation could have affected the overall outcome of whether academic mindsets predicted academic achievement. Having obtained a non-significant relationship between students’ academic mindsets and academic achievement, the researcher conducted a further regression analysis to establish whether the individual subscales of students’ academic mindsets predicted academic achievement or not. The results are presented in Table 4.41.
Table 4.41

Regression Analysis of the Subscales of Students’ Academic Mindsets on Academic Achievement

<table>
<thead>
<tr>
<th>Model</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Adj. $R^2$</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>24278.93</td>
<td>2</td>
<td>12139.46</td>
<td>.49</td>
<td>241.08</td>
<td>.00</td>
</tr>
<tr>
<td>Residual</td>
<td>24421.06</td>
<td>485</td>
<td>50.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48700.00</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $N = 488$. SS = sum of the squares; df = degrees of freedom; MS = mean of the squares, Adj.R$^2$ = Adjusted R squared; F = critical value of F.

a. Dependent Variable: academic achievement
b. Predictors: (Constant), malleable academic mindset, fixed academic mindset.

The results in Table 4.41 revealed that, the individual subscales of students’ academic mindsets were significant predictors of academic achievement ($F(2, 485) = 241.08, p < .05$). The coefficient of determination was $R^2 = .49$. This meant that, the subscales of academic mindsets explained 49% of the variations in academic achievement. This was a very interesting finding owing to the fact earlier results had indicated students’ academic mindsets did not significantly predict academic achievement (see Table 4.40). Again, as presented in Table 4.14, there was a negative but a significant correlation between fixed academic mindset and academic achievement while there was a positive significant correlation between malleable academic mindset and academic achievement. This therefore explains why, when the two subscales were combined, there was no significant relationship with academic achievement but when correlated singly, there was a significant correlation with academic achievement. Based on these findings, a
further analysis to determine the predictive weight of the subscales of academic mindsets on academic achievement was done. The results are presented in Table 4.42.

Table 4.42

*Predictive Weight of Students’ Academic Mindsets on Academic Achievement*

<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>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>30.10</td>
<td>3.17</td>
<td>9.48</td>
<td>.00</td>
</tr>
<tr>
<td>1</td>
<td>FAM</td>
<td>-.51</td>
<td>.09</td>
<td>-.22</td>
</tr>
<tr>
<td></td>
<td>MAM</td>
<td>1.44</td>
<td>.10</td>
<td>.54</td>
</tr>
</tbody>
</table>

*Note.* $N = 488$; FAM = fixed academic mindset; MAM = malleable academic mindset.
a. Dependent Variable: academic achievement

The findings in Table 4.42 revealed that, fixed academic mindset had a negative significant predictive weight on academic achievement ($\beta = -.22$, $p < .05$). Moreover, malleable academic mindset had a positive significant predictive weight on academic achievement ($\beta = .54$, $p < .05$). This meant that, fixed academic mindset contributed negatively to academic achievement while malleable academic mindset had the highest and positive contribution on academic achievement. Based on the results in Table 4.42, a prediction model was obtained as presented in equation 1.

$$\hat{y} = 30.10 - .22 \text{ (FAM)} + .54 \text{ (MAM)} (R^2 = .49) \; p < .05$$ (1)

Where: $\hat{y} =$ predicted academic achievement score; FAM = fixed academic mindset; MAM = malleable academic mindset.
Therefore, based on these results, the first supplementary null hypothesis was rejected. It was, therefore, concluded that students’ academic mindsets had a significant predictive weight on academic achievement. Despite the negative influence of fixed academic mindset and the positive influence of malleable academic mindset on academic achievement, students’ academic mindsets predicted academic achievement.

b. **ii. Testing the Second Supplementary Null Hypothesis**

H\textsubscript{04-2}: There is no significant predictive weight of learning strategies on academic achievement.

To test this hypothesis, a multiple regression analysis was performed in order to establish whether learning strategies predicted academic achievement or not. The results are presented in Table 4.43.

Table 4.43

*Model Summary of Learning Strategies and Academic Achievement*

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adj. $R^2$</th>
<th>SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.20$^a$</td>
<td>.04</td>
<td>.04</td>
<td>9.79</td>
</tr>
</tbody>
</table>

*Note. N = 488. Adj. $R^2$ = adjusted $R^2$; SEE = standard error of the estimate*

a. Predictors: (Constant), total learning strategies score.

As observed in Table 4.43, the adjusted $R^2$ was .04. This implied that 4% of the variations in academic achievement were explained by learning strategies use. Further,
a multiple regression analysis to establish whether learning strategies predicted academic achievement or not was done. The results are presented in Table 4.44.

Table 4.44

Regression Analysis of Learning Strategies on Academic Achievement

<table>
<thead>
<tr>
<th>Model</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2114.35</td>
<td>1</td>
<td>2114.35</td>
<td>22.05</td>
<td>.00b</td>
</tr>
<tr>
<td>Residual</td>
<td>46585.64</td>
<td>486</td>
<td>95.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48700.00</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 488. SS = sum squares; df = degrees of freedom; MS = mean square; F = critical value a. Dependent Variable: academic achievement
b. Predictors: (Constant), total learning strategies score

The results in Table 4.44 revealed that, learning strategies were a positive significant predictor of academic achievement ($F(1,486) = 22.05, p < .05$). In order to determine the predictive weight of learning strategies on academic achievement, a regression analysis was performed. The results are presented in Table 4.45.

Table 4.45

Predictive Weight of Learning Strategies on Academic Achievement

<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>$B$</td>
<td>Std. Error</td>
<td>$\beta$</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>29.76</td>
<td>4.33</td>
<td>6.87</td>
<td>.00</td>
</tr>
<tr>
<td>1</td>
<td>TLSTS</td>
<td>.206</td>
<td>.044</td>
<td>.20</td>
</tr>
</tbody>
</table>

Note. N = 488. TLSTS = total learning strategies score.

a. Dependent Variable: academic achievement.
The results in Table 4.45 indicated that, learning strategies had a positive significant predictive weight on academic achievement ($\beta = .20, p < .05$). This confirms earlier findings in as seen in Table 4.44. Thus, a significant predictive model was obtained as presented in equation 2.

$$\hat{y} = 29.76 + .20 \times \text{TLSTS} \quad (R^2 = .04) \quad p < .05$$  

(2)

Where;

$$\hat{y} = \text{Predicted academic achievement score}$$

$$\text{TLSTS} = \text{Total learning strategies score}.$$ 

Therefore, based on the second supplementary null hypothesis, there was a significant predictive weight of learning strategies on academic achievement. Consequently, the second supplementary null hypothesis was rejected. It was therefore concluded that, learning strategies had a significant predictive weight academic achievement. The researcher then focused on finding out whether the two predictor variables had a predictive weight on academic achievement. To achieve this, a multiple regression analysis was performed. The results are presented in Table 4.46.

Table 4.46

*Model Summary of Predictive Weight of Students’ Academic Mindsets and Learning Strategies on Academic Achievement*

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$RS$</th>
<th>$\text{Adj. } R^2$</th>
<th>$\text{SEE}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.210$^a$</td>
<td>.04</td>
<td>.04</td>
<td>9.79</td>
</tr>
</tbody>
</table>

*Note. N = 488. RS = $r$ square; Adj. $R^2 = $ adjusted $R^2$; SEE = standard error of the estimate.*

* a. Predictors: (Constant), total learning strategies score, total mindset score.*
The results in Table 4.46 showed that, the adjusted $R^2$ of students’ academic mindsets and learning strategies was .04. These findings implied that, 4% of the variation in academic achievement was due to students’ academic mindsets and learning strategies.

The researcher performed a further regression analysis to establish whether the two predictor variables combined predicted academic achievement. The results are presented in Table 4.47.

Table 4.47

Regression Analysis of Predictive Weight of Students’ Academic Mindsets and Learning Strategies on Academic Achievement

<table>
<thead>
<tr>
<th>Model</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2156.06</td>
<td>2</td>
<td>1078.03</td>
<td>11.23</td>
<td>.00a</td>
</tr>
<tr>
<td>Residual</td>
<td>46543.93</td>
<td>485</td>
<td>95.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48700.00</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $N = 488$. SS = sum square; df = degrees of freedom; MS = mean square; F = critical value of F.

a. Dependent Variable: academic achievement
   b. Predictors: (Constant), total learning strategies score, total mindset score

The findings in Table 4.47 revealed that, both students’ academic mindsets and learning strategies were significant predictors of academic achievement ($F (2, 485) = 11.23, p < .05$). The researcher further sought to establish the predictive weight of students’ academic mindsets and learning strategies. A further regression analysis was performed and the results are presented in Table 4.48.
Table 4.48

Predictive Weight of Students’ Academic Mindsets and Learning Strategies on Academic Achievement

<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>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>27.22</td>
<td>5.79</td>
<td>4.69</td>
<td>.00</td>
</tr>
<tr>
<td>1</td>
<td>TMS</td>
<td>.08</td>
<td>.12</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>TLSTS</td>
<td>.20</td>
<td>.04</td>
<td>.20</td>
</tr>
</tbody>
</table>

Note. $N = 488$. TMS = total mindset score; TLSTS = total learning strategies score

The results in Table 4.48 revealed that, students’ academic mindsets had very low and non-significant predictive weight on academic achievement ($\beta = .02$, $p > .05$). This again confirms earlier findings (see Table 4.43) that, when combined, fixed and malleable academic mindset did not have a significant predictive weight on academic achievement but when used singly, each had a significant predictive weight on academic achievement (see Table 4.44). Moreover, learning strategies had a significant predictive weight on academic achievement ($\beta = .20$, $p < .05$).

These results prompted the researcher to perform a multiple regression analysis to establish the predictive weight of the individual subscales of students’ academic mindsets and learning strategies on academic achievement. The results are presented in Table 4.49.
Table 4.49

Model Summary of the Subscales of Students’ Academic Mindsets and Learning Strategies

<table>
<thead>
<tr>
<th>Model</th>
<th>( R )</th>
<th>( RS )</th>
<th>( Adj. R^2 )</th>
<th>( SEE )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.81(^{a})</td>
<td>.66</td>
<td>.65</td>
<td>5.85</td>
</tr>
</tbody>
</table>

*Note. \( N = 488 \). RS = \( r \) square; \( Adj. R^2 \) = adjusted \( R^2 \); SEE = standard error of the estimate.

\(^{a}\) Predictors: (Constant), organization learning strategy, fixed academic mindset, rehearsal learning strategy, elaboration learning strategy, malleable academic mindset.

As shown in Table 4.49, the adjusted \( R^2 \) of all the subscales of academic mindsets and learning strategies was .65. This implied that, 65% of the variations in academic achievement were due to the subscales of students’ academic mindsets and learning strategies. It is worth noting that, each of the subscales of academic mindsets and learning strategies had a major impact on academic achievement than when combined.

To establish the predictive weight of the individual subscales of students’ academic mindsets and learning strategies on academic achievement, a regression analysis was performed. The results are presented in Table 4.50.
Table 4.50

Regression Analysis of Predictive Weight of the Subscales of Students’ Academic Mindsets and Learning Strategies on Academic Achievement

<table>
<thead>
<tr>
<th>Model</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>32156.02</td>
<td>5</td>
<td>6431.20</td>
<td>187.37</td>
<td>.00p</td>
</tr>
<tr>
<td>Residual</td>
<td>16543.97</td>
<td>482</td>
<td>34.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48700.00</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 488. SS = sum square df = degrees of freedom; MS = mean of the squares; F = critical value of F.

a. Dependent Variable: academic achievement
b. Predictors: (Constant), organization learning strategy; fixed academic mindset; rehearsal learning strategy; elaboration learning strategy, malleable academic mindset.

The results in Table 4.50 showed that all the subscales of students’ academic mindsets and learning strategies combined significantly predicted academic achievement ($F (5, 482) = 187.37, p < .05$). The researcher then focused on finding out whether the individual subscales had a significant predictive weight on academic achievement or not. The results are presented in Table 4.51.
Table 4.51

*Predictive Weight of the Subscales of Students’ Academic Mindsets and Learning Strategies on Academic Achievement*

<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>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>16.71</td>
<td>3.52</td>
<td>4.74</td>
<td>.00</td>
</tr>
<tr>
<td>FAM</td>
<td>-.34</td>
<td>.08</td>
<td>-.14</td>
<td>-4.31</td>
</tr>
<tr>
<td>MAM</td>
<td>.88</td>
<td>.09</td>
<td>.33</td>
<td>9.16</td>
</tr>
<tr>
<td>REHLS</td>
<td>.19</td>
<td>.06</td>
<td>.10</td>
<td>3.26</td>
</tr>
<tr>
<td>ELALS</td>
<td>.87</td>
<td>.06</td>
<td>.46</td>
<td>14.32</td>
</tr>
<tr>
<td>ORGLS</td>
<td>-.13</td>
<td>.06</td>
<td>-.06</td>
<td>-2.14</td>
</tr>
</tbody>
</table>

*Note. N = 488. FAM = fixed academic mindset; MAM = malleable academic mindset; REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy.*

a. Dependent Variable: academic achievement

The findings in Table 4.51 revealed that, elaboration learning strategy had the highest positive significant predictive weight on academic achievement ($\beta = .46, p < .05$). This was followed by malleable academic mindset ($\beta = .33, p < .05$) and rehearsal learning strategies ($\beta = .10, p < .05$) respectively. Fixed academic mindset had a negative significant predictive weight on academic achievement ($\beta = -.14, p < .05$) while organization learning strategy had the lowest negative significant predictive weight on academic achievement ($\beta = -.06, p < .05$). Therefore, based on these findings a significant predictive model was found as presented in equation 3.
\[ \hat{y} = 16.71 - .14 \text{ (FAM)} + .33 \text{ (MAM)} + .10 \text{ (REHLS)} + .46 \text{ (ELALS)} - .06 \text{ (ORGLS)} \left( R^2 = .65 \right) p < .05 \] (3)

Where;

\( \hat{y} = \) predicted academic achievement score; FAM = fixed academic mindset; MAM = malleable academic mindset; REHLS = rehearsal learning strategy; ELALS = elaboration learning strategy; ORGLS = organization learning strategy.

Based on the predictive equation, the fourth null hypothesis was rejected. It was therefore concluded that, students’ academic mindsets and learning strategies had a significant predictive weight on academic achievement. Hence the importance of training learners on the right mindset and learning strategies use.

b. Discussion of the Results

The findings of this study showed that, both students’ academic mindsets and learning strategies were significant predictors of academic achievement (see Table 4.47). However, when tested singly, students’ academic mindsets did not significantly predict academic achievement while learning strategies were significant predictors of academic achievement. The beta coefficients of the two predictor variables compared revealed that, learning strategies had a higher predictive weight on academic achievement while students’ academic mindsets had a low and non-significant predictive weight on academic achievement (see Table 4.51). Among subscales of academic mindsets and learning strategies, elaboration learning strategy had the highest positive significant
predictive weight on academic achievement followed by malleable academic mindset and rehearsal learning strategy. Fixed academic mindset and organization learning strategy had the lowest negative significant predictive weight on academic achievement (see Table 4.51).

The findings of this study corroborate those by Duperyat and Marine (2005) among adult learners at a university in France. A multiple hierarchical regression analyses revealed a non-significant predictive weight of academic mindsets on academic achievement and a significant positive predictive weight of cognitive engagement (rehearsal, elaboration, and organization learning strategies) on academic achievement. When the subscales of academic mindsets were tested singly, fixed academic mindset had a negative significant predictive weight on academic achievement while malleable academic mindset had a positive significant predictive weight on academic achievement.

Similar results to the current study were found by Stump et al. (2014) among engineering students’ intelligence beliefs and their perceived use of learning strategies and course grades at Arizona State University. The study reported a non-significant predictive weight of academic mindsets on course grades and a positive significant predictive weight of learning strategies and academic achievement. When the subscales of academic mindsets were tested singly, malleable academic mindset scores had a positive significant predictive weight on academic achievement while fixed academic mindset had a negative significant predictive weight on academic achievement.
In line with the current study findings on the predictive weight of academic mindsets and learning strategies on academic achievement, were results by Dahl et al. (2005) among Norwegian university students. The study reported that students’ academic mindsets positively and significantly predicted the learning strategies they used which consequently led to high academic achievement. Dweck and Leggett (1988) argue that academic mindsets influence the way students approach learning and achievement situations, the kind of goals they adopt, their effort and persistence and their achievement.

However, inconsistent results were reported by Rudig (2014) among university students at the University of Nevada, Las Vegas. The study found that, students’ academic mindsets and learning strategies did not predict academic achievement. In his study, those respondents with high ability still performed well; therefore, this could not be attributed to their academic mindsets or learning strategies use.

4.4 Exploratory Analysis

Having found significant sex differences in students’ academic mindsets and learning strategies, the researcher sought to explore the interaction effect of school type and age with students’ academic mindsets and learning strategies in predicting academic achievement. Although this was not part of the objectives of the study, this exploration could help control for the effects of school type and age given the study variables. It would also provide further insights into the findings of this study.
4.4.1 Interaction Effect of School Type, Students’ Academic Mindsets and Learning Strategies in Predicting Academic Achievement

To establish the interaction effect of students’ academic mindsets, learning strategies and academic achievement given the type of school, an analysis of variance was performed (ANOVA) and the results are presented in Table 4.52.

Table 4.52

ANOVA for Mean Differences in Academic Mindsets, Learning Strategies and Academic Achievement Given the School Type

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>83.21</td>
<td>4</td>
<td>20.80</td>
<td>1.65</td>
<td>.16</td>
</tr>
<tr>
<td>Within Groups</td>
<td>6079.81</td>
<td>483</td>
<td>12.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6163.03</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TLSTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>1581.45</td>
<td>4</td>
<td>395.36</td>
<td>3.95</td>
<td>.00</td>
</tr>
<tr>
<td>Within Groups</td>
<td>48339.03</td>
<td>483</td>
<td>100.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49920.49</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acad. Ach.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>12951.97</td>
<td>4</td>
<td>3237.99</td>
<td>43.74</td>
<td>.00</td>
</tr>
<tr>
<td>Within Groups</td>
<td>35748.02</td>
<td>483</td>
<td>74.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48700.00</td>
<td>487</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 488. SS = sum of squares; df = degrees of freedom; MS = Mean of the square; F = critical value of F; TSM = total mindset score; TLSTS = total learning strategies score; Acad. Ach. = academic achievement*

The results in Table 4.52 showed that, given the school type, there were significant mean differences between students’ academic mindsets and learning strategies in predicting academic achievement ($F (4, 483) = 43.74, p < .05$).
Based on these findings a post-hoc analysis using Tukey’s HSD (Honestly Significant Difference) to establish which school category introduced the mean differences in academic mindsets and learning strategies was done. The results are presented in Table 4.53.

Table 4.53

Post-Hoc Analysis of School Type and Mean Differences in Students’ Academic Mindsets, Learning Strategies and Academic Achievement

<table>
<thead>
<tr>
<th>(I) School Type</th>
<th>(J) School Type</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB</td>
<td>Boys’ Day</td>
<td>15.46*</td>
<td>1.49</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Girls’ Boarding</td>
<td>4.48*</td>
<td>1.22</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Girls’ Day</td>
<td>11.30*</td>
<td>1.51</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Co.educ. Day</td>
<td>11.25*</td>
<td>1.06</td>
<td>.00</td>
</tr>
<tr>
<td>BD</td>
<td>Boys’ Boarding</td>
<td>-15.46*</td>
<td>1.49</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Girls’ Boarding</td>
<td>-10.97*</td>
<td>1.49</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Girls’ Day</td>
<td>-4.16</td>
<td>1.73</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>Co.educ. Day</td>
<td>-4.20*</td>
<td>1.36</td>
<td>.01</td>
</tr>
<tr>
<td>GB</td>
<td>Boys’ Boarding</td>
<td>-4.48*</td>
<td>1.22</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Boys’ Day</td>
<td>10.97*</td>
<td>1.49</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Girls’ Day</td>
<td>6.81*</td>
<td>1.51</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Co.educ. Day</td>
<td>6.76*</td>
<td>1.06</td>
<td>.00</td>
</tr>
<tr>
<td>GD</td>
<td>Boys’ Boarding</td>
<td>-11.30*</td>
<td>1.51</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Boys’ Day</td>
<td>4.16</td>
<td>1.73</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>Girls’ Boarding</td>
<td>-6.81*</td>
<td>1.51</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Co.educ. Day</td>
<td>-.04</td>
<td>1.38</td>
<td>1.00</td>
</tr>
<tr>
<td>Co-ed. Day</td>
<td>Boys’ Boarding</td>
<td>-11.25*</td>
<td>1.06</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Boys’ Day</td>
<td>4.20*</td>
<td>1.36</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Girls’ Boarding</td>
<td>-6.76*</td>
<td>1.06</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Girls’ Day</td>
<td>.04</td>
<td>1.38</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. N = 488. BB = boys’ boarding; BD = boys’ day; GB = girls’ boarding; GD = girls’ day; Co-ed. Day = co-educational day
* The mean difference is significant at the 0.05 level.

Dependent Variable: Academic Achievement
The results in Table 4.53 revealed that, there were significant mean differences in academic mindsets and learning strategies in predicting academic achievement among participants in the majority of the school categories. The highest mean difference was found between participants drawn from boys’ boarding and boys’ day. This was followed by participants from girls’ day, co-educational day and the lowest was girls’ boarding. This implied that participants from boys’ boarding performed better than those from boys’ day, girls’ day and co-educational day while the mean difference between boys’ boarding and girls’ boarding was very minimal. Moreover, girls’ boarding performed better than boys’ day, girls’ day and co-educational day. Therefore, participants drawn from boarding schools were more likely to perform better than their counterparts in day schools. This may mean that, the day scholars are exposed to other external factors that may influence their academic mindsets and learning strategies. For instance, in Nairobi today and with advancement in technology, these students could gravitate towards the use of computers, mobile phones and the internet for the wrong purposes at the cost of their education. In boarding schools, control measures are put in place to ensure that, these devices are used for the intended purpose. There are specific times allocated for students to be in the computer labs and in most cases they are monitored by their teachers and computer technicians.

### 4.4.2 Age Category, Students’ Academic Mindsets and Learning Strategies

The researcher explored further on the mean differences in students’ academic mindsets and learning strategies given the age of the participants. The participants’ age was categorized into three groups of between 15 to 17, 18 to 20 and 21 to 23 years. To
achieve this, a post hoc analysis (Tukey’s HSD) was performed on the two predictor variables separately. The results on the mean differences on the subscales of students’ academic mindsets given the age of the participants are presented in Table 4.54.

Table 4.54

*Multiple Comparisons on Age and Mean Differences of Subscales of Students’ Academic Mindsets*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>(I) age</th>
<th>(J) age</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAM</td>
<td>15-17</td>
<td>18-20</td>
<td>.65</td>
<td>.42</td>
<td>.27</td>
</tr>
<tr>
<td></td>
<td>21-23</td>
<td>18-20</td>
<td>1.20</td>
<td>1.01</td>
<td>.46</td>
</tr>
<tr>
<td></td>
<td>18-20</td>
<td>15-17</td>
<td>-.65</td>
<td>.42</td>
<td>.27</td>
</tr>
<tr>
<td></td>
<td>21-23</td>
<td>21-23</td>
<td>.54</td>
<td>1.04</td>
<td>.85</td>
</tr>
<tr>
<td></td>
<td>21-23</td>
<td>15-17</td>
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<tr>
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<td>-.77</td>
<td>.37</td>
<td>.09</td>
</tr>
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<td>.02</td>
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<td>18-20</td>
<td>21-23</td>
<td>-.80</td>
<td>.91</td>
<td>.65</td>
</tr>
</tbody>
</table>

*Note.* *N* = 488. FAM = fixed academic mindset; MAM = malleable academic mindset

As observed in Table 4.54, there were no significant mean differences between the two subscales of academic mindsets given the age categories of the participants. The results on mean differences in the subscales of learning strategies are shown in Table 4.55.
Table 4.55

Multiple Comparisons on Age and Mean Differences of Subscales of Learning Strategies

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>(I) age</th>
<th>(J) age</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
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<td>REHLS</td>
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<td>-.51</td>
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<tr>
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<td></td>
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<td>.96</td>
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<tr>
<td>ORGLS</td>
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<td>18-20</td>
<td>-.59</td>
<td>1.18</td>
<td>.87</td>
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</tbody>
</table>

*Note. N = 488. REHLS = rehearsal learning strategy; ELALS = elaboration learning; ORGLS = organization learning strategy.*

The results in Table 4.55 revealed no significant mean differences in the subscales of academic mindsets and learning strategies given the age categories of the participants. These results concur with Mwangi (2015) who found no significant age differences in
form three students’ academic resilience. Academic resilience is a characteristic of a malleable academic mindset. Owing to the fact that, the participants of this study were all in form three, there was likelihood of not finding significant mean differences in the subscales of students’ academic mindsets and learning strategies given the age of the participants. According to Blackwell et at. (2007), learning changes the brain by forming new connections and different age groups are likely to have different academic mindsets and learning strategies.

4.5 Qualitative Data Analysis

The purpose of qualitative analysis in the current context was to explore in detail the earlier obtained quantitative results (Creswell, 2018). This was meant specifically to shed more light into the quantitative findings by getting the specific personal perspectives of the participants in reference to students’ academic mindsets and learning strategies. Priori codes developed from theory and quantitative findings informed the choice of qualitative questions. Dweck and Leggett (1988) posit that, individual differences in beliefs and values may lead to individual differences in behavior. For instance, when malleable mindset students encounter obstacles in their studies, they are likely to sustain engagement in tasks and also exhibit constructive self-instruction and self-monitoring, positive prognosis and positive affect and effective problem solving strategies. On the other hand, when fixed mindset students encounter obstacles, they may exhibit negative self-cognitions, negative affect and impaired performance.
According to Bandura (1989), expectations, beliefs, self-perceptions, goals and intentions give shape and direction to behavior. In other words, what people think, believe, and feel, affect how they behave (Bandura, 1986). Therefore, students’ academic mindset beliefs can influence the learning strategies they adopt. The significant predictive results of students’ academic mindsets and learning strategies on academic achievement yielded further questions that required interrogation through interviews.

a. Interview Data Analysis

From the data corpus, a data set of 40 participants (20 boys and 20 girls) was purposely selected to participate in the interviews. Thematic analysis was used to analyze interview data. Thematic analysis involves identifying, analyzing and reporting patterns (themes) within data (Clarke & Braun, 2013). This process was guided by the steps provided by (Creswell, 2018) which entailed; organizing and preparing data for analysis, reading through all data, coding the data, generating themes and descriptions, interrelating themes and descriptions, and interpreting meaning of themes.

b. Data Coding

According to Saldana (2015), “A code in qualitative inquiry is most often a word or short phrase that symbolically assigns summative, salient, essence-capturing, and/ or evocative attribute for a portion of language-based or visual data” (p.3). Codes can be developed a priori from existing theory or concepts (theory driven), they can emerge from raw data (data driven) or they can develop from project research goals and questions (Clarke & Braun, 2013). Moreover, according to Creswell (2018), “… the
Coding process involves taking text data or pictures gathered during data collection, segmenting sentences (or paragraphs) or images into categories with a term, often a term based in the actual language of the participant” (p.198). More specifically, the coding process entails two levels: open coding and axial coding. In the open coding, the researcher explored the ideas and meaning that were contained in the raw data. This was followed by axial coding which enabled the researcher to identify connections that may exist within codes (Saldana, 2015). Basically, the whole process of coding followed the guidelines provided by Tesch (1990) as cited in Creswell (2018).

c. Code Book Development

A code book is a set of codes, definitions and examples used as a guide to help analyze interview data. According to Macqueen et al. (1998) as cited in Clarke and Braun (2013), the structure of a code book should consist of six components including the code name/label, brief definition, full definition, inclusion criteria, exclusion criteria, and examples of quotes illustrating the code (see Appendix F).

The code book was developed through the iterative process of revisiting the theories and examining raw data. Through this, the researcher was able to gain clearer insights about the interview data. The main purpose of the interview data was to provide an in-depth understanding of the study variables by adding a human view of the participants in reference to students’ academic mindsets and learning strategies. According to social cognitive theory of motivation and personality, the fixed mindset students’ will view themselves as having inadequate ability and therefore not able to perform well. In addition, such students view failure as an indicator of their low ability. On the other hand, malleable mindset students view themselves as being able to develop their ability
through effort. To them, failure is not an indicative of low ability but an opportunity to propel them to work harder. From the quantitative results, participants categorized as having extremely high scores in fixed and malleable academic mindsets were interrogated further and followed through their learning strategies use and academic achievement. Their pseudonyms were used.

i. Fixed Academic Mindset

According to Dweck (1999), the fixed academic mindset students are unable to see how their efforts will result in their success and progress. Consequently, these fixed academic mindset individuals react to failure or challenges by exhibiting negative cognitions, negative affect and impaired performance. They focus on their ability and its inadequacy (Dweck & Leggett, 1988). Moreover, Bandura (1989), stated that, what people think, believe and feel affect how they behave. As a result, the participants categorized as high in fixed academic mindset did not show any improvement in their academic work. In fact, some of them indicated that they had given up and were not interested in learning since their effort was not rewarding. Based on the quantitative findings, four participants (2 females and 2 males) high in fixed academic mindset were identified. The intention was to get their personal views in order to get an in depth understanding of the quantitative results.

Nelly. The first fixed academic mindset participant was categorical in stating that form three work was challenging. Upon being asked why it was challenging, she said, “even if I read a book, I don’t pass.” She went further to say that, “even the teachers and my
parents have given up on me. They don’t guide me on what to do.” When asked about her performance in form three, she said that she had always obtained between E and D-. When asked why there was no improvement Nelly said, “I revise but I don’t pass.” She went on to say, “Some subjects like Mathematics, Chemistry, Biology and Kiswahili are difficult to understand.” Nelly was asked about what she was doing about those particular subjects and she said, “I gave up on them.” She was then asked about her reasons for working hard in class, she said, “In class I work very hard to make sure that I understand the content.” Although this response was not in line with her previous responses, Nelly seemed not to understand what was happening.

When asked about whether she felt in charge of her work, Nelly said, “No” and went on to say, “Nobody tells me to read and therefore I also don’t bother.” When asked whether she had any program that she followed when reading, Nelly said, “No.” Nelly’s reason for not having any program was, “I have no program because I don’t like reading and even if I read, I don’t pass therefore there is no need.” Nelly indicated that she had a personal timetable in form one and two but in form three she did not have any. Nelly was asked about how she organizes herself when she has to read a lot of content within a short time, she said, “I read quickly.” Upon being asked whether apart from the class notes she read anything else, Nelly said, “even the class notes are boring to read. Sometimes I read revision books and some other times I don’t revise at all.”

When asked about whether she had changed her reading method from the previous classes, she said, “Yes” and went on to say, “In form one and two, I was reading class
notes and revision books but in form three, the work is too much I don’t know where to start. Sometimes I read revision books.” When asked about what she does when a method of reading is not working, she said, “I leave it.” Asked whether she required teachers to guide her in form three, she said, “I can’t study alone and I don’t know how to answer some questions.” It is important to note that, although Nelly was a fixed mindset student, from the quantitative findings, she used elaboration learning strategy more than rehearsal and organization learning strategies. The implication was that, Nelly did not have any defined learning strategy that she preferred. This seemed to corroborate the quantitative results (Creswell, 2018).

**Mumbi.** The second fixed academic mindset respondent. According to Mumbi, form three work was challenging. When asked why, she said, “Sometimes in an exam, you cannot remember.” In response to the question about whether she was guided in choosing the optional subjects in form three, she said, “My teachers and parents assisted me so much, but even if I read I don’t understand.” When asked about her performance in form three, she had this to say, “In form one and two, I got a mean grade of D throughout and in form three I get E.” She went on to say, “Some subjects like Chemistry, Mathematics, Biology and the set books are hard. Actually I have given up on them because however much I try to read them, I don’t pass.” Mumbi was asked about how she feels whenever she does not perform as per expectation, she said, “I feel bad about myself but there is nothing I can do.” When asked about her reason for working hard, she said, “I work very hard to make sure I compete with my classmates although I am always among the last in our class.”
Mumbi was then asked, “As a form three, do you feel in charge of your work?” She responded by saying, “I still need help because I don’t know what happens to me.” When asked about whether she had any program that she follows, she said, “I have a personal timetable which I follow sometimes.” Asked about what she does when she has to read a lot of material within a short time, she said, “I just revise using past papers because many times I have tried to read but it has not worked.” In response to what else she reads apart from the classroom notes, she said, “Mainly I read revision books because questions may come from there.”

When asked whether she had changed her reading method from the previous classes, she said, “In form one and two I read my class notes but in form three, I read revision books.” When asked what she does whenever a method of reading is not working, she responded by saying, “I leave it or I ask friends.” Asked whether she still needed teachers to guide her on how to read in form three she said, “Yes”, she went on to say that “I need teachers to guide me because I don’t know how to read well so they will show me the way to go.” Again, Mumbi was a fixed academic mindset respondent and did not have a defined learning strategy in the way she went about reading. Interestingly, from the quantitative findings, she used more of organization learning strategy than rehearsal and elaboration learning strategy.

Omondi. The third fixed academic mindset respondent, when asked about form three work, he said, “Form three work is quite challenging.” “Some subjects like Chemistry, Mathematics, Physics and Kiswahili are hard, I don’t even read them.” When he was
asked about whether the teachers and parents assisted him in selecting the subjects to take in form three, he said, “My teachers do not bother with me but my parents have been of help.” When asked about the consistency of his grades, he said, “I have always obtained a D- because I don’t read at all and even if I read I do not pass and it is like I have given up.” He went on to say, “My parents have been disappointed with me several times but my efforts to perform have not worked.” When asked about the reason for working hard in form three, Omondi said, “In class I work very hard to compete with my classmates and make sure I understand the content. But, I am used to being among the last in our class.”

Omondi was then asked whether he felt in charge of his work, he said, “No”, he went on to say, “I have always been failing.” Asked whether he had any program that guided him, he affirmed by saying, “Yes, I have a personal timetable which I don’t usually follow.” In response to the question on how he was reading especially when required to read a lot of content within a short period, Omondi said, “When I have to read a lot of material, I don’t want to stress my head, I only read what I can understand or even sometimes I ignore that I am supposed to read.” When asked whether, apart from class notes he read any other material, he said, “I also read revision books.” Upon being asked whether he had changed how he was reading in the previous classes, he said, “In form one and two I was not reading but in form three I try writing short notes as I read.” When he was asked what happens when a method of reading is not working, he said, “I change to another method or I stop reading that subject.” When Omondi was asked whether he requires teachers to guide him on how to study, he said, “No.” He then went
on to say, “I know how to read.” Although Omondi was a fixed mindset respondent, from the quantitative results, he appeared to use more elaboration learning strategy than rehearsal and organization learning strategies.

**Ahmed.** This was the fourth fixed academic mindset respondent. He indicated that, form three work was challenging. When asked why, he said, “The exams are tough.” Upon being asked whether there are subjects he considers more difficult than others, he said, “Yes.” He went on to say, “Some subjects like Kiswahili, Mathematics and Chemistry are hard.” Asked about what he was doing about such subjects he said, “Even if I work hard on these subjects, I don’t pass and therefore, I have given up on them.” He was then asked whether he was guided on the optional subjects he was taking in form three and he said, “My teachers and parents guided me on the subjects to select.” He continued to say, “Actually I prefer reading the subjects I like Biology, History and Business, other than reading what I cannot understand.” When asked about his performance in form three, he said, “I am not steady, my grade has been a D or a D+ and my parents complain a lot.”

Ahmed was then asked about how he felt when he did not perform as expected, he said, “In fact I get very discouraged because my parents expect a lot from me.” When asked about his intention of working hard, he said, “In class, I work very hard to make sure I understand the content but I don’t improve.” Although Ahmed had indicated earlier on that he had given up on some subjects, he seemed to understand the importance of working hard in form three. Ahmed was then asked whether he feels in charge of his
work and he said, “No.” When asked why, he responded by saying, “I need help because I don’t know what to do, it is like I am confused.” Then he was asked whether he had a program that he followed, he said, “No”. Asked why, he said, “This is because I read the subjects I like and I have no personal timetable to guide me. Even if I make a timetable I will not follow it.”

When asked, “What do you do when you have to read a lot of content within a short time?” He responded by saying that, “Even if I try to read much, I will not pass. I just read revision books or I don’t even read at all.” When asked whether he had changed his method of reading in the previous classes, he said, “Yes.” When asked why, he said, “In form one and two I was working hard but in form three I am not working hard.” Then he continued to say, “This is because of my friends and I also play a lot.” Ahmed was then asked what he does when a certain method of reading is not working, he said, “Sometimes I get bored and leave it or I ask my friends on how to go about it.” Upon being asked whether he needed teachers to guide him on how to read in form three, he said, “No.” Asked why, he said, “I am okay”. Ahmed was a fixed academic mindset participant. From the quantitative results he scored high on rehearsal learning strategy than elaboration and organization learning strategies.

From the conversations with participants categorized as having high fixed academic mindset, it emerged clearly that, most of these participants did not have definite learning strategies. They read without any organized program. The issue of the importance of teachers and parents guiding the learners also emerged. Those who were
guided seemed to persist longer than those who were not. This corroborates with Bandura (1986), on the role of the environment and person interaction that, human expectations, beliefs, emotional bents and cognitive competences are developed and modified by social influences that convey information and activate emotional reactions through modeling, instruction and social persuasion. Moreover, these participants seemed not ready to face the challenges in form three and as a result, they gave up. This concurs with the quantitative findings that showed a negative correlation between fixed academic mindset and academic achievement (see Table 4.14).

**ii. Malleable Academic Mindset**

According to the social cognitive theory of motivation and personality, the malleable academic mindset individuals see intelligence as a fluctuating thing that is improved through one’s effort. In fact, “these students act as if there are no obstacles that they cannot overcome and are therefore, more successful, resilient and use failure and mistakes as feedback in order to improve their performance” (McWilliams, 2014, p. 31). Based on the quantitative results, four participants (2 females, 2 males) categorized as high in malleable academic mindset were followed to solicit additional information about their personal perspectives and experiences in form three.

**Maria.** The first malleable academic mindset participant appeared confident and relaxed. When asked, “Generally how do you consider the content covered in form three?” She responded by saying, “Form three work is quite challenging but I have never felt like it is too much because I work very hard and I understand.” When asked
whether the teachers and parents guided her on the optional subjects she was taking in form three, she said, “To be honest, I chose the subjects by myself. I live in a children’s home and since I know what I want in my life, I knew the subjects to select.” In response to the statement, “I have always obtained the same grade since I joined form three,” she said, “No,” then went on to say, “In form three I have never dropped. My mean grade has been a B+ and above. I work very hard and I know I will do well in form four.” When asked whether there are subjects she considers more difficult than others, she said, “I find Chemistry a bit tough but since I practice a lot I have no problem with it. I work hard in all the subjects and I always do well.”

Maria was then asked about how she feels when she does not perform as per expectations and she said, “I get disappointed with myself but this makes me work even harder.” She continued to say, “I need this education to be independent in my life.” When asked about her intention of working hard, Maria said, “In class I work very hard to make sure that I understand the content. This is because if I understand I will definitely perform well.” She was then asked whether she felt in charge of her work and she said, “Yes” and then continued to say, “It is my hard work that will enable me perform in this class. I need to put a lot of effort.” Asked whether she had any program that she followed and she said, “Yes,” and continued, “I have a personal timetable because it enables me to know which subjects I have revised for and which ones I have not. It also helps me in time management.”
In response to the question, “What do you do when you have to read a lot of material within a short time?” She said, “I already know most of the topics. I just read what is not clear.” When asked what else she reads apart from the class notes, she said, “Apart from the class notes, I also read the course books and as I read I still make short notes and also highlight the most important areas. I also read revision books for practice.” Asked whether she had changed the way she was reading in the previous classes, she said, “No,” and continued, “I have always read my notes and text books. I make short notes and read them severally.” Asked about what she does when a certain method is not working, she said, “I have different approaches and therefore I change it immediately.” When asked whether she needed teachers to guide her on how to study in form three, she responded by saying, “No” asked why, she said, “I already know how to read and get the most important points from what I am reading. I also understand as I read. The teachers have done their part.” Although Maria utilized all the three learning strategies, she mostly preferred elaboration and rehearsal learning strategies than organization learning strategy.

Fridah. This was the second malleable mindset participant. This girl appeared composed and sure of what she was saying. When asked about her general view of the content taught in form three, she responded by saying, “Although form three work is challenging, I work very hard. I read over and over again and I have always done well.” When asked whether she was guided on the optional subjects she was taking in form three, her response was, “My teachers and parents have been very supportive and guided me well.” She was then asked whether there are subjects she considers more
difficult than others and she said, “Although some subjects like Mathematics, Chemistry and French are difficult, I have done a lot of revision. I also discuss with my friends and consult with teachers and I am improving.”

When asked about her performance in form three, Fridah responded by saying, “In form three, my mean grade has been a B and above. I have been working very hard especially in my weak subjects and I have improved greatly.” She was then asked about how she feels when she does not perform as per expectations and she said, “I feel disappointed, but hard work is everything. In this world, a good grade is everything.” When asked about her intention of working hard in form three, she said, “In form three I work very hard to make sure I understand the content and this has helped me maintain my good performance.” In response to the question, “As a form three, do you feel in charge of your work?” She said, “Yes,” and continued, “As a student, I am required to do more and I am well organized.”

Fridah was then asked if she had a program that she followed, she said, “Yes,” and then went on to say, “I have a personal timetable that guides me on what to read and when.” When asked about what she does when she has to read a lot of material within a short time, she said, “When the work is a lot and there is no time, I use group discussion and also read my summary notes in the different subjects.” When asked whether she reads any other material apart from the class notes, she says, “The teachers’ notes are not enough. I also read text books in the relevant areas and revision books.” She was then asked whether she had changed her method of reading, she said, “Yes,” and continued,
“In form one and two, I was only reading class notes. In form three, I read class notes, text books and revision books. As I read, I make short notes, highlight the most important points and read over the short notes again.” In response to the question on what she does when she realizes that a certain method of reading is not working, she said, “I consult those doing well in the subject on how to go about it.” Asked whether as a form three she still requires teachers to guide her on how to study, Fridah responded, “Yes,” and continued, “I still need to be guided in order to do better.” Fridah, utilized all the learning strategies but she used more of elaboration and rehearsal learning strategies than organization learning strategy.

Kariuki. The third malleable academic mindset respondent appeared composed and confident. In response to the question about his general view about the content taught in form three, he said, “Form three work is challenging but I have no choice, I have to work very hard.” When asked whether he was assisted in selecting the optional subjects in form three, Kariuki said, “No,” and continued, “I know what I want and therefore I chose the subjects myself.” When Kariuki was asked about his general performance in form three, he responded by saying, “Even if sometimes I drop, I don’t give up, my grade has been a B and above. I only need to work and be more focused.” When asked whether he had a program that he followed, he said, “I made a personal timetable which I follow strictly so that I don’t overdo some subjects.”

Kariuki was then asked how he felt when he did not perform as per expectations, and he responded by saying, “If I don’t perform well in a subject, this encourages me to work
even harder, I don’t give up on a subject.” When asked about his intention for working hard, Kariuki said, “I work very hard to make sure that I understand the content.” He continued to say, “Actually what matters is my overall grade. If I work to compete with my class mates I will be frustrated.” Then he was asked whether he felt in charge of his work and he said, “Yes,” and continued, “it is my life and I have to be responsible.” When asked whether he had a program that he followed, he said, “I have a personal timetable that guides me on what to read so that I don’t ignore some subjects.”

When asked about what he does when he has to read a lot of content within a short time, he said, “Since I have been reading, I don’t need to be afraid. I only go through my short notes paying more attention to what is not clear.” Asked about whether he reads any other material apart from the class notes, he said, “I also read textbooks and revision books to add more information to what the teacher gave in class.” Then he was asked whether he changed his reading method from the previous classes, he said, “Yes,” then he said, “In form one and two, I had no timetable. I was just reading my class notes. In form three I have a timetable, I make short notes as I read, and I also underline the most important points.” Kariuki was then asked what he does when a certain method of reading is not working, he had this to say, “I change the method to another one and I also consult my friends on how best to do it.” In response to whether he needed teachers to guide him on how to study, he said, “I need teachers to advice me occasionally.” From the quantitative results, Kariuki used all the learning strategies but he endorsed elaboration learning strategy more than rehearsal and organization learning strategies.
Alex. This was the fourth malleable academic mindset respondent. Alex appeared composed and confident of what he was saying. When asked about his perception of the content in form three, he said, “Form three is quite challenging especially with the introduction of set books but I have really worked hard to understand them.” When asked whether he was assisted in selecting the optional subjects he was taking in form three, he said, “I know what I want and therefore I chose the optional subjects to take myself.” In response to the statement, “I have always obtained the same grade since I joined form three.” He said, “I have been improving. My grade has been B+ and above because I revise a lot.” When asked whether there are some subjects he considers more difficult than others, he said, “Yes,” and continued to say, “I find the set books both in English and Kiswahili difficult, but I work very hard on them. I also discuss with my friends and through that I have been able to do well.” When asked about how he felt if he did not perform as per expectations, he said, “I get so stressed but I always encourage myself since this helps me to work even harder.” He continued, “I try to assess myself and come up with better ways of approaching that subject and I always improve.”

Alex was then asked his intention of working hard in class, he said, “In class I work very hard to ensure that I understand the content.” When asked whether he felt in charge of his work, he had this to say, “In form three, it is expected that you take responsibility over your own life. I am able to organize myself.” In response to the question whether he had a program that he followed, he said, “I have a personal timetable that guides me on what to read so that I avoid over reading some subjects and ignoring others.” When
asked about how he manages himself especially when he has to read a lot of material within a short period, he said, “I don’t panic since I have been reading. I read my short notes and pay more attention on my weak areas.”

Asked whether he had changed the way he was reading in the previous classes, he said, “In form one and two, I was only reading my class notes. In form three, I read my class notes, text books and as I read I make short notes and also highlight the most important areas.” When asked about what he does when a reading method is not working, he said, “I change it or join group discussions.” Then he was asked whether he still needed teachers to guide him on how to study in form three, he said, “No.” Asked why, he said, “they have already taught me and therefore, I only need to practice.” Alex utilized all the learning strategies but he used elaboration learning strategy more than rehearsal and organization learning strategies.

From the interview conversations with the eight respondents, there was a relationship between their responses and the scores they had obtained on the two scales of students’ academic mindsets and learning strategies. Interestingly their responses also mirrored their academic achievement results. Those respondents who endorsed a fixed academic mindset did not appear to have well defined learning strategies and even when they used any learning strategy, they did not seem to be sure of what they were doing. They also made comments like, “I have given up”, “Even if I read I don’t pass”, and “I have always obtained a grade E”. These statements pointed to low academic achievement. On the other hand, those respondents who endorsed a malleable academic mindset had well
defined learning strategies and seemed confident of what they were saying. Their statements like, “I work very hard”, “I don’t give up”, “I know what I am supposed to do”, portrayed a picture of a student who is likely to perform very well.

The session that follows presents the qualitative summary of a data set of 40 interviewed participants in relation to students’ academic mindsets, learning strategies and academic achievement. The summary of students’ academic mindsets from the qualitative analysis was as presented in Table 4.56.

Table 4.56

Summary of the Qualitative Analyses of Subsets of Students’ Academic Mindsets

<table>
<thead>
<tr>
<th>Students’ Academic Mindset</th>
<th>Girls</th>
<th>Boys</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Academic Mindset</td>
<td>9 (22.50)</td>
<td>7 (17.50)</td>
<td>16 (40.00)</td>
</tr>
<tr>
<td>Malleable Academic Mindset</td>
<td>11 (27.50)</td>
<td>13 (32.50)</td>
<td>24 (60.00)</td>
</tr>
<tr>
<td>Total</td>
<td>20 (50.00)</td>
<td>20 (50.00)</td>
<td>40 (100.00)</td>
</tr>
</tbody>
</table>

*Note. N = 40. ( ) = percent*

As presented in Table 4.56, majority (60%) of the interview respondents were in the malleable academic mindset subset while, (40%) were in the fixed academic mindset subset. These findings support the quantitative results obtained earlier on (see Table 4.7). In relation to sex differences, more girls (22.50%) endorsed a fixed academic mindset than boys (17.50%). On the other hand, more boys (32.50%) endorsed a malleable academic mindset than girls (27.50%). These findings are in line with the
quantitative results obtained earlier (see Table 4.29). The qualitative data on respondents’ learning strategies use are presented in Table 4.57.

<table>
<thead>
<tr>
<th>Learning Strategies</th>
<th>Girls</th>
<th>Boys</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehearsal Learning Strategy</td>
<td>7 (17.50)</td>
<td>6 (15.00)</td>
<td>13 (32.50)</td>
</tr>
<tr>
<td>Elaboration Learning Strategy</td>
<td>11 (27.50)</td>
<td>10 (25.00)</td>
<td>21 (52.50)</td>
</tr>
<tr>
<td>Organization Learning Strategy</td>
<td>2 (5.00)</td>
<td>4 (10.00)</td>
<td>6 (15.00)</td>
</tr>
<tr>
<td>Total</td>
<td>20 (50.00)</td>
<td>20 (50.00)</td>
<td>40 (100.00)</td>
</tr>
</tbody>
</table>

*Note. N = 40. ( ) = percent*

As presented in Table 4.57, majority of the respondents endorsed elaboration learning strategy (52.50%) while (32.50%) endorsed rehearsal learning strategy. The lowest percentage was observed in organization learning (15.00%). In relation to sex, more girls than boys endorsed rehearsal (17.50%) and elaboration (27.50) learning strategies respectively. This was a reflection of the quantitative findings (see Table 4.32).

It also corroborates the results by previous studies (Simsek & Balaban, 2010; Rudig, 2014) who found girls to be more effective in learning strategies use. Interestingly more boys (10.00%) than girls (5.00) endorsed organization learning strategy. This is in line with Mutweleli (2014) who reported boys as having endorsed more of organization learning strategy than rehearsal and elaboration learning strategies.
The main purpose of this study was to examine the relationship between academic mindsets and learning strategies in predicting academic achievement. Triangulation was done in data analysis where the quantitative findings were explored further using qualitative analysis techniques. It was therefore necessary to obtain the academic T scores of the interviewees. This was done in order to establish if a relationship existed between the subsets of the study variables and academic achievement. To achieve this, the average academic achievement T-scores of the interviewees was computed for each of the subsets of students’ academic mindsets and learning strategies. The results are presented in Table 4.58.

Table 4.58

*Academic Achievement across the Qualitative Subsets of Academic Mindsets and Learning Strategies*

<table>
<thead>
<tr>
<th>Subsets of Study Variables</th>
<th>Academic Achievement T-score Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Academic Mindset</td>
<td>39.05</td>
</tr>
<tr>
<td>Malleable Academic Mindset</td>
<td>54.70</td>
</tr>
<tr>
<td>Rehearsal Learning Strategy</td>
<td>41.25</td>
</tr>
<tr>
<td>Elaboration Learning strategy</td>
<td>50.09</td>
</tr>
<tr>
<td>Organization Learning Strategy</td>
<td>40.00</td>
</tr>
</tbody>
</table>

*Note. N = 40.*

As presented in Table 4.58, the highest academic achievement average T-score was observed in malleable academic mindset ($M = 54.70$). This was followed by elaboration learning strategy ($M = 50.09$) and rehearsal learning strategy ($M = 41.25$) respectively.
The lowest academic achievement average T-score was observed in organization learning strategy ($M = 40.00$) and fixed academic mindset ($M = 39.05$). These findings are a mirror of the quantitative results (see Table 4.42). For instance, those respondents who endorsed a malleable academic mindset had the highest academic average T score while fixed academic mindset had the lowest academic average T score (see Table 4.38). Moreover, those who endorsed elaboration learning strategy had the highest academic average T score followed by rehearsal and organization learning strategies, although all the three subsets of learning strategies were significant predictors of academic achievement (see Table 4.51).

From the conversation with the interviewees, some prominent themes emerged in relation to how students’ academic mindsets and learning strategies predict academic achievement. According to Clarke and Braun (2013), a theme captures important information about the data in relation to research questions, and represents some level of patterned response within the data set. The themes therefore provided further insight into the quantitative results.

**Prominent Themes from Interview Analysis**

a. **Response to Challenges**

The first theme that was dominant from the participants’ responses gave a clear distinction between those respondents who had highly endorsed a malleable academic mindset and those who had highly endorsed a fixed academic mindset. Their ability to persevere in the face of academic failure or challenges was revealed in their responses.
Those who endorsed a malleable academic mindset made comments like, “I work very hard,” “When I don’t do well in a subject, I don’t give up,” and “Failing gives me an opportunity to work even harder.” When these students, encounter academic challenges or failure, their confidence in their ability to learn and perform well is not shaken (Dweck, 1999). To such participants, failure was taken as a normal occurrence in the academic pursuit and therefore, energized them to work hard. The malleable academic mindset participants exerted more effort because they believed in its usefulness.

On the other hand, those who endorsed a fixed academic mindset made comments like, “Even I if read, I don’t pass,” “The work in form three is too much, I don’t know how to go about it,” “I have been reading but I don’t improve,” and “I have given up, I don’t read at all.” According to Blackwell et al. (2007), when fixed academic mindset students encounter academic challenge or failure, they give up or withdraw effort. To the fixed academic mindset participants, exerting more effort did not make any sense. As far they were concerned, they could not do well.

b. The Influence of Academic Mindsets on Learning Strategy use

The second theme that emerged from the interviews was that, the kind of academic mindset held by the respondent influenced the type of learning strategy the respondent preferred most. For instance, those respondents who endorsed a malleable academic mindset seemed aware of the learning strategies to use. They made comments like, “When reading, I write short notes,” “I read over and over again to make sure that I understand,” and “As I read, I underline the most important points.” This was in
agreement with Duperyat and Marine (2005), that, malleable academic mindset students devote effort to the use learning strategies like rehearsal, elaboration and organization learning strategies to learn course material. From the results of this study, the academic achievement average T score of malleable academic mindset participants was found to be high (see Table 4.58).

On the contrary, those respondents who endorsed a fixed academic mindset were not sure of the learning strategies to use. Consequently, there was a disconnect between how they studied and the learning strategies they used. They made comments like, “When the work is too much, I read quickly,” “I don’t know how to study,” “I don’t read at all,” “I read revision books because exam may come from there.” Such statements contradicted the earlier quantitative results as these respondents had indicated that they were using learning strategies while in real sense, they did not know what they were supposed to do. From the results of this study, the academic achievement average T score of fixed academic mindset participants was found to be low (see Table 4.58).

c. Reasons for Working Hard in Class

This was the third theme that emerged from the interviews. Those respondents who endorsed a malleable academic mindset indicated that, their intention of working hard in class was to make sure that they understood the content. Through this, they were able to plan and work without anxiety. They were focused towards improving their competence and acquiring new knowledge. This was necessary for them to develop the
necessary skills required in different areas. On the other hand, the fixed academic mindset respondents indicated that their intention of working hard in class was to make sure that they compete with their classmates. This was in line with Duperyat and Marine (2005), who argued that, “fixed academic mindset individuals are focused on obtaining good performance in order to document themselves or others, the adequacy of their ability” (p. 42). Therefore, the main objective of the fixed mindset participants was not to understand the content but to prove before the others how bright they were.

d. The Role of Teachers, Parents, and Peers in Improving Academic Achievement

This was the fourth theme that emerged from the interview conversations. Although initially it was not considered as one of the objectives of the study, it became clear from the participants’ responses. Those respondents who endorsed a malleable academic mindset indicated that, their teachers, parents and peers were detrimental in guiding them on how to study, the subjects to take in form three, and how to plan. They made statements like, “In form three, I have no choice I have to work. My parents are very keen to know what I am doing,” “My teachers have been there for us. They guide us very well.” Others had this to say, “Whenever I don’t understand what I am reading, I consult my friends,” or “I join group discussions.”

On the other hand, the fixed mindset students indicated that, in most cases, teachers, parents, and peers affected them negatively. They made comments like, “My teachers ignore me in class”, “Teachers don’t bother about me,” “My parents have given up on
me,” “I don’t read at all because of my friends,” “Sometimes I feel bad when my friends are discussing about me,” “nobody wants to read with me in class.” From these statements, it was clear that, students’ academic mindsets were also affected by external factors like the teachers, parents and peers which may either promote or inhibit academic achievement. According to the social cognitive theory of learning, human expectations, beliefs, cognitive competencies are developed and modified by social influences that convey information through modeling, instruction and social persuasion (Bandura, 1986).

In conclusion, the findings from the qualitative data analysis were in agreement with the quantitative results obtained earlier. The intention of the qualitative findings was to provide more depth, more insight into the quantitative results. For instance, when the fixed mindset participants were followed through interviews, it emerged that, majority of them were not aware what learning strategies were, hence they did not have any preferred learning strategy. Consequently, their academic achievement results were low. On the other hand, those participants who endorsed a malleable academic mindset indicated that, they used more of elaboration and rehearsal learning strategies. Consequently, their academic achievement results were high. This corroborated the quantitative results obtained earlier (Creswell, 2018).
CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusions and recommendations of the study. Firstly, the summary of the main findings is presented. Secondly, the conclusions based on the findings by objective and lastly, the recommendations of the study in relation to policy and further research.

5.2 Summary

The purpose of this study was to examine how students’ academic mindsets and learning strategies predict academic achievement among public secondary school students in Nairobi County. The study also investigated if there were sex differences in students’ academic mindsets and learning strategies. The exploratory part of the study investigated the interaction effects between the study variables, school type and age. Furthermore, a qualitative analysis was performed with an intention of providing more light to the quantitative results.

The first objective of the study sought to establish the relationship between students’ academic mindsets and academic achievement. Initial results revealed a non-significant relationship between students’ academic mindsets and academic achievement. A further analysis on the relationship between the specific subscales of students’ academic mindsets and academic achievement was done. Results revealed a significant negative
relationship between fixed academic mindset and academic achievement. On the other hand, a significant positive relationship between malleable academic mindset and academic achievement was found.

The second objective sought to establish the relationship between learning strategies and academic achievement. The findings revealed a significant relationship between learning strategies and academic achievement. A further analysis on the relationship between the specific subscales of learning strategies revealed that, elaboration learning strategy had the highest significant positive relationship with academic achievement followed by rehearsal learning strategy. On the other hand, a non-significant positive relationship between organization learning strategy and academic achievement was found.

The third objective investigated if there were sex differences in students’ academic mindsets and learning strategies. This was made possible by first establishing if there were sex differences in students’ academic mindsets and then learning strategies. Significant sex differences were found between students’ academic mindsets. A further analysis revealed a statistically significant sex difference between boys and girls in fixed academic mindset. More girls than boys were found to endorse a fixed academic mindset. However, there were no significant sex differences between boys and girls on malleable academic mindset. On the sex differences between learning strategies, there were no significant sex differences found although, some significant sex differences
were found in the subscales of learning strategies. More girls than boys were found to endorse use of elaboration and rehearsal learning strategies.

The fourth objective of the study examined the predictive weight of students’ academic mindsets and learning strategies on academic achievement. It was found that, students’ academic mindsets and learning strategies had a significant predictive weight on academic achievement. More specifically, learning strategies had a higher predictive weight on academic achievement than students’ academic mindsets.

The exploratory analysis of the study revealed significant mean differences between students’ academic mindsets and learning strategies in predicting academic achievement given the school type. More boarding schools than co-educational day schools were found to perform better. In addition, there were no significant mean differences in students’ academic mindsets and learning strategies given the age of the participants.

The qualitative findings were in agreement with the quantitative results obtained earlier on regarding the relationship between students’ academic mindsets and learning strategies in predicting academic achievement. The malleable academic mindset respondents performed higher than the fixed academic mindset respondents. Moreover, majority of the interviewed respondents endorsed elaboration and rehearsal learning strategy than organization learning strategy. The highest academic achievement average T score was observed in malleable academic mindset and elaboration learning strategy. This was followed by rehearsal and organization learning strategy while the lowest
academic achievement average T score was observed in fixed academic mindset. However, an important finding emerged that, although the fixed academic mindset participants had indicated that they used the different learning strategies, from the conversations, it emerged that they had no knowledge of learning strategies.

5.3 Conclusions

The first objective of the study sought to establish whether there was a relationship between academic mindsets and academic achievement. The results did not support the hypothesized relationship between academic mindset and academic achievement. A non-significant relationship was found between academic mindsets and academic achievement (Table 4.11). When the subscales of academic mindsets were tested singly, a significant positive relationship was found between malleable academic mindset and academic achievement. On the other hand, a significant negative relationship was found between fixed academic mindset and academic achievement (see Table 4.12). This implied that students’ academic mindsets play a pivotal role in learner motivation and achievement and more so, malleable academic mindset. When learners understand how the brain works, they will embrace effort and hence higher academic achievement.

The second objective was to establish the relationship between learning strategies and academic achievement. A significant positive relationship was found (see Table 19). When the subsets of learning strategies were tested singly, the highest significant relationship was found between elaboration learning strategy, followed by rehearsal learning strategy while the lowest was found between organization learning strategy and
academic achievement (see Table 4.20). In conclusion, it is worth noting that, teaching is not just about content delivery but it also entails teaching learners on learning strategy use. When learners are aware of different learning strategies, they enjoy learning and they are also able to apply appropriate learning strategies. For instance, learners did not utilize organization learning strategy which is necessary for deep understanding and integration of information. This implied that, despite its importance, learners did not actually understand what it entails, hence the need for training on learning strategy use in the classroom.

The third objective sought to establish sex differences in students’ academic mindsets and learning strategies. There were significant sex differences in students’ academic mindsets. More specifically, there were significant sex differences in fixed academic mindset with more girls than boys endorsing a fixed academic mindset. On the other hand, there were no significant sex differences in malleable academic mindsets (see Table 4.33). Although girls had a higher mean than boys in malleable academic mindsets, these mean differences were not statistically significant. Furthermore, there were no statistically significant sex differences in learning strategies. However, statistically significant sex differences were observed in the specific subscales of learning strategies. Significant sex differences were observed in rehearsal and elaboration learning strategy but such differences were not observed in organization learning strategy. In conclusion, both girls and boys need to be sensitized on malleable academic mindset and learning strategies. This may lead to high academic gains.
The fourth objective was to establish the predictive weight of students’ academic mindsets and learning strategies on academic achievement. Both students’ academic mindsets and learning strategies had significant predictive weight on academic achievement (see Table 4.47). However, learning strategies were found to have a higher significant predictive weight on academic achievement while students’ academic mindsets had low non-significant predictive weight on academic achievement. This confirms the earlier findings on the relationship between academic mindsets and academic achievement (see Table 11). This non-significant predictive weight of academic mindsets could have been brought about by fixed academic mindsets which affected academic achievement negatively.

When all the subscales of students’ academic mindsets and learning strategies were tested, it was found that, each had a significant predictive weight on academic achievement. Malleable academic mindset, elaboration learning strategy and rehearsal learning strategy had a positive significant predictive weight on academic achievement while organization learning strategy and fixed academic mindset had a negative significant weight on academic achievement (see Table 4.54). Therefore, the significant predictive weight of both academic mindsets and learning strategies on academic achievement implies their importance in the teaching learning process. When learners understand how their academic mindsets affects how they study, this will enable them adopt a malleable academic mindset which will consequently lead to effective use of learning strategies.
On the exploratory analysis, significant mean differences were found between students’ academic mindsets and learning strategies in predicting academic achievement given the school type. Both boys’ boarding and girls’ boarding were found to perform better than day and co-educational day schools. This led to the conclusion that, there were other factors outside the school that negatively influenced students’ academic mindsets and learning strategies hence low academic achievement.

Based on the qualitative data analysis, the following conclusions were made: Firstly, the teachers, parents and peers play a very important role in enhancing students’ academic mindsets and learning strategies. Secondly, learners need knowledge of academic mindsets and learning strategies. Through this knowledge, they will be able to understand different academic mindsets and how they affect learning.

5.4 Recommendations

From the study findings, the following recommendations were made regarding policy and further research:

5.4.1 Policy Recommendations

i. The first objective of the study sought to examine the relationship between academic mindsets and academic achievement. Initial findings revealed a non-significant relationship between academic mindsets and academic achievement. When the specific subscales of academic mindsets were tested singly, there was a significant negative relationship between fixed academic mindset and academic achievement. Moreover, there was a significant
positive relationship between malleable academic mindset and academic achievement. Therefore, it is important that, all stakeholders be involved in inculcating a growth or a malleable academic mindset of secondary school students. This could be done by incorporating messages that enhance use of academic mindsets and learning strategies as they teach in order to nurture their development.

ii. The second objective of the study was to find out if there was a relationship between learning strategies and academic achievement. The findings revealed a significant positive relationship between learning strategies and academic achievement. Therefore, it was recommended that the government should initiate interventions may be through training programs to enhance learning strategies among secondary school students.

iii. The third objective investigated sex differences in students’ academic mindsets and learning strategies. Results showed significant sex differences in students’ academic mindsets with girls obtaining higher scores in academic mindsets than boys, although it was found that, more girls than boys endorsed fixed academic mindset. In addition, there were no significant sex differences in learning strategy use although further research revealed that girls were better than boys in learning strategy use. Therefore, it was recommended that parents and teachers provide a conducive environment to nurture the development of academic mindsets and learning strategies among boys and girls. This could be done by encouraging them to apply the
use of malleable academic mindset and learning strategies to enhance their academic achievement.

iv. The fourth objective of the study examined the predictive weight of academic mindsets and learning strategies on academic achievement. A significant predictive weight of both academic mindsets and learning strategies was found. More specifically all the subscales of academic mindsets and learning strategies had a significant predictive weight on academic achievement. This could help the Kenya Institute of Curriculum Development (KICD) and teachers in developing and implementing a curriculum that takes into account these variables. Consequently, this knowledge will be impacted on students hence high academic achievement.

v. Although not part of the objectives of the study, the interrelationship among study variables given the school type and age were explored. The findings revealed significant mean differences between students’ academic mindsets and learning strategies. Participants drawn from boarding schools performed better than day schools. Therefore, the government through the Ministry of Education should address the concerns of school type (Boarding, day and co-educational day) by providing equal and favorable learning conditions for the students.

### 5.4.2 Recommendations for Further Research

The following suggestions were considered necessary for further research.
i. Students’ academic mindsets and learning strategies were found to have a significant predictive weight on academic achievement. This study adopted an explanatory sequential mixed methods design which involved a quantitative phase followed by a qualitative phase. This design lacks a unified process of data analysis that integrates both quantitative and qualitative data. Therefore, further research could use a longitudinal research design which requires following up participants over a certain period without having to use different forms of data analysis procedures.

ii. An explanatory sequential mixed method design was used in this study. For the quantitative data, predictive correlational research design which describes the degree to which variables are related was used. This design does not explain the cause effect relationship among variables. Therefore, further research could use an experimental research design which explains cause effect relationship among variables. For instance, learners in the experimental group will be trained on how the brain works and different learning strategies. This will enable the researcher establish if there are significant differences between those learners in the experimental group and those in the control group.

iii. This study was based on one cohort of students, that is, form three students in public secondary schools. Results from one cohort could not be generalized to other cohorts. Further research could be conducted using different cohorts in primary, colleges and even university students to find out the relationship
between students’ academic mindsets and learning strategies in predicting academic achievement.

iv. This study investigated the predictive weight of students’ academic mindsets and learning strategies on academic achievement in general. It did not establish the academic mindsets and learning strategies in specific subject areas. Therefore, further research on specific subjects like mathematics, chemistry, Kiswahili, and others could provide additional information on students’ academic mindsets and learning strategies in predicting academic achievement.

v. This study was carried out in Nairobi County. The results cannot be generalized to other counties with confidence. Therefore, further research is necessary in other counties to find out the predictive weight of students’ academic mindsets and learning strategies on academic achievement.
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Appendices

Appendix A

Letter to Students Seeking Consent

Josephine Mutua
Kenyatta University,
Department of Educational Psychology,
P.O Box 43844,
Nairobi.

Dear Student,

I am a student at Kenyatta University in the Department of Educational psychology. I am undertaking research on student’s academic mindsets and learning strategies used by learners and how they determine their academic achievement.

You will be required to answer questions about yourself. This should take between 20 to 30 minutes. Your participation in this study is voluntary and you will not suffer any dire consequences for non-participation.

High level of confidentiality will be observed in the whole process and your personal details will not be shared with anyone. The findings of this research will help improve the learner’s intelligence beliefs, study skills and eventually this will help improve their academic achievement.

Please sign in the space provided below and detach this part of the page and hand it in.

I________________________ have understood the nature of this study and agree to participate.

Looking forward to your acceptance and to working with you.

Yours faithfully,

Josephine Mutua.
Appendix B

Questionnaire for Students

Part I: Background Information

Please fill in the blank spaces and put a tick (√) where appropriate.

1. Code no. ______________________________________________________

2. Gender: Male ( )               Female ( )

3. Age in years __________________________________________________

4. Name of school________________________________________________

5. School type
   Boys’ boarding ( )               Boys’ day ( )
   Girls’ boarding ( )               Girls’ day ( )
   Co-educational day/Mixed day ( )

Part II: Academic Mindset Questionnaire

The following questions ask about your ideas about intelligence. There are no right or wrong answers, just answer as accurately as possible. Using the scale below, kindly indicate the extent to which you agree or disagree with the given statements. Put a tick (√) against the statement that corresponds to your opinion in the space next to each statement. The responses range from, 1 = Strongly Agree, 2 = Agree, 3 = Mostly Agree, 4 = Mostly Disagree, 5 = Disagree and, 6 = Strongly Disagree.
<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>ANSWERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have a certain amount of intelligence, and there is nothing much I can do to change it.</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>My intelligence is something about me that I cannot change very much.</td>
<td></td>
</tr>
<tr>
<td>No matter who I am, I can significantly change my intelligence level.</td>
<td></td>
</tr>
<tr>
<td>To be honest, I cannot really change how intelligent I am.</td>
<td></td>
</tr>
<tr>
<td>I can always change how intelligent I am.</td>
<td></td>
</tr>
<tr>
<td>I can learn new things, but I cannot really change my intelligence.</td>
<td></td>
</tr>
<tr>
<td>No matter how much intelligence I have, I can always change it quite a bit.</td>
<td></td>
</tr>
</tbody>
</table>
### PART III: Motivational and Learning Strategies Questionnaire (MSLQ)

The following questions ask about your learning strategies. There are no right or wrong answers just answer as accurately as possible. Answer the questions about how you study as accurately as possible. The responses will be; 5 = *Very true of me*, 4 = *True of me*, 3 = *Not sure*, 2 = *Untrue of me*, 1 = *Very untrue of me*. Read the statement carefully and put a tick (√) against the statement that describes how you study.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>ANSWERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATEMENT</strong></td>
<td><strong>ANSWERS</strong></td>
</tr>
<tr>
<td><strong>REHEARSAL LEARNING STRATEGY</strong></td>
<td><strong>Very true of me</strong></td>
</tr>
<tr>
<td>1</td>
<td>When reading, I practice saying what I have read many times</td>
</tr>
<tr>
<td>2</td>
<td>I usually read the notes given in class several times</td>
</tr>
<tr>
<td>3</td>
<td>As I read my notes, I underline the most important points and then read through them again</td>
</tr>
<tr>
<td>4</td>
<td>When studying, I make a summary of the notes and then read the summarized notes many times</td>
</tr>
<tr>
<td>8</td>
<td>I can change even my basic intelligence level considerably.</td>
</tr>
<tr>
<td>STATEMENT</td>
<td>ANSWERS</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>ELABORATION LEARNING STRATEGY</strong></td>
<td>Very true of me</td>
</tr>
<tr>
<td>5 As I read, I memorize the key words to remind me of important concepts</td>
<td></td>
</tr>
<tr>
<td>6 When reading, I make a list of important terms in a subject and memorize them</td>
<td></td>
</tr>
<tr>
<td>7 As I read, I go through the content several times first in detail and then more generally</td>
<td></td>
</tr>
<tr>
<td>8 When I understand what I am reading, I usually write extra notes on the text I am reading</td>
<td></td>
</tr>
<tr>
<td><strong>ELABORATION LEARNING STRATEGY</strong></td>
<td></td>
</tr>
<tr>
<td>9 When studying, I read the notes given by teachers and those from group discussions and then come up with my own study notes</td>
<td></td>
</tr>
<tr>
<td>10 As I read, I usually link ideas from one subject to another whenever possible</td>
<td></td>
</tr>
<tr>
<td>11 When reading, I try to link the information that I am reading to what I already know</td>
<td></td>
</tr>
<tr>
<td>12 When studying, I always write short notes of the main points from what I read and what is given by teachers</td>
<td></td>
</tr>
<tr>
<td>13 I try to apply ideas from what I read in other class activities such class lessons and discussions</td>
<td></td>
</tr>
<tr>
<td>14 Before I read, I summarize the tasks to be done</td>
<td></td>
</tr>
<tr>
<td>STATEMENT</td>
<td>ANSWERS</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>ELABORATION</strong></td>
<td><strong>VERY TRUE OF ME</strong></td>
</tr>
<tr>
<td>15 When reading, I underline the most important points and then read again paying more attention to the underlined areas</td>
<td></td>
</tr>
<tr>
<td>16 When studying, I read both the textbook and my class notes picking the key points and writing them down</td>
<td></td>
</tr>
<tr>
<td>17 During revision, I read my notes and try to remember the key areas. After sometime, I re-read the notes to see what I can remember and what I have to read again</td>
<td></td>
</tr>
<tr>
<td><strong>ORGANIZATION</strong></td>
<td><strong>LEARNING STRATEGY</strong></td>
</tr>
<tr>
<td>18 When I find it difficult to understand an area, I change the way I read to help me understand</td>
<td></td>
</tr>
<tr>
<td>19 When I study, I write down the most important points to help me understand what I read</td>
<td></td>
</tr>
<tr>
<td>20 When studying, I try to form mental pictures of what I am getting from the content</td>
<td></td>
</tr>
<tr>
<td>21 When studying, I go through the content and try to find the most important ideas</td>
<td></td>
</tr>
<tr>
<td>22 When revising, I pay more attention to the most important areas first.</td>
<td></td>
</tr>
<tr>
<td>23 As I read, I draw simple charts, diagrams or tables to help me understand the content better</td>
<td></td>
</tr>
<tr>
<td>24 When reading a new text, I first</td>
<td></td>
</tr>
</tbody>
</table>
look through it, read as I write notes, and then write the key points

25 I read different subjects in sections, and after each section I try to remember what I have read.

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.
Appendix C

Pro Forma Summary of Participant’s Academic Results of end of Term One and Two, 2016

<table>
<thead>
<tr>
<th>Participant’s Code Number</th>
<th>School Term</th>
<th>Final Score</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>End of Term One</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>End of Term Two</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D

Academic Achievement T-Sore of Form Three Students End of Term One and Term Two year 2016

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid</th>
<th>Cumulative Percent</th>
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<tbody>
<tr>
<td>25-29</td>
<td>3</td>
<td>.6</td>
<td>.6</td>
</tr>
<tr>
<td>30-34</td>
<td>21</td>
<td>4.3</td>
<td>4.3</td>
</tr>
<tr>
<td>35-39</td>
<td>55</td>
<td>11.3</td>
<td>11.3</td>
</tr>
<tr>
<td>40-44</td>
<td>72</td>
<td>14.8</td>
<td>14.8</td>
</tr>
<tr>
<td>45-49</td>
<td>99</td>
<td>20.3</td>
<td>20.3</td>
</tr>
<tr>
<td>50-54</td>
<td>86</td>
<td>17.6</td>
<td>17.6</td>
</tr>
<tr>
<td>Valid</td>
<td>55-59</td>
<td>61</td>
<td>12.5</td>
</tr>
<tr>
<td>60-64</td>
<td>49</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>65-69</td>
<td>30</td>
<td>6.1</td>
<td>6.1</td>
</tr>
<tr>
<td>70-74</td>
<td>8</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>75-79</td>
<td>3</td>
<td>.6</td>
<td>.6</td>
</tr>
<tr>
<td>85-89</td>
<td>1</td>
<td>.2</td>
<td>.2</td>
</tr>
<tr>
<td>Total</td>
<td>488</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Appendix E

Interview Schedule for Student Interviewees

Part A: Interview Consent Form

I understand the purpose of this interview with Mrs Josephine Mutua is to facilitate her PhD study in Educational Psychology at Kenyatta University. I have been informed of what the interview entails and the purpose of the research. I also understand that participation is voluntary and that there are no penalties attached in case I withdraw from the interview at any stage. I have also been assured of the confidentiality in handling all the information shared and my real name will not be used when writing the report. I therefore give consent to participate.

Code Number:____________________________ Date ___________ 2016

Part B: Semi-Structured Interview Schedule

General questions

a) Generally, how do you consider the content covered in form three?
   i) Easy
   ii) Very easy
   iii) Challenging
   iv) Difficult
   v) Very difficult

b) What has made you choose your answer in the above question?

c) What optional subjects are you taking in form three?
d) What made you choose those subjects?

e) What role did the teachers play when choosing the subjects to take in form three?

f) What role did your parents play when choosing your subjects in form three?

**Academic mindset questions**

a) I have always obtained the same grade since I joined form three. Yes/ No? Why?

b) What do you mainly do when the content in a subject is challenging?

c) Are there subjects you consider more difficult than others? Which ones? Why?

d) What have you been doing about those difficult subjects?

e) How do you feel whenever you don’t perform as per your expectation? Why?

f) What do you do whenever you don’t perform well?

g) What do you do whenever you perform well?

h) Which of the following statements describes you well?

   i) In class I work very hard to make sure I compete with my classmates.

   ii) In class I work very hard to make sure I understand the content

**Learning strategies questions**

a) As a form three student, do you feel in charge of your work? Why?

b) Do you have a program that you follow when reading? Yes/No. Why?

c) Who came up with that plan for you?

d) What do you do when you have to read a lot of material within a short time?
e) In addition to the notes given in class, do you think you need to read any other material? Why?

f) Have you changed the way you were reading in the previous classes? Yes/No
   i) How were you reading before?
   ii) How are you reading now?

g) Explain to me what you do when you find a certain method of reading is not working in some subjects.

h) Do you still feel you need your teachers to guide you on how to study in form three? Why?

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS DISCUSSION.
### Code Book for Students’ Academic Mindsets and Learning Strategies

<table>
<thead>
<tr>
<th>Code</th>
<th>Response to Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Some students believe that, despite the challenging work, more effort is required for them to excel. Others believe that, effort expenditure is futile. They cannot pass.</td>
</tr>
<tr>
<td>Inclusion Criteria</td>
<td>Effort expenditure</td>
</tr>
<tr>
<td>Exclusion Criteria</td>
<td>No effort expenditure</td>
</tr>
<tr>
<td>Examples</td>
<td>“The work in form three is challenging. I work very hard and I have been improving” “The work in form three is a lot and challenging. Even if I work hard, I don’t pass. I feel like giving up”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Teachers and Parents’ Guidance.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Teachers and parents guide students on how to study, how to make a personal timetable and the subjects to take in form three.</td>
</tr>
<tr>
<td>Inclusion Criteria</td>
<td>Teachers and parental guidance</td>
</tr>
<tr>
<td>Exclusion Criteria</td>
<td>Not guided</td>
</tr>
<tr>
<td>Examples</td>
<td>“I was assisted by my teachers and parents on how to make a personal timetable and on the subjects to select. “My teachers and parents were not involved in any way as far as making a personal timetable and the subjects to select is concerned.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Reasons for working hard in Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Students work hard in class to prove their ability. Students work hard in class to make sure they understand the content.</td>
</tr>
<tr>
<td>Inclusion Criteria</td>
<td>Learning based</td>
</tr>
<tr>
<td>Exclusion Criteria</td>
<td>Ability based</td>
</tr>
<tr>
<td>Examples</td>
<td>“I work very hard in class to make sure I compete with my classmates.” “I work very hard in class to make sure I understand the content.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>These are the different approaches that learners use to encode</td>
</tr>
<tr>
<td>Information</td>
<td>Inclusion Criteria</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Exclusion Criteria</td>
<td>Learning strategies not defined</td>
</tr>
<tr>
<td>Examples</td>
<td>“I repeat what I am reading several times and make short notes. Then I do exercise on what I have read”. “In form one and two, I was not interested in reading. In form three I read revision books”.</td>
</tr>
</tbody>
</table>
Appendix G

Mindset Authorization

Permission for use of copyright material

To Whom It May Concern:

We grant Josephine Mutua (Student at Kenyatta University - Nairobi, Kenya) permission to use the “What’s My Mindset” assessment for a research project so long as the below copyright citation is used.

Copyright © Mindset Works, Inc. Used with Permission. Additional mindset resources at www.mindsetworks.com

We understand this is for educational research purposes. Please only use as requested.

Scoring/interpretation information:

If the goal is to examine program impact in a research study, we recommend some or all of the measures here. These were used in other research studies and have demonstrated internal reliability and predictive value with respect to one another and achievement outcomes. (E.g., see here.)

If the training is focused on mindset, be sure to include the theories of intelligence scale as a first priority. Other scales could also be incorporated based on the outcomes of most interest. See scales here.

In the case you plan to measure impact on teachers directly, rather than on students, part 1 here may be a better option. (Part 2 addresses classroom goal structures, and was developed by different researchers.)

Validity/reliability information:

The short survey “Mindset Assessment” has not been used in rigorous research by itself. Rather, it contains a sampling of questions from several research-validated scales measuring mindsets about intelligence, learning goals, and beliefs about effort. These scales are too long and redundant for a quick online survey. See full scales here.

Please do not further use these materials beyond these descriptions. By using the “Mindset Assessment” tool, you are agreeing to the above terms. For our full terms of service please visit: Terms of Service. Mindset Works inc. retains the copyright to all documents, per USC Title 17 (US Copyright Law).

Date: 6/12/17    Approved By: Elisha Perez    Signed: 

Mindset Works, Inc.

Support and Operations Team.
Appendix H

MSLQ Authorization


Motivated Strategies for Learning Questionnaire (MSLQ) Manual

FILE
Research · August 2015
DOI: 10.13140/RG.2.1.2547.6968 · 2015-08-07 T 19:45:22 UTC

1st Teresa Duncan
12.26 · ICF International

2nd paul pintrich

3rd david smith

4th Wilbert J. Mckeachie
38.23 · University of Michigan

Description

This is the user manual for the MSLQ. The MSLQ is in the public domain, and so you do not need permission to use the instrument. We do ask that you simply cite it appropriately (Pintrich, P.R., Smith, D.A.F., Garcia, T., & Mckeachie, W.J. (1991). A manual for the use of the motivated strategies questionnaire (MSLQ). Ann Arbor, MI: University of Michigan, National Center for Research to Improve Postsecondary Teaching and Learning.). If you have any questions, please email mslq@umich.edu.
Appendix I

Graduate School Authorization

KENYATTA UNIVERSITY
GRADUATE SCHOOL

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

Our Ref: E83/24624/2010

DATE: 27th July 2016

Director General,
National Commission for Science, Technology & Innovation
P.O Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MUTUA JOSEPHINE NGINA-- REG. NO. E83/24624/2010

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

Ms. Mutua intends to conduct research for a Ph.D Proposal entitled, “Academic Mindsets and Learning Strategies as Predictors of Academic Achievement among Public Secondary School Students in Nairobi County, Kenya”.

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

28 JUL 2015
Appendix J

Research Permit

THIS IS TO CERTIFY THAT:
MS. MUTUA JOSEPHINE NGINA
of KENYATTA UNIVERSITY, 0-100
NAIROBI, has been permitted to conduct
research in Nairobi County

on the topic: ACADEMIC MINDSETS AND
LEARNING STRATEGIES AS PREDICTORS
OF ACADEMIC ACHIEVEMENT AMONG
PUBLIC SECONDARY SCHOOL STUDENTS
IN NAIROBI COUNTY, KENYA

for the period ending:
26th August, 2017

Applicant’s Signature

Director General
National Commission for Science,
Technology & Innovation

CONDITIONS

1. You must report to the County Commissioner and
the County Education Officer of the area before
embarking on your research. Failure to do that
may lead to the cancellation of your permit.
2. Government Officer will not be interviewed
without prior appointment.
3. No questionnaire will be used unless it has been
approved.
4. Excavation, filming and collection of biological
specimens are subject to further permission from
the relevant Government Ministries.
5. You are required to submit at least two (2) hard
copies and one (1) soft copy of your final report.
6. The Government of Kenya reserves the right to
modify the condition of this permit including
its cancellation without notice.
Appendix K

Research Authorization

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-318345, 318445, 318549
Fax: +254-20-318345, 318549
Email: info@nacostl.go.ke
Website: www.nacostl.go.ke
when replying please quote Ref No.

NACOSTI/P/16/63964/13130

Mutua Josephine Ngina
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Academic mindsets and learning strategies as predictors of academic achievement among public secondary school students in Nairobi County, Kenya,” I am pleased to inform you that you have been authorized to undertake research in Nairobi County for the period ending 26th August, 2017.

You are advised to report to the County Commissioner and the County Director of Education, Nairobi 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
Nairobi County.

The County Director of Education
Nairobi County.
Appendix L

Map of Nairobi County