STUDENTS' ACADEMIC INTERACTION, SELF-ESTEEM AND ACHIEVEMENT RELATIONSHIPS IN PUBLIC SECONDARY SCHOOLS IN NAKURU COUNTY, KENYA

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DECLARATION AND RECOMMENDATION

Declaration

This Thesis is my original work and it has not been submitted for a degree or any award in this or any other University.

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DEDICATION

This thesis is dedicated to my parents Philip Olum Addero and Rose Omondi Addero for the sacrifice of facilitating my education. To Mary Ogot for her patience, financial and moral support and my children Barrack Olum and Seline Ber for their love and inspiration.

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ABSTRACT

Academic achievement is important in the determination of students' future prospects. Educationists and other stakeholders have consistently used students' academic achievement results as basis of advancement and employment opportunities. The learners' academic self-esteem and academic interaction correspondingly shape the learning environment of students. The purpose of this study was to examine students' academic interaction, academic self-esteem and academic achievement relationships in public secondary schools in Nakuru County, Kenya. Correlational research design and both quantitative and qualitative research approaches were used in the study. The population of the study comprised 23,309 that is 11,938 boys and 11,371 girls form three students from 294 public secondary schools in Nakuru County. A total of 29 public secondary schools and 378 form three students were selected using stratified random sampling. The study used purposive sampling to sample 29 class teachers from the selected public secondary schools in Nakuru County. The total sample size for this study was therefore 407 respondents. The study used closed-ended questionnaires to collect data from students and interview schedule to collect data from class teachers. Data for academic achievement was obtained from school examinations results record. To ensure content validity of the research instruments, the researcher developed questionnaires and an interview schedule in line with the objectives of the study in consultation with the supervisors and lecturers from the Faculty of Education and Community Studies. To test the reliability of the questionnaire, a pilot study was done on one secondary school that was not part of the actual study. Cronbach's Alpha test of internal consistency were established whereby the items had reliability coefficients of 0.870, 0.871, 0.875 and 0.873 which were considered acceptable. Quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS) version 24 while qualitative data was analyzed using NVivo version 12. The study established that there was a statistically significant relationship between students' academic interaction and academic achievement in public secondary schools in Nakuru County, Kenya. It was also established that there was a significant relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya. The study also found out that there was a significant relationship between students' academic self-esteem and academic achievement in public secondary schools in Nakuru County, Kenya. It was further found that the model to predict academic achievement of students using student-student, student-teacher, student-parent academic interactions and student academic self-esteem as predictor variables explained the highest percentage of variation in academic achievement. The study concluded that students' academic interaction and academic self-esteem had a linear relationship with their academic achievement. In respect to this, the study recommends Kenyan teachers training institutions to advance teaching methods that seeks to improve students' academic interaction and academic self-esteem for better academic achievement. Findings on students' academic interaction, academic self-esteem and academic achievement will be beneficial to Nakuru County Director of Education, researchers and academicians in coming up with strategies of making the learning environment conducive for the learners' development of self-esteem and appropriate forms of interaction.

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ABBREVIATIONS AND ACRONYMS

ANOVA:	Analysis of Variance
ASAL:	Arid and Semi-Arid Lands
ASE:	Academic Self Esteem
BOM:	Board of Management
FPE:	Free Primary Education
HSE:	High Self-esteem
IQ:	Intelligence Quotient
KCSE:	Kenya Certificate of Secondary Education
KICD:	Kenya Institute of Curriculum Development
KNEC:	Kenya National Examinations Council
MOE:	Ministry of Education
NACOSTI:	National Commission for Science, Technology and Innovations
OECD:	Organisation for Economic Co-operation and Development
PTA:	Parents Teachers Association
SE:	Self-esteem
SPSS:	Statistical Package for Social Sciences
SQ:	Students' Questionnaire
TSC:	Teachers Service Commission
UPE:	Universal Primary Education
USA:	United States of America
VIF:	Variance Inflation Factor

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Academic achievement is globally paralleled as an indicator of intellectual ability of a learner in a given educational system. A student is expected to work towards obtaining good academic achievement attained over a certain period of time (Cuesta, 2018). In the context of secondary schools, academic achievement is measured through students' mean scores in the administered examinations (Murunga & Obuba, 2017; Ntawiha, 2016; Suleman & Gul, 2015). Poor academic achievement is likely to result in the students' lack of opportunities to progress in higher learning, limited opportunities in the technical training institutions and missed employment opportunities in careers of choice. A country is also likely to lack skilled manpower necessary to achieve its national agenda and attract international investors (Gupta & Mili, 2016).

The academic achievement could be below average, on average or above average. Below average academic achievement may imply the obtained academic achievement results are less than the median mark of the examination. This is termed as under-achievement or failure which may limit the student from certain career paths that needs individuals to demonstrate high degree of academic competencies (Riswanto & Aryani, 2017). On average achievement on the other hand implies that the achievement results in a given academic examination is equivalent or around the median mark. This further implies that the student is neither a failure nor a good performer in academic tasks in the school (Gbollie, Keamu & Keamu, 2017). Above average academic achievement implies that the student has obtained above the median mark of the academic examination. Above average academic achievement attracts good career progressions of the students. Some career paths may require high academic achievement and therefore the student may be needed to demonstrate more level of academic competencies (Joensen & Mattana, 2017).

Poor academic achievement may lead to lost opportunities in the field of academic progression. A study in India by Gupta and Mili (2016) noted that as students performed below average it hindered their academic progression to higher levels of learning. When the students in a country fail to perform well in their academics the future of the country is

considered ineffectual in terms of skilled man power. In Turkey, Bahar (2016) observed a massive failure of students in their academic achievement that posed a threat to the future labor market competencies. This also called for setting up of bodies tasked to inspect the causes of underperformance in Turkey. In Indonesia for example, a special inquiry commission was also formulated to investigate the cause of poor academic achievement of high school students (Riswanto & Aryani, 2017).

In achieving the set academic goals, student interacts with different group of people including their teachers, fellow students and parents with an aim of obtaining support to improve their academic realization. These groups of people basically constitute the immediate environment for students. According to Bean, Bush, McKenry, and Wilson (2013) the immediate environment of students determines how the students perform in various activities in school and out of school toward their academic achievement. This implies that the students' interactions with their environment is one of the means of learning. Ravinder (2017) posits that through interactions, students identify mentors who can help them achieve their academic goals and students who perform better than their peers may become role models for the rest of students in terms of academic aspirations. In addition students tend to associate themselves with teachers who are close to them in the process being socialized to comprehend the requirements of the curriculum (Fatih, 2016). Bean *et al*. (2013) asserts that parents' academic support to students is created by an interaction where the parents support the students' academic aspirations and in return the students responds by obligating to obtain high academic achievement. These forms of associations produce three types of interactions; namely; student-student academic interaction, student-teacher academic interaction, and student-parent academic interaction.

Student-student academic interaction refers to a two-way association between a student and another student in performing academic tasks in or outside the school (Schmid, Bernard, Borokhovski, Tamim, Abrami, & Surkes, 2014). This may be in form of a student seeking academic assistance on areas that were not clear, when in need of learning resources such as a book or in class discussions and group activities. Gunnarsdóttir (2014) asserts that the level of student-student academic interaction may differ from one student to another due to their level of academic self-esteem. This implies that the level in which student interacts

with teachers, fellow students and parents may be based on their level of academic self-esteem. In USA, Donohue (2017) revealed that the student self-learning improved the level of academic achievement of the students. Yaduvanshi and Singh (2018) further found out that student-student interactions were correlated to academic achievement of students. In Nigeria, Ekechukwu (2017) found out that there was significant relationship between the student-student interactions and their academic achievement in end of year examinations. In Kenya, Waseka and Simatwa (2016) found out that there was a positive relationship between student to student classroom interaction and their academic achievement. Ondimu (2016) further noted that student to student interaction and this influenced their academic achievement.

On the other hand, student-teacher academic interaction refers to two-way engagement between a student and teacher for academic benefits. Indicators of student-teacher academic interaction may include frequency of asking and answering questions, value of teachers' feedback, completing of teachers' assignment, and availability of teachers for academic consultation among other aspects. In Sweden, a study by Borg, Kembro, Notander, Petersson, and Ohlsson (2017) established that good interaction between students and their teachers resulted to a better academic performance of the students. In Canada, Valdebenito, Eisner, Farrington, Ttofi, and Sutherland (2018) revealed that there were significant differences in the academic achievement of student between the schools that used teacher centered approaches in teaching and those that used teacher centered approaches. In USA, Sharp and Sharp (2017) revealed that the level of student-teacher interaction was the distinctive reason for the differential academic achievement of the students. In Ghana, Glover (2015) established that there were significant differences in the level of academic achievement of students that interacted well with teachers and those who had indiscipline cases. In Liberia, Gbollie and Keamu (2017) noted that there was poor academic achievement among the secondary school students which was attributed to the fact that students rarely asked questions in class and did not submit their assignments for marking. In Kenya, Nyaboke (2015) revealed that the level in which the teacher interacted with the student affected the students' academic achievement.

Student-parent academic interaction implies to the relationship that exists between student and their parents or guardians geared towards academic assistance (Ravinder, 2017). Student-parent academic interaction can be measured using indicators such as the extent of parents' advice to students, encouraging children to do their homework, provision of interactive learning environment at home and parents' ability to talk to their children in regard to their academic progress among other aspects (Fan & Williams, 2010). In New Zealand, Nechyba, McEwan, and Older-Aguilar (2016) revealed that parental interactions was a significant predictor of student performance in secondary schools. On Kenyan context, Magara (2017) found out that most single parents were most of the time busy in their occupations thus leaving them with inadequate time to monitor their children's academic progress. Juma (2016) noted that parental involvement in education influences students' academic achievement to a great extent.

Academic self-esteem also plays a critical role in determining how students interacts with individuals who help the student achieve the set academic achievement (Sahin, Barut, Ersanli, and Kumcagız, 2014). Self-esteem is defined as a personality trait that describes person's sense of self-worth (Muhammad, Muhammad & Mahmood, 2015). On the educational context, Maruyana, Rubin, and Kingsbury (2016) conceptualizes academic self-esteem to be the belief that the student can have better academic achievement. Student academic self-esteem can be indicated by the level of assertiveness in class tasks, ability to communicate in class, attitudes towards self in regard to learning capabilities and ability to take leadership role in group discussions among other aspects (Kithela, 2016).

Academic self-esteem plays a great role in determining the levels of associations between individuals within a school situation which may involve academic pursuing interactions by students. In a study In the USA, Orth and Robins (2014) noted that when students were faced with academic self-esteem related challenges they were hindered from seeking assistance from their teachers, parents and even fellow students. On the same context, Masselink, Roekel, and Oldehinkel (2018) establish poor interactions among students and their teachers were occasioned by cases which were likely to have a negative effect on the teacher-student classroom based relationship. In addition a study by Sharma and Agarwala (2015) noted challenges of students as a result of low academic self-esteem included

reduced assertiveness, poor communication skills and negative attitudes towards seeking academic assistance. A study by McGaha-Garnett (2017) revealed that there was a significant relationship between the academic self-esteem and academic achievement of the students. On Nigerian context, Maruyana *et al*. (2016) found out that there was significant difference between academic achievement of students with high academic self-esteem and students with low academic self-esteem. Okolo, Ofielu, Nebo, and Nebo (2017) in Nigeria found out that there was a significant relationship between student academic self-esteem and the academic achievement of students.

In Kenya, Waseka and Simatwa (2016) noted the existence of poor relationships among certain students in their classroom interactions. This was mainly characterized by frequent fights, unwillingness to help each other in academic tasks and theft of learning resources. Musili (2015) on the other hand observed that teacher interactions with their students in secondary school in Kibwezi was inadequate since students did not approach their teachers for academic assistance this was noted as a factor that may lead to poor performance. Kithela (2016) noted that schools in Nairobi had poor academic achievement characterized by majority of the students obtaining a mean grade below the academic examination mean score. The author further noted that majority of students exhibited low academic self-esteem and aspired for low-level careers. Low academic achievement was also noted as a factor resulting to a lower transition to tertiary institutions of learning, Wambui (2015) in a study on the relationship between perceived parental acceptance rejection and academic self-esteem among students in secondary schools noted that there was low transition from secondary schools to tertiary institutions due to poor academic achievement of student.

The academic achievement of secondary schools in Nakuru County has been below average over a period of time. This is well demonstrated by the results of academic achievement of secondary students in Nakuru for the year 2013 to 2017 which is below average and the national mean grade as shown in Table 1.

Table 1

Nakuru County KCSE Academic Achievement Summary

YEAR / SUB-COUNTY	2013	2014	2015	2016	2017
GILGIL	4.629	4.767	4.657	2.891	2.229
KURESOI	5.174	5.288	5.175	3.535	3.242
MOLO	4.891	6.020	5.300	4.380	3.406
NAIVASHA	4.902	5.014	4.889	3.716	3.115
NAKURU	5.410	5.410	5.400	4.310	3.702
NAKURU NORTH	4.783	4.756	4.103	4.882	3.852
NJORO	4.601	4.361	4.205	3.860	3.009
RONGAI	4.712	4.689	4.078	3.325	3.023
SUBUKIA	4.566	4.739	4.724	3.462	3.136
NAKURU COUNTY MEAN	**4.852**	**5.000**	**4.726**	**3.818**	**3.190**
NATIONAL MEAN	**4.885**	**5.061**	**5.360**	**4.050**	**3.998**

Source: Nakuru County Director of Education (2018)

According to Table 1, the academic achievement of most sub-counties of Nakuru County has been below the national mean grade for the years 2013-2017. In addition, Nakuru County performs poorer than other counties in Kenya. For example, in the year 2017, the Bomet County had a mean score of 3.400, Kericho county had a mean score of 3.408, Kajiado county had a mean score of 3.427, Elgeyo Marakwet county a mean score of 3.54, Laikipia county a mean score of 3.75, Baringo County a mean score of 3.818 and Trans Nzoia county had a mean score of 3.9105 against a mean score of 3.190 in Nakuru County (KNEC, 2017). This dismal performance in academic achievement of students in Nakuru County warrants an investigation.

Poor academic interactions may also result into deviant behaviors as the students from secondary schools in Nakuru County were likely to indulge in antisocial activities when they felt overwhelmed and stressed with academic challenges resulting in high rates of student expulsion and cases of poor academic achievement (Kimani, 2016; Thuo et al., 2018). Since the immediate environment of students in secondary schools is majorly

composed of fellow students, teachers and their parents, these interactions may contribute to the variation in their academic achievement and warranted an inquiry. Other studies conducted among secondary schools in Nakuru County have also reported low academic self-esteem among the students, inadequate student-parent academic interaction and lack of willingness among the students to help each other as factors likely to affect a student's academic achievement (Akinyi & Musani, 2018). From the foregone there is evidence of studies that have mainly focused on the individual variables and other related pedagogical and psychological attributes. There has been a dearth of studies sufficiently examining the relationships among the three variables of interest in this study. It is therefore on this background that the current study found it important to examine students' academic interaction, academic self-esteem and academic achievement relationships in public secondary schools in Nakuru County, Kenya.

1.2 Statement of the Problem

Students' academic interaction is one of the primary means of learning. Through academic interaction the student is able to actively learn from academic based associations with the immediate environment. The academic achievement of a student is also likely to be affected by the learners view of self which when not well enhanced is likely to result in self-rejection, deficiency in emotional security and intolerance of errors among other issues. According to the KCSE results for the years 2013-2017, the academic achievement of secondary schools in Kenya has not been satisfactory despite the importance attached to success in academic work. Among the counties in Kenya, Nakuru county has consistently recorded a mean score below the national mean score as well as below the average mean score of 6.00 (C-plain) in the Kenya Certificate of Secondary Education. Students are constantly faced with many academic challenges as they progress in their education. In coping with these challenges they are likely to interact with their immediate environment as they seek for advice or academic assistance. Since the immediate environment of students in secondary schools is majorly composed of fellow students, teachers and their parents, this study hypothesizes that their interactions may contribute to the variation in their academic achievement. Additionally, this study hypothesizes that the level of academic self-esteem of a student may affect how the student works towards achieving the set academic goals. Despite academic achievement of students in secondary schools in

Kenya having drawn attention of researchers and education stakeholders, there is paucity of comprehensive and conclusive study carried out to establish the relationships among student academic interactions, academic self-esteem and academic achievement, which are the variables of the current study.

1.3 Purpose of the Study

The purpose of this study was to establish students' academic interaction, academic self-esteem and academic achievement relationships in public secondary schools in Nakuru County, Kenya.

1.4 Objectives of the Study

This study was guided by the following specific objectives;

(i) To establish the relationship between students' academic interaction and academic achievement in public secondary schools in Nakuru County, Kenya.

(ii) To determine the relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya.

(iii) To determine the relationship between students' academic self-esteem and academic achievement in public secondary schools in Nakuru County, Kenya.

(iv) To establish the prediction equation among students' academic achievement, academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya.

1.5 Hypotheses

The study was guided by the following hypotheses:

H_{01}: There is no statistically significant relationship between students' academic interaction and academic achievement in public secondary schools in Nakuru County, Kenya.

H_{02}: There is no statistically significant relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya.

H_{03}: There is no statistically significant relationship between students' academic self-esteem and academic achievement in public secondary schools in Nakuru County, Kenya.

H_{04}: There are no statistically significant prediction equation among students' academic achievement, academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya.

1.6 Significance of the Study

This study shed more light in regard to students' academic interaction, academic self-esteem and academic achievement relationship in public secondary schools in Nakuru County, Kenya. By establishing the relationships that exists between student academic interactions and academic achievement in secondary schools, this study will help secondary school students, teachers, parents and Kenya Institute of Curriculum Development (KICD) to understand student academic interactions that yield best academic achievement. Findings on the relationship between academic self-esteem and academic achievement will help students in adjusting their academic self-esteem for better academic achievement. By developing a regression model to predict academic achievement of students in secondary schools, the teacher training institutions and other education stakeholders will be able to know the aspects to prioritize in formulating policies and teaching methods geared towards improving the academic achievement of the students in relation to academic self-esteem and academic interaction. This study contributed to the existing literature in regard to students' academic interaction, academic self-esteem and academic achievement which may help future researchers and academicians in further studies and teaching.

1.7 Scope of the Study

The study was carried out among the public secondary schools in Nakuru County which defines the geographical scope of the study. The schools were from urban, peri urban and from rural set up. The study focused on student academic interaction, academic self-esteem and academic achievement and this defined the content scope of the study. The study respondents were form three students and class teachers.

1.8 Assumptions of the Study

The study was guided by the following assumptions;

i. Form three students had developed specific academic self-esteem and academic interaction patterns.

ii. The respondents gave honest feedback on academic interaction and academic self-esteem.
iii. Other factors that were related to academic achievement out of the operationalized ones were not considered and in which intervening variables were statistically controlled.

1.9 Limitations of the Study

The following are some of the limitations that were encountered;

i. The generalization of the study findings to other schools should be done with caution especially for private schools not aligned to government based curriculum and having infrastructural set ups or schools majorly in the rural setups.
ii. The study only focused on academic interaction, academic self-esteem factors and academic achievement defined and operationalized as related factors.
iii. The study used the examination results obtained from several schools having different psychometric properties.

1.10 Definition of Terms

Academic Achievement: This refers to the educational goal that is achieved by students over a certain period of time (Cuesta, 2018). In this study, academic achievement refers to student examination mean scores and it was measured using standardized t-scores obtained from the average of previous three End of Term Examination results.

Academic Self-esteem: This refers to a personality trait that describes a person's sense of self-worth. It is the self-believe that one has towards tasks to be accomplished (Muhammad *et al*., 2015). In the current study, academic self-esteem refers to the level of assertiveness in class tasks, ability to communicate in class, attitudes towards self in regard to learning capabilities and ability to take leadership role in group discussions among other aspects.

Student Academic Interactions: This refers to the relationship that exists between students and fellow students, teachers and their parents in a school set up whose aim is to promote academic learning (Ravinder, 2017).In the current study, academic interaction refers to the association between students and their peers, teachers and parents in promoting their academic achievement.

Student IQ: This refers to students score derived from several standardized tests designed to measure human intelligence (Fatih, 2016). In this study, student IQ implied to cognitive abilities of the student not necessarily derived from the teachers' effort in class.

Student-Parent Academic Interaction: This refers to the relationship that exists between student and their parents or guardians geared towards academic assistance (Valerie, Shute, Hansen, Underwood & Rim, 2011). In this study, student-parent academic interaction is conceptualized as the extent of parents' provision of learning resources, making sure their child gets homework done, quality of the learning environment at home and parents' ability to monitor children's academic progress among others.

Student-Student Academic Interaction: This refers to the two-way association between a student and peers in performing academic assignments (Schmid *et al*., 2014). In the current study, Student-student academic interaction refers to the relationship that exists in

a classroom between secondary school students and their peers aimed at assisting each other academically.

Student-Teacher Academic Interaction: This refers to two-way association that exists between students and their teachers in a learning environment (Fatih, 2016). In this study, Student-Teacher academic interaction refers to the relationship that exists between secondary school students and their teachers in classroom which in turn affects students' academic achievement.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

In this chapter the researcher has reviewed related literature according to the objectives of the study. The themes under which the literature was reviewed include students' academic interaction, academic self-esteem and academic achievement and their relationships. This chapter also covers both the theoretical and conceptual framework.

2.2 Students' Academic Interactions and Academic Achievement

Academic achievement refers to the extent in which a student performs in respect to set learning outcomes in a school assessment which may comprise internally or externally standardized tests (Cuesta, 2018). The academic achievement could be below average, on average or above average (Riswanto & Aryani, 2017). Below average academic achievement may imply the obtained academic achievement results are less than the median mark of the examination. Academic interactions on the other hand refers to associations among the teachers, learners, parents and other stakeholders with an aim of achieving academic goals. Student academic interactions was studied in three aspects, namely; student-student academic interaction, student-teacher academic interaction and student-parent academic interaction (Gbollie, Keamu & Keamu, 2017).

2.2.1 Student-Student Academic Interactions and Academic Achievement

Interactions among student-student are vital in their academic achievement (Schmid *et al*., 2014). Student-student academic interactions entails the association among learners aimed at achieving set academic goals such as group discussions, sharing of learning resources, respect among themselves in undertaking school based activities and classroom debates (Schmid *et al.*, 2014). In the context of student-student interaction, Ravinder (2017) carried out a meta-analysis study in Canada on the effect of collaborative learning on enhancing student achievement. The study sought to answer the researcher question "Does collaborative learning have any statistically significant effect on student achievements outcomes?" The study used 20 representative studies involving 2434 participants selected from an extensive literature search on Student-Student Academic Interactions aspects. The study found out that student to student interactions positively influenced the level of

academic achievement of the students. This reviewed study was based on a meta-analysis of the existing literature and therefore could be biased towards the findings of other researchers. The reviewed study relied on secondary data while the current study will obtain first hand data from respondents.

In USA, Donohue (2017) carried out a study to examine among other aspect the influence of student individual characteristics on their academic achievement. The study used a sample size of 35 students. Data for the study was collected by the use of questionnaires. The study revealed that students were allowed to interact with their fellow students in academic aspects in ways such as group discussion, debates and assignments. The study revealed that the student self-learning improved the level of academic achievement of the students. The study further found out that there was a significant relationship between the student to student interactions and the student academic achievement. It was in respect to this revealed that the students that interacted more with fellow students in learning activities tended to perform better in academic examinations as compared to those who did not frequently collaborate with the fellow students in doing academic tasks in school. This study presents contextual difference for learning and teaching approaches in schools in the USA significant varies from the Kenyan schools and therefore the student-student interaction opportunities may vary and therefore the need for the current study.

A study by O'Malley (2015) carried out to examine how the learning environment of students affects their academic achievement in California schools. The study used a meta-analysis from survey that have been conducted by the state government for the year 2010-2014. The study revealed that there was significant relationship between student-student interactions through cooperative learning and the academic achievement results. The study recommended the use of cooperative learning to increase the contact time between the students during classroom learning in order to improve the performance of this students. The study was however methodologically different from the current study for it reviewed already done survey and therefore there could be biasness towards the other studies. The current study collected data to ascertain the relationship between student-student interactions and their achievement in academics in Kenyan context.

In New Zealand, Cotton (2013) carried out a study to examine the influence of student interactions and their influence on their academic outcomes in secondary schools. The study used descriptive research design and sampled 345 students. The data for the study was collected using questionnaires and interviews. The study results indicated that students were given opportunity to consult one another in undertaking class assignments. The study further revealed that there was a significant relationship between student-student interactions and academic achievement of students. However, it was revealed that top performing students did not always consult their peers but only relied on the input of their teachers. This study presents a conceptual research gap that the current study filled by carrying out a study in Kenyan context.

Yaduvanshi and Singh (2018) carried out a study to examine in the opportunities provided for by cooperative learning approach. Among the aspect that the study examine is the student-student interactions in the use of cooperative learning and their influence of the academic achievement of secondary school students. The study used a sample size of 62 respondents who were required to fill questionnaires. Using qualitative approach in data analysis, the study found out that student-student interactions were correlated to academic achievement of students. It was further indicated that student-student interactions varied with student gender. It was in this respect established the girls interacted more with fellow students than boys did and therefore the academic achievement of girls' schools was higher than that of boys' schools. A sample of 62 respondents used in the reviewed study presents a methodological gap for the current study that was done using a sample size of 407 respondents and therefore more generalizable to the study population.

Focusing on African schools, OECD (2015) examined how student-student interactions help in improving the performance of secondary school students. The study was majored in 30 countries in Africa. The study used descriptive and exploratory research approach. From the study, it was revealed that the interactions between students in attempting academic task improved the performance of students through the development of critical thinking. Among the counties that this study was conducted, Kenya was not among them and therefore a contextual research gap for the current study that seeks to establish whether student-student interactions is related to student performance.

On Nigerian context, Fatokun and Omenesa (2015) carried out a study to establish the effect of prior knowledge and classroom interactions on students' achievement in chemistry. The study used quasi experimental research design. A sample of 93 secondary school students were purposively sampled for the study. The study found out that there was a positive relationship between student prior knowledge in Chemistry and academic interaction. The study also established that prior knowledge on Chemistry subject encouraged students to interact among themselves in sharing their level of concept understanding. This also correlated with student academic achievement. The study presents a contextual gap in that it was done outside Kenya while the proposed study was done on Kenyan context. Methodologically, the study used a small sample size of 93 students while the current study used a large sample size of 407 respondents. The study focused on academic achievement in chemistry only while the current study will focus on all examinable sub jects at KCSE.

Ekechukwu (2017) carried out a study that sought to examine the effect of student socialization on their academic achievement in secondary schools in Port Harcourt. The study sampled 100 students and the student were required to fill in the questionnaires. Using correlational analysis, the study revealed that there was significant relationship between the student-student interactions and their academic achievement in end of year examinations. The study further revealed that academic achievement increased with the increase in the level of interactions among the student in classroom learning. In respect to this, the students that socialized well with their fellow student tended to perform better than those whose socialization was low. This reviewed study was done outside Kenya and therefore the need to establish student-student academic interactions in Kenyan context and their influence on the academic achievement of students.

In Ethiopia, Mersha, Bishaw, and Tegegne (2013) carried out a study to examine the effect of student-student interactions on academic achievement of female students in secondary school level. The study was based on both quantitative and qualitative approaches. Questionnaires were used for quantitative data while interviews were used for qualitative data. Using regression analysis, the study established that student-student interactions predicted the level of academic achievement of female students in the school. Using t-test,

the study further found out that there were significant differences in the academic achievement of the students that interacted with the fellow students and those who did not. Since this reviewed study only focused on female study, there was a need for a study to be conducted using both genders of the students and therefore the need for the current study.

Focusing in Kenya, Waseka and Simatwa (2016) carried out a study on student factors influencing achievement of students in secondary education in Kakamega County. Among student factors that were studied included student to student classroom interactions, peer pressure and student attitudes. The study used a sample size of 380 students from secondary schools in Kakamega County. The study revealed that there was a significant relationship between peer pressure among students and their academic achievement. In regard to student to student classroom interaction, the study found out that there was a positive relationship between student to student classroom interaction and their academic achievement. However, this study by Waseka and Simatwa (2016) was different from this proposed study for it was carried out in Kakamega County while the proposed study was done in Nakuru County which are far apart. The current study used a sample size of 407 which is higher than that of Waseka and Simatwa (2016) and therefore making this current study more generalizable.

Ondimu (2016) also carried out a study to evaluate the influence of students' physiological needs on academic achievement of public secondary schools in Eastern Zone of Nakuru Municipality, Kenya. The study used survey research design to establish how students' physiological needs affects their Academic achievement. In meeting the study objective, this study examined how physiological needs of the students determines their interaction with their peers and how this influences their academic achievement. The study target population was 800 and a sample of 370 respondents were chosen for the study through systematic random sampling. The study found out that meeting students' physiological needs determined the level of student to student interaction and this influenced their academic achievement. The reviewed study presents a conceptual gap in that it focused on physiological needs of the students as its independent variable while the dependent variable of this study is student-student academic interaction and how it affects students' academic achievement.

Mapesa (2013) did a study on peer influence on academic achievement of form one students in girls boarding secondary schools in Kanduyi constituency in Kenya. The study specifically sought to establish how peer group prior achievements, peer group composition and peer group teaching environment influence form one academic achievement in girls boarding secondary schools. The study adopted a descriptive survey design with a sample size of 95 respondents comprising of 90 students and 5 teachers from the guidance and counseling department. It was established that peer group members who scored high grade in KCPE had positive influence to student academic achievement in girls' secondary schools. The study further found out that peer group composed of rich students positively influenced academic achievement of girl students. In addition, the study by Mapesa (2013) found that students' learning environment had a positive influence on girl student academic achievement. The study used a small sample size of 95 respondents while the proposed study used a large sample size of 407 respondents and therefore filling the methodological gap.

2.2.2 Student-Teacher Academic Interactions and Academic Achievement

A number of studies have been conducted to explain how student interactions with teachers relate with the academic achievement of students. Student-teacher academic interactions refers to the academic based relationships that seek to improve the learners' performance in school activities (Sharp & Sharp, 2017). These may include activities such as academic consultations with the teachers, teacher academic motivation to learners and teacher availability for assistance. Focusing on students from Turkey, Fatih (2016) carried out a study on motivation to learn and teacher–student relationship. The study found out that positive teacher–student interactions contributed to a warm classroom environment that facilitates successful adaptation in school and thereby increases students' motivation to learn. On the other hand, negative teacher–student interactions were associated with lower achievement and lower academic self-esteem as well as ongoing relational conflict with peers. The study focused on motivation to learn while the current study focused on academic achievement as one of its variable and therefore a conceptual research gap that this current study intends to fill.

In Taiwan, Li (2015) carried out a study to examine the effect of student-teacher interactions on the student academic achievement in secondary school level. The study adopted descriptive research design and target both the students and the teachers. Students provided data for the study by answering questionnaires while teachers gave data through interviews. The study found teachers interacted well with the students in classroom learning. It was in this regard established that students that interacted with their teachers more had a better performance as compared to those who didn't not interact with their teacher more. There were significant differences in the academic mean score of the two groups of students. The study concluded that student-teacher interaction was a significant predictor of academic achievement of students. A conceptual research gap was identified since the reviewed study was done in Taiwan while the current study will be done in Kenya whose education system vary and hence student-teacher interactions may also vary.

In a study on cooperative learning approach in secondary schools in Turkey, Altun (2015) sought to find out the effect of student-teacher interactions on the academic achievement of students. The sample size for the study comprised on 20 students of a private schools, that is, 7 girls and 13 girls. Both qualitative and quantitative methods of data collection were employed in the study. The study revealed that there was a positive relationship between student-teacher interactions and the academic achievement of the students. It was further revealed that there were significant differences between the students that had long hours of contact with those teachers that had few hours of contact with their teachers. In respect to this, hours of contact between students and their teachers had a positive impact on the academic achievement of the students. The study recommended that teachers to increase their hours of contact with their students for better academic achievement. The sample size used in the study was only 20 respondents and therefore the study could not be generalizable to a larger scope and hence a methodological research gap for this study that used a sample size of 407 respondents.

In Sweden, a study by Borg, Kembro, Notander, Petersson, and Ohlsson (2017) sought to establish among other factors the influence of student-teacher interactions on the academic achievement of students. The study used interviews to collect data from teachers. From the interviews conducted, it was established that good interaction between students and their

teachers resulted to a better academic performance of the students. It was in this respect noted that those student that asked their teachers many questions in class were able to achieve higher academic grades compared to those who kept quiet in class. It was also revealed that disciplined students had good interaction with their teachers compared to those faced with indiscipline case. In respect to this, there was a significant difference in the academic achievement of students between the students who had good relationships with their teachers and those who had negative relationships with their teachers. The study was however different from the current study for it only interviewed teachers and did not get feedback from the students. The current study was more reliable for it gathered information from bot teachers and the students.

In Canada, Valdebenito, Eisner, Farrington, Ttofi, and Sutherland (2018) sought to establish the role of student interactions on the academic achievement of students. Among the student interaction aspects that the study concentrated on is the role of student-teacher interactions. The study was based on a correlational research design. The researcher revealed that there were significant differences in the academic achievement of student between the schools that used teacher centered approaches in teaching and those that used student centered approaches. In this respect, the study established that the time duration of interaction between the student and the teacher in classroom learning was a significant predictor of student performance. The study recommended that the teachers to be available for academic consultation by the students in order to increase the interaction between the students and the teachers and therefore increasing the level of academic achievement of the students in Canada. The current study was done in Kenya to bridge this contextual research gap.

In USA, Dilling (2016) carried out a study whose aim was to make recommendations to help students with specific learning disabilities. The study explored several student interactions and how the interactions could help improve the academic achievement for the students. Using Pearson Correlation, the study revealed that there was a significant relationship between the student-teacher interactions and the academic achievement of the students. Using regression analysis, the study established that student-teacher interactions predicted the level of academic achievement of students. It was therefore noted that an

increase in the interactions between the student and teachers improved the academic achievement of the students. The study recommended teachers to provide more platforms to interact with the students in order to improve the academic achievement of students with specific learning disabilities. This current bridged this contextual research gap by carrying out a study in Kenyan secondary schools.

Still in the context of USA, Sharp and Sharp (2017) carried out an investigation to establish the cause of academic achievement differences in secondary schools in Texas City. The study was explorative in nature and sampled 271 students. The study revealed that the level of student-teacher interaction was the distinctive reason for the differential academic achievement of the students. This was attributed to different teaching approaches of the different secondary schools in Texas City. Student-teacher interactions were found to a significant predictor of academic achievement of students. The study recommended the use of teaching approaches that increases the interactions between the students and the teachers in a learning environment.

In Belgium, Consuegra, Engels, and Lombaerts (2015) carried out a study to examine among other aspect the influence of student-teacher interactions on academic achievement of students. Using primary data collected through the use of questionnaires, the study revealed that there was significant relationship between student-teacher interactions and academic achievement. It was further revealed that student-teacher interactions was a significant predictor of academic achievement of the students. In respect to this, an increase in the level of interactions between the students and their teachers, caused an increase in the level of academic achievement scores of the students. The study recommended the use of instructional approaches geared towards increase the interactions between the students and teachers. Since the study was conducted in secondary schools in Belgium, the current study sought to bridge this contextual research gap.

In Ghana, Glover (2015) examined the influence of teacher-student interactions on the academic achievement of students in secondary schools. The study was based on mixed methods approach. Questionnaires and interview guides were used for the data collection purposes. The study established that there were significant differences in the level of

academic achievement of students that interacted well with teachers and those who had indiscipline cases. Positive academic interactions between the students and teachers were seen to improve the academic achievement of students. In this regard, Glover (2015) found that student-teacher interactions was a significant predictor of academic achievement of students. This study used a mixed research approach while the current study used a correlational research design and therefore the different.

In Somalia, Mohamed (2012) carried out a study on factors that influence secondary school students' performance in mathematics in Banadir region of the country. Among the aspects that the study focused on included student-teacher interaction in a mathematics classroom. The study employed a survey research design and used stratified sampling technique in selecting 12 secondary schools and a sample of 16 teachers and 275 form four students for the study. The study found that 37.5% of the teachers felt that student-teacher interaction in a mathematics classroom played a major role in students' performance in the subject. It was also found out that teacher feedback to student questions in mathematics determined how the students perform in the subject. The current study will link the student-teacher academic interaction with student academic achievement, an aspect that the reviewed study failed to do.

In Kenya, Nyaboke (2015) did a research to investigate the factors influencing teacher student interaction in public and private secondary schools in Matungulu Sub-county, Machakos. The researcher used descriptive survey research design whereby a questionnaire was used as the instrument for data collection. A total of 120 respondents was sampled using purposive sampling technique for students and simple random sampling for teachers. The study revealed that teachers in private schools were able to interact well with students from all academic categories. The study also found out that public schools presented a more restrictive environments than in private schools. The study also found out that teacher-student interaction was poorer in public than in private schools. The researcher recommended that other studies to be done in other sub-counties to assess the teacher-student interaction in scopes not covered in the study. This study also presented research gaps that this current study seeks to fill. The study presents a methodological gap in that it used descriptive research design and therefore did not link student-teacher interaction with

student academic achievement, a research gap that this current study sought to fill by using correlational research design. The study also compared student-teacher interaction from public and private schools which presents a contextual research gap for this study that was carried out in public schools only.

A study by Musili (2015) established the influence of teacher related factors on students' performance in Kenya Certificate of Secondary Education in public secondary schools in Kibwezi sub-county, Kenya. One of the aspects that the study focused on was student to teachers' interaction and how the interaction influences the academic achievement of the student. The study used descriptive survey design and stratified sample was used to select the study respondents. A sample of 18 principals, 90 teachers and 180 students was used. The study revealed that the level in which the teacher interacted with the student affected the students' academic achievement as indicated by 94.4% of the principals and 86.0% of the teachers. The study also revealed that motivated teachers have positive interaction with students and this interaction led to better student academic achievement as cited by 77.8% of the principals. This study by Musili (2015) however did not link student-teacher interaction with student academic achievement for it used descriptive statistics only. This study used both descriptive statistics and inferential statistics that will enable the linking of the two variables that thus will help in decision making in regard to student-teacher academic interaction.

Njuguna (2015) did a study on verbal classroom interaction patterns of selected secondary home science teachers with their students in Nairobi province. The study investigated the variation of verbal classroom interaction patterns of Home Science teachers with their students in girls, boys and mixed secondary schools in Nairobi Province. One of the study objective was to examine teacher-student interaction patterns that exist in a normal home science classroom. A total of six home Science teachers from six stratified randomly selected schools within Nairobi Province were involved in this study. The study found out that teacher-student interaction patterns existing in boys' classrooms were autocratic while in girls' and mixed classrooms, they were democratic.

The reviewed study by Njuguna (2015) presents both methodological and contextual gap to be filled by this current study. Contextually, the study was done among Home Science teachers and this limits its generalization to general student-teacher interaction in classroom in any other subject. The proposed study filled this gap by carrying out this study focusing on all examinable subjects taught in secondary schools. Methodologically, the study used descriptive analysis only while the current study used inferential analysis to link student-teacher academic interaction with academic achievement of the students, an aspect that was not established in the reviewed study.

A study by Okioga (2013) sought to establish the effect of student socialization on the student performance in academics in Kisii County. The study used a sample size of 186 students. Data for the study was collected by the use of questionnaires. From the data collected, it was revealed that there was a significant correlation between student interactions with their teachers and student academic achievement. It was noted that students that interacted with their teachers more often had a better academic grades compared to those who did not frequently interact with their teachers. It was revealed that interaction with teachers resulted to motivation towards academic aspects of the student. The study did not meet the data triangulation requirement of research and therefore the results could not be sufficiently reliable. The current study collected data from both the teachers and the students and therefore increasing the reliability of the data for it come from the two sources.

2.2.3 Student-Parent Academic Interaction and Academic Achievement

Student to parent academic interaction entails the cooperation between parents and students with the aim of achieving learners' academic goals such as provision of learning resources to students, conducive learning environment at home and parents approachability (Nechyba, McEwan & Older-Aguilar, 2016). Previous studies have shown that the student-parent interaction is very important in determining how students perform in school examinations. In American context, Bean *et al*. (2013) carried out a study on the impact of parental support, behavioral control, and psychological control on the academic achievement and academic self-esteem of African-American and European American students. One of the study objectives was to establish the impact of parental support on the

academic achievement and academic self-esteem of African-American and European-American students. The study established that African-American students had a lower parental support score as compared to European-American students. In regard to level of academic achievement, the study established that European American students performed better than their counter parts. However, upon using t-test to test if there was significant differences in the academic achievement between African-American and European-American students, the study established that there was no significant differences in the academic achievement of the two groups. There exists a contextual gap to be filled by the current study since the reviewed study was done in American context while current study was done on Kenyan context.

In New Zealand, Nechyba, McEwan, and Older-Aguilar (2016) carried out a study to examine among other variables the influence of student-parent interactions on the academic achievement of students in secondary schools. The study adopted causal comparative research approach. In this regard students with both parents were crossed examined against those with single parents and the ones without both parents in respect to the academic achievement grades. Using analysis of variance, it was established that parents with both parents outperformed those with single parent and those without parents. The study further revealed that parental interactions was a significant predictor of student performance in secondary schools in New Zealand. This study presents a methodological research gap for the study was based on comparative research design while the current study will be based on correlational research design.

Wu (2015) carried out a study to examine among many other aspects, the effect of student-parent interactions on the academic progressions of students in secondary schools in Taiwan. The study sampled 50 students and 50 parents who were required to fill a research questionnaire. It was noted that student-parent interactions affected the level of academic achievement of students. It was in respect to this established that those parents who provided for their children in terms of learning resources as well as provision of adequate time to study at home, their children performed better than the rest. It was further revealed that student-parent interaction was a significant predictor of academic achievement of

students. Since the study was done in Taiwan, there is a need to establish whether the results were comparable in Kenyan context.

Fan and Williams (2010) carried a study to establish the effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation among secondary schools students in South Africa. The study sought among others aspects to link parental involvement in student academic affairs and students' academic achievement. The study established that parents who were involved in academic affairs of their children such as providing learning materials and attending parents meeting among others performed relatively higher in their academics as compared to those whose parents were less involved. It was also established that parental involvement in the learning of their children acted as a motivation to the children which resulted to higher academic achievement. However, the study did not show how academic achievement of the students can be predicted using the student-parent interaction, an aspect that was done in this proposed study and therefore a methodological gap.

On Kenyan context, Magara (2017) carried out a study on the influence of Single Parenting on Students' Academic Achievement in Selected Secondary Schools in Taveta Sub-county, Taita Taveta County. Amongst the objectives of the study by Magara (2017) was to establish how single parenting affected parental involvement in their children's education and this affected on their children's academic achievement. Using exploratory research design, the study randomly sampled 80 Form 3 students and 34 teachers. The study obtained its data using questionnaires. The study found out that most single parents were most of the time busy in their occupations thus leaving them with inadequate time to monitor their children's academic progress. In this regard, the study revealed that of 41% students with a single parent; the parents were not fully involved in their children's academic affairs. The study further found out that educated parents were more involved in their children's education. The results obtained revealed that student-parent interaction dynamics had a direct correlation with students' academic achievement. This reviewed study only focused on interactions aspects on the context of single parenting and therefore there is need to focus on student-parent academic interactions in a holistic manner.

Mwaa (2016) carried out a study to investigate the extent by which parental factors influence career choice among form four students in Nairobi County. The population of the study was all the 27,614 form four students who had enrolled for the Kenya National Examinations Council (KNEC) examinations for the year 2016. A total of 400 students were sampled for the study. The study used purposive sampling technique to sample 10 schools from Nairobi County to participate in the study while simple random sampling technique was used to sample the students. Questionnaires were used as the instruments for data collection. Descriptive statistics such as frequencies and percentages were used to analyse the data. Results from the study showed that parental factors such as parental highest education level, parents' occupation, parental values and expectations, and parent-child relationships influence the career choice of students in Nairobi County. This study presents a methodological research gap in that it only utilized descriptive statistics and therefore was unable to establish the link between the study variables, a gap this current study sought to fill by use of pearson correlation.

Kimani (2016) carried out a study that sought among other aspects to evalaute the relatiuonship between student-parent interactions ansd acdemic achievememt of students in secondary schools in Nakuru County. The study was carried out in 18 public secondary schools within Nakuru County. A sample size of 180 students took part in the study. stratified and purposive sampling techniques were used to obtain the sample. Data was collected by use of a questionnaire. Kimani (2016) found out that there was a significant relationship between student-parent interactions and academic achievement of students. The study concluded that academic achivement of the students dependent among other factors on the academic interactions between students and their parents. It was recommended that parents to be involved in the acdemic affairs of their children in order to boost the academic achievement.

Juma (2016) sought to investigate the influence of parental socioeconomic status on students' academic achievement in public secondary schools in Tana River County, Kenya. Amongst other objectives, the study sought to determine the influence of parental involvement in education on students' academic achievement. A descriptive survey design using a sample of 158 students, 17 teachers and 11 parents' representatives was used to

execute the study. Questionnaires were used to collect information from students and teachers while interview schedule was used to collect information from parents. The findings of the study were that parental involvement in education influences students' academic achievement to a great extent. This study was done outside Nakuru County and therefore there is need to carry out the study in Nakuru County to find out if the results would be comparable.

A study by Nyaboke (2015) on factors influencing teacher student interaction in public and private secondary schools in Matungulu Sub-county found that students that came from homes that had high moral values were more interactive than those from insecure family backgrounds. The researcher used descriptive survey research design whereby a questionnaire was used as the instrument for data collection. A total of 120 respondents was sampled using purposive sampling technique for students and simple random sampling for teachers. The study revealed that parents were concerned about the educational aspects of their children. However, the study did not indicate interaction levels of students with their parents and how their interactions affect student academic achievement. The identified conceptual research gap was filled by this current study that sought to determine the relationship between student-parent academic interaction and academic achievement in public secondary schools in Nakuru County.

Nadenge (2015) set out to investigate critical parental socioeconomic factors effecting the academic achievement of students in selected secondary schools in urban informal settlements in Westlands District in Nairobi County. The study focused on aspects such as parental occupation, parental involvement in learning activities and parent-teacher relationship. The study used descriptive survey design and a sample of 125 respondents comprising of 91 students, 18 teachers and 16 parents. The study employed questionnaires for students, Focus Group Discussions for teachers and Interview schedules for parents in data collection. Among many other findings, the study found out that parent-teacher relationship and their involvement in their children's academic achievement was positively correlated. The proposed study is however different from the reviewed study for it will focus on student-parent academic interactions rather than teacher-parent relationship and therefore a conceptual gap that this current study sought to fill.

A further study by Ntitika (2014) on parental characteristics influencing students' academic achievement in public secondary schools in Isinya District highlighted various aspects of student-parent interaction. The study focused on parental attitude, education level and economic status. The study utilized descriptive survey research design. The study used a sample of 42 PTA members, 150 students and 4 principals in public secondary schools in Isinya District. The researcher used questionnaires and interview guides to collect data. The study found out that 29% of the students indicated their parents were involved with their homework. This particular study by Ntitika (2014) did not however show the relationship between the parent involvement in student homework and academic achievement which is the focus of this proposed study. The reviewed study is conceptually different from this current study since it focused on parental characteristics such as education level, parental attitude and economic status while the current study will focus on student-parent academic interactions. This proposed study will endeavour to fill in the identified research gaps.

In investigating how home-based factors influenced KCSE performance in public day secondary schools in Lari District, Kiambu County, Mwaura (2014) sampled 86 Parents Teachers Association members and 138 teachers. Questionnaires and interview schedules were used for data collection. The study findings indicated that educated parents assist their students in doing their school work. This study further found out that parents' socio-economic status influences the students KCSE performance. The study concluded that the home chores influenced the student's academic achievement. This survey did not involve students and therefore the findings may have been biased. This current study was carried out among students and class teachers. The reviewed study measured academic achievement using KCSE results while the proposed study used end term examinations as a measure of academic achievement.

Focusing in Nakuru County, Koskei (2015) did a study on the influence of parental involvement on students' academic achievement of public mixed day secondary schools in Kuresoi Sub-county in Nakuru County. The study employed *ex-post facto* design. The researcher used stratified random sampling technique. The study involved 6 secondary schools. A sample of 180 form four students was selected to participate in the study. The

finding of this study revealed that parental involvement in education did not significantly influence students' academic achievement. The study used insufficient sample size and only focused on public day mixed schools while the current study was broader in scope for it focused on all public secondary schools; both mixed and day schools.

2.3 Students' Academic Interactions and Academic Self-Esteem

Different scholars have established the link between student interactions with their level of academic self-esteem. Academic self-esteem is defined as the students' self-belief in their potential to perform well academically (Masselink, Roekel & Oldehinkel, 2018). Gunnarsdóttir (2014) carried out a study to establish the effect of student interactions with their parents and fellow students on the level of academic self-esteem. The study was carried out in Iceland by Icelandic Centre for Social Research and Analysis (ICSRA). The study sample 2261 students through random sampling and used Rosenberg self-esteem scale to measure the levels of students' academic self-esteem. The study established that there was a positive and significant correlation between care and warmth interactions with parents and the level of academic self-esteem ($r=0.374$, $p=0.000$ for boys and $r=0.323$, $p=0.000$ for girls). The study further established that conversation about personal issues with parents was positively and significantly correlated to level of academic self-esteem of boys ($r=0.322$, $p=0.000$) and that of girls ($r=0.367$, $p=0.000$). It was also noted that parental interaction through advise on studies was correlated to academic self-esteem levels for both boys ($r=0.316$, $p=0.000$) and girls ($r=0.312$, $p=0.000$). In regard to student interactions with peers. Gunnarsdóttir, (2014) found out that conversation about personal issues with fellow students correlated to student academic academic self-esteem for boys ($r=0.270$, $p=0.000$) and girls ($r=0.239$, $p=0.000$). A correlation coefficient of 0.330 and 0.303 was observed between peer assistance to perform assignment tasks and level of academic self-esteem of boys and girls respectively. This correlation was significant at 5% significance level. The study was done outside Kenya and therefore presenting a contextual research gap for the current study.

In investigating the correlation between academic self-esteem and student academic achievement, Hisken (2011) focused on factors that can lead to high academic self-esteem in secondary school set up. The study used correlational research design and collected data

using questionnaires that were based on Rosenberg self-esteem scale to measure the levels of students' academic self-esteem. The study established that there was a strong positive correlation between peer interactions and students' academic self-esteem at a correlation coefficient of 0.867. The study further established that students who actively consulted with teachers and fellow peers in doing academic assignments had a higher score on Rosenberg self-esteem scale as compared to those who did academic assignments without consultations. The study was however done in United States of America and therefore carrying out the current study in Kenya context filled this contextual research gap.

In the USA, Bathgate (2017) carried out a study to examine how student interactions affect the academic self-esteem of the students. The study was based on descriptive research design and sample 300 students from the secondary school level. The study revealed that the level of student academic self-esteem shifted depending on the level in which the students interacted with fellow students, teachers and parents back at home. It was noted that the student interactions improved the level of the academic self-esteem of the students. In respect to this, the study found out that the students who interacted well in academic aspect with both the teachers and fellow students tended to have better academic motivation compared to those who rarely interacted with fellow students as well as their teachers. The study concluded that there student interactions were significant predictors of student academic self-esteem. The reviewed study was done in USA that might experience differences in the education system and policies and therefore student education may vary in both countries and therefore the need for the current study.

In a study in the United kingdom, Newport-berra (2013) carried out a study to examine the influence for interactions among the students on the academic self-esteem of the students towards learning activities in secondary schools. The study noted that academic self-esteem could significantly be predicted by the students' interactions in the school. It was found that student-teacher interactions had the highest influence on the student academic self-esteem towards learning activities. Interactions between fellow students was also established to boost the level of academic self-esteem of the students to a great extent. The study recommended that enhancement of student and teacher interactions in the school in order to improve the academic achievement of the students. A study to establish the

relationship between the student interactions and academic self-esteem was conducted in Kenya to fill the contextual research gap in the reviewed study.

In Turkey, Wai and Osman (2019) carried out a study to examine the relationship between student academic interactions and the academic self-esteem. The study adopted survey research design and targeted 387 respondents. The study established that there was a positive association between student interactions and their academic self-esteem. It was further noted that a unit increase in the level academic interactions led to 0.257 units increase in the level of academic self-esteem. The students who interacted less with their teachers, fellow students and parents had a low academic self-esteem compared to those who interacted more. The reviewed study by Wai and Osman (2019) was done in Turkey while this study was done in Kenya and therefore a contextual research gap.

A study was conducted by Handreke and Klemenčič (2018) sought to establish the influence of student interactions and academic self-esteem of the students. The study established that those students who actively interacted with fellow students as well as the teachers tended to have a positive attitudes and perceptions towards academics. Interactions of students was seen to be a significant booster of the students' academic self-esteem. This was evidenced in the way the students enjoyed the learning sessions and perceived class lesson as fun. On the other hand, the study revealed that those students that isolated themselves from the rest of students had negative perceptions towards learning. The study recommended that teachers should interact more with the students in order to improve the academic self-esteem of the students.

From Nigeria context, Eremie and Chikweru (2015) carried out a study to examine the levels of student academic self-esteem as informed by peer interactions in private and public secondary school students in Rivers State. The study sought to test the null hypothesis that peer interactions influences the level of academic self-esteem of secondary school students. To test the research hypothesis, the study used descriptive survey research design and population of six secondary schools; three public and there private. Questionnaires were used to collect data for the study. The study established that peer interactions in private schools was higher than that in private schools. Using simple linear

regression, the study established that peer interaction significantly influenced the level of academic self-esteem of student in secondary schools in Nigeria. This was supported by a beta coefficient of 0.789 in a regression model to predict academic self-esteem using peer interaction of students. This influence was statistically significant at 5% significant level. As the reviewed study was done in Nigeria, the current study was done in Kenya and therefore a research gap to be filled.

Still on Nigerian context, Kpolovie, Joe, and Okoto (2014) carried out a study to examine the influence of academic self-esteem of students on the academic achievement of the students. The study used descriptive research design and a sample of 518 students picked from secondary school in Nigeria. Questionnaires were used for data collection. Using simple linear regression, the study established that academic self-esteem of the student predicted the level of academic achievement of the students. It was in this respect established that when there was an increase in the level of academic self-esteem among students, their academic motivation also improved significantly. The study recommended the increase in the motivation sessions of students towards academic activities in order to improve academic outcomes of the students during examinations.

In the Democratic Republic of Congo, Torrente *et al.* (2015) carried out a study to examine how classroom interactions could improve the motivation of students towards learning. This study used descriptive research design and targeted secondary school students in Democratic Republic of Congo. Data for the study was collected through the used questionnaires. The study revealed that student interactions with fellow students and teachers boosted the motivation of students towards learning and also increased their confidence in facing examinations. Student interactions was also found to be a significant predictor of student academic self-esteem. It was further noted that those students that actively interacted with their teachers were found to enjoy learning compared to those who had limited time period with their teachers. This study presents a contextual research gap for it was done in Democratic Republic of Congo while the current study was done in Kenyan secondary schools.

In Kenyan context, Wambui (2015) carried out a study to examine the relationship between student-parent academic interactions on academic self-esteem of students in Kikuyu Sub-County in Kiambu County. The study used correlation research design to achieve its objectives. Stratified sampling was used to select the secondary schools to participate in the study while simple random sampling was used to select students to be respondents to the study. Data was collected by use of questionnaires. The study established that there were significant differences in the level of academic self-esteem of boys and girls, with boys having higher scores of academic self-esteem. This was attributed to parental interactions where the study established that boys interacted with their parents more frequent than girls. Using Pearson correlation, the study established there was a moderate correlation coefficient between student to parent interaction and the level of student academic self-esteem. While the reviewed study was done in Kiambu County, the current study was done in Nakuru County which is more cosmopolitan than Kiambu County and therefore a contextual research gap.

Okoko (2014) did a study to establish among other objectives the influence of student interactions with teachers and peers on their level of academic self-esteem in Ndhiwa District in Kenya. To achieve the objectives of the study, Okoko (2014) used descriptive research design and targeted form four students in Ndhiwa District. Open and closed ended questionnaires were used to collect data for the study. It was established that student interactions with teachers, peers and parents as well as co-curriculum activities influenced students' academic self-esteem. It was further established that those students who interacted more with their teachers were inspired to obtain their first degree (at a frequency of 87%) unlike students who did not frequently interact with their teachers. However, the study did not statistically test the influence and only relied on perceptions of respondent and therefore the current study used inferential statistics to test the relationship between the two variables to close this research gap. Again, the study was done in Ndhiwa Sub-County in Homabay County and the current study was done in Nakuru County which is more cosmopolitan than Homa Bay County and therefore a contextual research gap.

A study by Munanu and Kobia (2016) sought to find out the effect of parenting on levels of academic self-esteem of adolescent students in secondary schools in Nairobi County.

The study used a sample of 454 secondary schools students randomly selected from 6 day secondary schools in Nairobi County. The study established that authoritarian parents did not have time to associate and interact with their children and this influenced the level of academic self-esteem. In this regard, the study established that time expenditure in interacting with children was positively correlated to level of student academic self-esteem at a correlation coefficient of 0.686 which was significant at 5% confidence level. It was further established that students who interacted more with their mothers as opposed to their fathers had a significantly higher level of academic self-esteem. As the study was done on day secondary schools, a contextual research gap to be filled in the current study that will focus on all types of secondary schools.

2.4 Students' Academic Self-Esteem and Academic Achievement

Empirical studies in Kenya and outside Kenya have shown relationship between academic self-esteem and academic achievement of student in diverse ways. From Pakistan, Muhammad *et al.* (2015)carried out a study to establish the relationship between academic self-esteem and academic achievement of secondary school students. A total number of 80 students comprising of 40 male students and 40 female students was used. The study used purposive sampling to select the study participants. The study found out that there was a significant relationship ($r=0.879$, $p<.01$) between academic self-esteem and academic achievement. There was a significant difference on academic self-esteem and academic achievement scores between male and female students. Female students had high scores on academic achievement as compared to male students while male students had high scores on academic self-esteem as compared to female students. Due to the use of purposive sampling in the reviewed study, the study findings may be biased. This proposed study sought to fill this methodological gap by using random sampling to select respondents for the study. This current study was rich in that it will utilize a large sample size as opposed to a sample size of 80 respondents used in the study by Muhammad *et al.* (2015)

In Azerbaijan Democratic Republic, Muhammud (2015) carried out a study to find out the Relationship between Academic self-esteem and Academic Achievement among Pre-University Students. The study aimed at identifying whether there are differences between the academic achievement of boys and girls based on their levels of academic self-esteem. The study used academic achievement results from previous semester exams. A total of 50

girls and 50 boys was randomly chosen to participate in the study. The study established that there was a significant ($p<0.01$) positive relationship between academic self-esteem and academic achievement of pre-university students. Also the study found out that there existed significant differences between academic achievement of girls and boys. However, the study found out that there was no significant differences between the academic self-esteem of boys and that of girls. The study concluded that academic self-esteem is a good predictor of academic achievement. The small sample size used in the reviewed study and limits its generalization.

Phil, Sattar, Khan, and Phil (2014) carried out a study to investigate the influence of academic self-esteem on the academic achievement of students in Pakistan. The study used a meta-analysis and whereby it was established that students with high academic self-esteem tended to achieve higher academic grades than those with low academic self-esteem. The study recommended that students develop positive perception towards academic activities in the school and therefore leading to better academic achievement of the students. This was also in line with a study by Srivastava and Joshi (2014) who found a positive relationship between student academic self-esteem and academic achievement of the students. Both studies were carried out using meta-analysis approach and therefore resulting to a methodological research gap that the current study sought to achieve.

In the United Kingdom, McClowry *et al*. (2013) carried out a study to examine among other factors the influence of academic self-esteem on academic achievement students. The study was based on correlational research design and targeted students in secondary level of education. Data for the study was collected through the use of questionnaires and interviews. From the study, it was found out that there was a significant correlation between student academic self-esteem and the academic achievement of the students at secondary school level. The study further noted that academic self-esteem was a significant predictor of academic achievement of students. It was recommended that teachers should motivate their learners to develop positive perceptions and attitudes towards learning.

A study by McGaha-Garnett (2017) sought to establish among other objectives the influence of academic self-esteem on the academic achievement of students from Oklahoma State in the United States of America. The sampled both student and teachers through the use of questionnaires and interviews respectively. From the collected data, it was established that student with high academic self-esteem achieved high mean grades in their academics and the vice versa. It was revealed that there was a significant relationship between the academic self-esteem and academic achievement of the students. In respect to this, it was further revealed that academic self-esteem of students significantly predicted the academic achievement of the students. The study opened a research gap for a study to be carried in Kenyan context.

A study carried out in the United Kingdom by Vass *et al*. (2015) sought to investigate the influence of academic self-esteem on the academic achievement of students among other objectives. The study used cross-sectional research design. Questionnaires based academic self-esteem inventories were used to measure the level of academic self-esteem while the academic achievement of students as measured using academic scores form internal examinations. The study revealed that there was a negative association between low academic self-esteem and academic achievement of students. It was in this regard noted that a low academic self-esteem led to hopelessness in achieving the targeted academic results. The study recommended the motivation of students towards better academic achievement through changing their attitudes toward studies. The study was carried out outside Kenya and therefore creating a contextual research gap. Turkey

Alyami, Melyani, Johani, and Ullah (2017) carried out a study to investigate the influence of academic self-esteem on the academic achievement of students. The sample size of the study comprised of 214 students. The study used Rosenberg Self-Esteem Scale (RSES) to measure the level of student academic self-esteem. The study established that there was a moderate correlation (r=0.488) between student academic self-esteem and academic achievement. Students with high academic self-esteem were seen to perform better in academics than those with low academic self-esteem. The researcher recommended that students to be boosted on their academic self-esteem through motivational talks as well as rewarding good academic achievement. Alyami, Melyani, Johani, and Ullah (2017)

measured academic achievement through the use of Academic Self-Efficacy (ASE) while the current study will measure academic achievement through the use of examination results and therefore a methodological research gap that the current study sought to fill.

The relationship between academic self-esteem and the academic achievement was examined by Durmaz (2016) in a study on secondary school student mothers in Turkey. The study adopted quasi-experimental research design and targeted all girls attending secondary schools as mothers. Rosenberg Self-Esteem Scale was used to measure the level of academic self-esteem among the student mothers. The study revealed that there was a positive and significant correlation between student mothers' academic self-esteem and their level of academic achievement. It was in this regard noted that the student mothers who were positive perception about childbearing and motherhood outperformed those who has a negative perception on motherhood as students. The study by Durmaz (2016) was on student mothers while the current study will be done on general students in secondary school regardless on their parenting status. This therefore presented contextual research gap for the current study.

Serati (2015) carried out a study to examine the relationship between academic self-esteem and academic achievement of secondary school girls in Iran. The study used a sample size of 100 students and applied stratified cluster random sampling method to select the students. Coppersmith's Self Esteem Questionnaire was used to gather data on the self-esteem of the girls. The study revealed that there was a significant relationship between the level of academic self-esteem and the level of academic achievement of the students. It was in this respect revealed that those students that were highly motivated towards higher academic grades and entire activities of school learning had a better academic achievement as compared to those who were less motivated towards the same. The study recommended that students to be more motivated towards improving their academic self-esteem. This study was done on secondary school girls while the current study was done on both the girls and boys and therefore a contextual research gap.

In Pakistan, Farhan (2015) carried out a study to examine the effect of academic self-esteem and student academic achievement. The study used cluster random sampling to select a sample of 300 students to participate in the study. The student stress was measured using of Rosenberg self-esteem scale. The study revealed that there was no significant correlation between academic self-esteem and the academic performance of students. The academic performance was evaluated in respect to achievement in literature while the current study will be done in respect to all subjects and therefore broad scope and hence a conceptual research gap. In addition, the study was done in Pakistan while the current study will be done in Kenyan context and therefore a contextual research gap.

On Nigerian context, Akaase and Okpechi (2018) sought to investigate the relationship between academic self-esteem and academic achievement of the students in mathematics and English Language. The study sampled 345 students from 15 secondary schools in Cross River State. Simple random technique was used in the selection of the sampled respondents. The findings showed that there was a significant difference in the academic success of students with positive academic self-esteem than those with negative academic self-esteem. It was concluded that academic self-esteem significantly influenced students' academic success. Based on findings of the study, it was recommended that students should boost their academic self-esteem as it is an important factor that strengthens the prediction of academic success in Mathematics and English Language. It was further noted that there should be school counseling intervention in improving academic self-esteem among students. Students should be trained on how to improve greatly in their academic self-esteem and academic efficacy. The study was done in Nigeria and the current study was done in Kenya and therefore different since the two countries have different education system.

Maruyana *et al*. (2016) did a study on the influence of academic self-esteem on academic achievement among secondary school students in Nigeria. The study set out to test the null hypothesis that there is no significant difference between academic achievement of students with high academic self-esteem and students with low academic self-esteem. The researchers used descriptive research design and their target population was the public

secondary school students in Ondo State Nigeria who were in senior secondary school. A sample of 240 students from six schools was utilized. In testing the null hypothesis of the study, it was found out that there was significant difference between academic achievement of students with high academic self-esteem and students with low academic self-esteem. The study rejected the null hypothesis and concluded that students with high academic self-esteem perform better in school work than students with low academic self-esteem. This study was done outside Kenya and therefore this study seeks to fill this contextual gap by carrying out the proposed study on Kenyan context.

Okolo, Ofielu, Nebo, and Nebo (2017) carried out a study to examine the factors that affect the academic achievement of secondary school students in Nigeria. The study was based on exploratory research design. The study collected data from 200 students and 25 class teachers. Among the factors that the study established to influence the academic achievement of students included student academic self-esteem. In respect to this, the study found out that there was a significant relationship between student academic self-esteem and the academic achievement of students. It was noted that students who were academically motivated performed better in their examinations compared to those who had low academic self-esteem. The study recommended teachers and parents to motivate the students in order to improve their academic achievement.

On Kenyan context, Kithela (2016) carried out a study to investigate how school type was related to academic self-esteem, academic achievement and career aspirations of secondary school students. The study targeted public students in the form 4 class. The study used a sample size of 480 students from 79 public secondary schools within Nairobi County. The study used correlation design whereby data was gathered by use of questionnaires with standardized scales. Kithela (2016) found out that there was significant relationship between school type and academic self-esteem of students, academic achievement and career aspirations. In this regard, the study found out that most of the students from national and extra-county schools had high academic self-esteem, and aspired for high professional careers compared to majority of sub-county students' who exhibited low academic self-esteem and aspired for low-level careers. The study did not however establish the relationship between academic self-esteem and academic achievement which is the focus

of this proposed study. Again, the reviewed study used form four students to gather its data while the current study used form three students who may have different levels of academic self-esteem from form four students.

Focusing on student intrinsic factors, Mutua (2014) carried out a study on academic motivation and self-regulated learning as predictors of academic achievement of students in public secondary schools in Nairobi County, Kenya. The main aim was to determine a prediction model of secondary school students' academic achievement given academic motivation and self-regulated learning. The study adopted an *ex post facto* research design and was located in Nairobi County, Kenya. The target population was all the year 2012 form three students in public secondary schools in Nairobi County. The sample consisted of 938 form three students selected from 10 public secondary schools. Purposive, stratified and simple random sampling procedures were used in the selection of schools and participants. Among the metric of self-regulated learning, the study established that there was significant relationship between academic self-esteem and academic achievement of the students. The study presents a contextual gap in that it was done in Nairobi that covers urban areas while the current study was done in Nakuru that covers both urban and rural areas.

2.5 Theoretical Framework

This study used three theories, which are; Self- Determination Theory, Maslow's Hierarchy of Needs Theory and Goal Theory. The three theories were chosen in order to guide the study in respect to the three variables of the study, namely; academic interactions, academic self-esteem and academic achievement of students in public secondary schools in Nakuru County. Self- Determination Theory was used to guide the study in regard to students' academic interaction, Maslow's Hierarchy of Needs Theory will guide the study in regard to academic self-esteem while Goal Theory was used to guide the study in respect to academic achievement.

2.5.1 Self-Determination Theory

Self- Determination Theory was developed by (Ryan & Patrick, 2001). The theory states that students need to feel a sense of competence, a sense of relatedness to others, and a sense of autonomy (Anderman, Midgley, Wigfield & Eccles, 2001). When these factors are satisfied, self-motivation is enhanced and mental health, when thwarted it leads to diminished motivation and wellbeing. These psychological needs and processes are considered important in the domain of education. Competence involves having the knowledge to complete various school tasks and also believing that one can do so. Autonomy on the other hand includes initiating and regulating one‘s tasks. Competence enables students to feel confident, accepted, and related to those around them. This creates an environment that determines the level of interaction and whereby a student interacts with fellow students, teachers and parents. This also regulates the amount of acceptance and academic achievement of the student (Urdan & Midgley, 2003).

The student academic interaction is an important and powerful motivator for the development of the need for competence and autonomy within the learning environment since teachers assigns students some work to accomplish. A study by Fatih (2016) shows that students who believe that they are competent academically are more likely to be interested in academic and school tasks. Similarly, when teachers and parents support children’s basic psychological needs and provide a conducive learning environment through healthy interactions, they are simultaneously promoting more positive student-parent and student-teacher academic interactions (Wang & Holcombe, 2010). Within this type of environment, students report greater levels of competence, autonomy, and positive relatedness as supported by this theory (Urdan & Midgley, 2003).

Ryan and Patrick (2001) further investigated the importance of relatedness in the context of student-student academic interactions. Students spend more time with their peers than with their teachers and parents which forms friendship and more interactions that are closer and more intense than before. The results by Ryan and Patrick (2001) showed that the peer groups accounted for change in students’ achievement in the school. Therefore this theory

is relevant and useful in explaining student interactions in schools and how the level of interaction could affect students' academic achievement.

2.5.2 Maslow's Need Hierarchy Theory

Maslow's Need Hierarchy theory was developed by Abraham Maslow in 1954. The theory states that human beings are motivated by intrinsic needs. According to Maslow (1954), the needs follow a specific hierarchy. The first hierarchy of needs is physiological needs and includes the most basic needs such as warmth, water, rest, food. The second hierarchy is safety needs which includes personal security, financial security, health, wellbeing and protection. The third hierarchy of needs is love and need to belong (affiliate). This hierarchy includes needs such as intimate relationships and friends. The fourth hierarchy of needs is esteem and comprises of needs such as respect, feeling of accomplishment, prestige and confidence. The fifth and last hierarchy of needs is self-actualization needs (Hasebur Rahman & M. Nurullah, 2015). This hierarchy comprises of fulfilling one's full potential as well as creatives needs.

Maslow's Need Hierarchy theory further states that lower needs must be satisfied before one can progresses to the next level of needs (Einstein et al., 2016). Maslow's theory classifies needs into two subsidiary sets. The first set is conceptualized on the desire for strength, for achievement, for adequacy, for confidence in the face of the world, and for independence and freedom. The second set involves the desire for reputation or prestige, recognition, attention, importance or appreciation. The second set is mainly concerned about respect or esteem from other people. Therefore the desire to achieve more for self-actualization purposes is central to Maslow's theory of hierarchy of needs. In school set up, once a student achieves certain level of recognition or attains a specific level of academic achievement, the student will thereafter desire more academic achievement. To achieve higher targets, the student will needs more psychological "appetite" which in this study is conceptualized to be academic self-esteem. Academic self-esteem acts as a psychological drive that seeks higher levels of self-actualization (Bean *et al.*, 2013).

However, the desire to achieve more according to Maslow's Theory is within the potential of one's self. It refers to the need to do what one is fitted for. It refers to the desire for self-fulfillment, that is, the tendency for one to become actualized in what is potentially capable of. This is the desire to become more and more what one is or to become everything that one is capable of becoming. The process in which students exploit their potential through the desire to become more and more of their self is sufficiently explained by Maslow's Theory. This study will apply this theory in the context of students seeking more academic achievement and therefore believing in themselves that they can achieve higher levels of academic achievement. This believe was conceptualized as the academic self-esteem that a student needs to achieve higher academic achievement than previous results. Therefore Maslow's theory was used to explain how academic self-esteem among the students affects their level of academic achievement. This theory has been used by other researchers in related studies as the current study. These researchers include (Kithela, 2016) in a study on the relationship among school type and secondary school students' academic self-esteem, academic achievement and career aspirations in Nairobi County. Maruyana *et al.*(2016) used the same theory on the influence of academic self-esteem on academic achievement among secondary school students.

2.5.3 Goal Theory

Goal theory is the theory used in educational psychology to describe how students' academic self-esteem leads to higher academic grades. Goals of learning are thought to be a key factor influencing the level of a student's intrinsic motivation. The Goal Theory proposes that there are two types of motivation for achievement in school. These types are; Performance goal orientation and task goal orientation. Students with performance goal orientation are interested in getting good grades or having a higher academic achievement as compared to fellow students (Anderman & Midgley, 1997). On the other hand, students with a task goal orientation are motivated in increasing their knowledge on the subjects offered in school and enjoy in learning new concept. Task goal orientation enables students to engage in challenging tasks and are motivated in applying cognitive strategies, to understand a concept if seek assistance (Elliot, 2006).Both performance goal orientations and task goal orientation are also associated with academic achievement of students (Kaplan & Maehr, 2007).

Urdan and Midgley (2003) further improved the goal theory by describing four types of goals based on social interaction of students. These goals are social approval, social compliance, social solidarity, and social concern. In social approval, a student engages in academic activities in order to be approved or recommended for good work done. In social compliance, student does what is right and recommended to do in terms of academic achievement. Urdan and Midgley (2003) described social solidarity as a situation whereby students work together for a common good which is witnessed through group discussion and class debates among other activities that promote academic achievement. Students in a school setup always want to achieve the objective of them being in school and also the expectations of their parents as explained in social concern goal.

Browne and Cudeck (1993) investigated the goal theory and found that students showed characteristics of four different goal orientations: work avoidance, social affiliation, social responsibility, and social concern. Work avoidance related to students attempting to avoid class work or copying from other students. This also covers off-task behaviors witnessed in lazy students. Social affiliation orientation on the other hand is whereby students work with their peers which creates a sense of belonging and this helps them work more effectively and promoted positive feelings toward learning. Browne and Cudeck (1993) asserted that students with a social responsibility goal orientation were motivated by a desire to fulfill their role expectations. These included parent, teacher, and peer expectations such as participating in extracurricular activities, helping fellow peers and behaving responsibly if in student council position. Students feel proud of themselves and satisfied when they meet these expectations. Lastly, students with a social concern orientation work hard to succeed so that they could then help others.

This theory applies to this student in explaining the academic achievement of students in secondary schools. The students have different motivations towards their academic achievement and these reasons are outlined in the goal theory. The goal theory has been used by Luo *et al*. (2014) to examine the self-construal and students' math self-concept,

anxiety and achievement. This theory has also been previously used by related studies in Kenyan context, for example by Mutua (2014) in studying academic motivation and self-regulated learning as predictors of academic achievement of students in public secondary schools in Nairobi County, Kenya. Therefore the theory will effectively guide the study in regard to student achievement.

2.6 Conceptual Framework

In examining the relationship among students' academic interactions, academic self-esteem and academic achievement, the study hypothesizes the association among the variables as shown in Figure 1. The figure shows a cyclic relationship among the three variables of the study. This study focuses on student-student academic interactions, student-teacher academic interactions, student-parent academic interactions, students' academic self-esteem and academic achievement as the variables of the study. Other factors that this study conceptualizes to affect academic achievement were student IQ, the availability of learning resources and student academic culture. The study standardized the results of students' academic achievement using $\hat{Z}$-score based on each school mean grade from which the students were chosen.

Independent/Dependent Variables

Independent/Dependent Variable

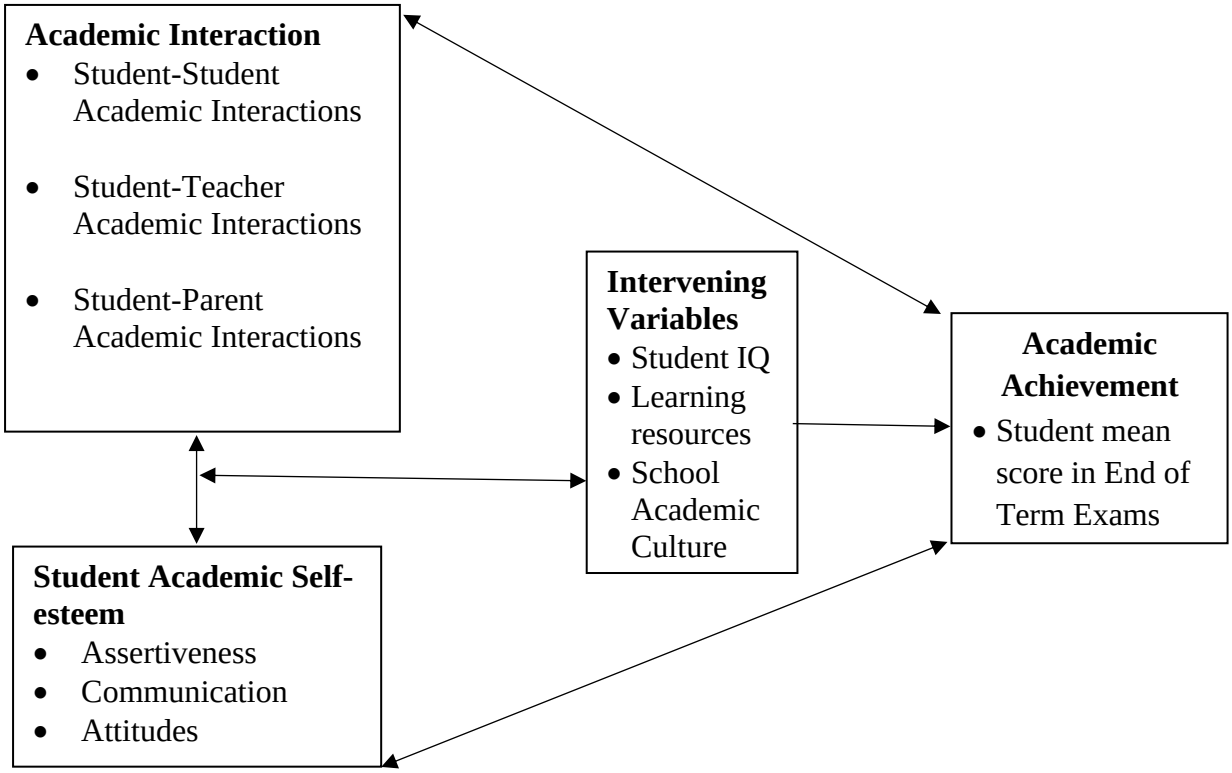

Figure 1: Students' Academic Interactions, Academic Self-Esteem and Academic Achievement of Students and their Relationships

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was used by the study. It contains the research design, study location, population of the study, sampling procedures and sample size, instrumentation, data collection procedures and concludes by explaining how data analysis was done.

3.2 Research Design

This study used correlational research design to integrate different components of the study to meet the study objectives. Correlational research design involves establishing the relationships that exist between variables of a study (Mugenda & Mugenda, 2013). Correlational research design is advantageous in that it enables the researcher to establish association or link between variables and also the strength of such association (Sekaran, 2003). Through this design, the researcher established the relationships among students' academic interactions, students' academic self-esteem and student academic achievement. This study yielded both quantitative and qualitative data and therefore the study used both quantitative and qualitative research approaches. Quantitative approaches involve the use of figures and mathematical formula to describe a phenomenon in a study. On the other hand, qualitative approaches are used to complement the quantitative approaches by giving more details why certain results were obtained (Saunder, Lews & Thornhill, 2009). The reason for the use of both the qualitative and quantitative approaches was to enrich the study.

3.3 Study Location

This study was carried out in Nakuru County which has a diverse population of 2,162,202 (Kenya National Bureau of Statistics, 2019). There was a total of 408 secondary schools in Nakuru County that comprises of 307 public secondary schools and 101 private secondary schools. These schools had a total enrolment of 110,025 students with 93,235 of them in public secondary schools and 16,790 in private schools. There were 56,351 boys and 53,674 girls in the 408 secondary schools in Nakuru County (Nakuru County Director of Education, 2018). As seen in Table 1, the academic achievement of most sub-counties of

Nakuru County had been below the national mean grade for the year 2013-2017. The academic achievement of Nakuru County was also lower compared to some of the counties in Kenya. The low academic achievement of secondary schools in Nakuru County warranted an investigation. In addition, Nakuru County covers urban, peri-urban and rural sets ups and therefore increased the generalizability of the study findings and this makes Nakuru County ideal for this study. Nakuru County is a cosmopolitan and therefore there was an enhanced diversity in terms of the background of the study participants.

3.4 Population of the Study

This study targeted all form three students from 294 public secondary schools in Nakuru County. This implies that 13 public secondary schools did not have a form three class since all public secondary schools in Nakuru County were 307. All the target population was accessible and therefore the accessible population was equal to the target population. The study targeted public secondary schools because they were the majority (84.74%) in Nakuru County and that were run by the government which implies that they had relatively homogeneous characteristics, hence more likely to have low standard deviations. Form three students were preferred because by the time of this study they were in secondary school for about three years out of the four years of secondary education and had selected the subjects for KCSE examination. At form three, most students tend to become serious with their studies by working hard. The hard work is hoped to have resulted in defined academic self-esteem and student interactions towards academic goals. At form four level, most students are left to revise for themselves since most schools aim to complete syllabus in form three thus lower academic interaction between them and teachers. There is approximately 23,309 (11,938 boys and 11,371 girls) form three students, from the 294 public secondary schools in Nakuru County (Nakuru County Director of Education, 2018). Table 2 summarizes the target population of form three students based on the type of school.

Table 2

Population of Form Three Students

Type of Category	**No. of Schools**	**Form Three Students**	
		Boys	**Girls**
Mixed Day	257	6,943	6,614
Girls' Boarding	22	_	5,550
Boys' Boarding	13	3,885	_
Mixed boarding	2	162	155
Total	**294**	**10,990**	**12,319**
		23,309	

Source: Nakuru County Director of Education (2018)

In addition to the students, class teachers were also incorporated in the study. This is because class teachers spend a lot of time with the students hence had more knowledge on student academic interactions, academic self-esteem and academic achievement which were the variables of this study. This also helped in cross-checking with students' feedback and also in meeting data triangulation requirement for the study.

3.5 Sample Size and Sampling Procedure

The sample size for schools was determined by using Mugenda and Mugenda (2013) criteria of 10% of the target population. Kothari (2004) also recommends the use of at least 10% of the population as the sample size. Using the criteria of 10% of target population, 29 public secondary schools out of a total of 294 schools were sampled for this study. On the other hand, the sample size for form three students was determined using Krejcie and Morgan (1970) formula as follows;

$$S = \frac{X^2NP(1-P)}{d^2(N-1)+X^2P(1-P)}$$

Where:

S = Required Sample Size

X = Z value taken as 1.96 for 95% confidence interval

N = Population Size

P = Population proportion assumed to be 0.5

d = margin of error, taken as 0.05

Upagade and Shende (2012) recommends the use of Krejcie and Morgan (1970) formula for finite population. Substituting into the formula;

$S = [1.96^2 \times 23{,}309 \times 0.5(1-0.5)] / [0.05^2(23{,}309-1) + 1.96^2 \times 0.5(1-0.5)]$

$S = 377.947196$

S = 378 form three students

Using stratified random sampling procedure, the study selected 29 public secondary schools in Nakuru County and 378 form three students. The type of the school was used as the stratification criteria. In addition, the sub-county from which the schools are located was considered in the stratification in order to ensure that there was no biasness based on geographical location of schools. In doing this, the sampled respondents were representative of all the nine sub-counties in Nakuru County as well as all the four types of secondary schools, namely; Mixed Day, Girls' Boarding, Boys' Boarding and Mixed Boarding secondary schools. Therefore, 25 Mixed Day, two Girls boarding, one Boys' Boarding and one Mixed Boarding secondary schools will participate in the study.

From each stratum, the number of students to be selected was determined by the stratum size and after which the individual students were selected randomly. In random sampling of students, the researcher first asked for the list of form three students who had participated in the previous three end of term examinations. Secondly, the researcher made paper folds equivalent to the number of students in the list obtained. Thirdly, the researcher put a mark in form of a tick on the paper folds equivalent to sample size of students required in the particular school and left the rest unmarked. Finally, the papers were mixed in a basket and the form three students asked to pick one paper fold per student. Those who had picked paper folds with the mark were requested to take part in the study. One class teacher from each of the 29 selected public secondary school in Nakuru County was selected to participate in the study using purposive sampling. In respect to this, class teacher from one of the form three classes with highest number of students was selected to participate in the study. The total sample size for this study was 407 respondents comprising of 197 boys,

181 girls and 29 class teachers. Table 3 shows the distribution of the sample size across the four school types.

Table 3

Sample Size Distribution of Schools and Students

Type of school	**Sample Size**			
	Schools	**Students**		**Class Teachers**
		Boys	**Girls**	
Mixed Day	25	124	85	25
Girls' Boarding	2	-	91	2
Boys' Boarding	1	65	-	1
Mixed Boarding	1	8	5	1
Sub-Total	**29**	**197**	**181**	**29**
Grand Total				**407**

3.6 Instrumentation

The study used both primary data and secondary data. For primary data, the study used closed-ended questionnaire to gather data on student academic interactions and academic self-esteem from students and guided interview schedule to collect data from class teachers. According to Clements and Sarama (2016), closed-ended questionnaires provide a quick way of data collection since they provide a multiple choice to each question. Questionnaire provided privacy to respondents since they can responded to the questions without interference of researcher or subjects being evaluated by the questionnaire. These are some of the considerations for the choice of this research tool. The questionnaire was structured into five sections. The first section gathered data on basic information of respondents, namely; student's gender and age.

3.6.1 Student-Student Academic Interaction Questionnaire

The second section focused on student-student academic interaction. The student-student academic interaction was measured in terms of the frequency of seeking academic assistance from fellow students, level of encouragement among students, level of

participation in group work and level of sharing of learning resources. 10 items were used to in the Student-Parents academic interaction questionnaire which was self-adopted reliable and validated. The instrument was based on the five point likert scale as follows; Never = 0, Rarely = 1, Sometimes = 2, Usually = 3, and Always = 4.

3.6.2 Student-Teacher Academic Interaction Questionnaire

The third section of the questionnaire sought to gather data on student-teacher academic interaction. The student-teacher academic interaction was measured in terms of the frequency of asking and answering questions, value of teachers' feedback, students' completion of teachers' assignment and availability of teachers for academic consultation among others. 10 items were used to in the Student-Teacher academic interaction questionnaire which was self-adopted reliable and validated. The instrument was based on the five point likert scale as follows; Never = 0, Rarely = 1, Sometimes = 2, Usually = 3, and Always = 4.

3.6.3 Student-Parent Academic Interaction Questionnaire

The fourth section of the questionnaire obtained data on student-parent academic interaction which was measured in terms of the extent of parents' provision of learning resources, making sure their students gets homework done, quality of the learning environment at home and parents' ability to monitor students' academic progress among others. 10 items were used to in the Student-Parents academic questionnaire which was self-adopted reliable and validated. The instrument was based on the five point likert scale as follows; Never = 0, Rarely = 1, Sometimes = 2, Usually = 3, and Always = 4.

3.6.4 Student Academic Self-Esteem Questionnaire

The last section of the questionnaire was on student academic self-esteem which was measured in terms of student assertiveness in class tasks, ability to communicate in class, attitudes towards self in regard to learning capabilities and ability to take leadership role in group discussions among others. 10 items were used to in the Academic self-esteem scale which was adopted and adjusted using Rosenberg Self-esteem Inventory. The research questionnaire was based on a five-point Likert scale as follows; Never = 0, Rarely = 1, Sometimes = 2, Usually = 3, and Always = 4.

3.6.5 Class Teachers Interview Schedule

Interviews for class teachers were used to complement the data collected from students. The interview schedule guides and questionnaires were in line to the research objectives. They specifically contained closed ended and open-ended questions in regard to student academic interactions and academic self-esteem. Interviews are advantageous in that, through interviews more information may be obtained through follow-up questions (Kothari, 2004). Using interviews for class-teachers, in-depth information was obtained in regard to student academic interactions and student academic self-esteem.

3.6.6 Academic Achievement Pro forma

For secondary data, the study obtained the data on student academic achievement from examination records. Academic records for the previous three End of Term Examinations were considered in this study. Since different schools take different exams that are of different degree in complexity, the examinations results were standardized using both the Z-Score and t-score in order to make the results comparable.

3.7 Validity of the Research Instrument

Validity of the research instruments was achieved through constructing questionnaires and interview schedule in line to the research objectives of the study. Additionally, the two supervisors of this study and lecturers from the Faculty of Education and Community Studies Egerton University cross checked whether the research instruments measured what the study claims to measure. The faculty supervisors and lecturers also advised on aspects that needed to be improved on the research questionnaires and interview schedule. Their recommendations were used to improve the research instruments. The research instruments therefore measured what the study intended to measure.

3.8 Reliability of the Research Instrument

To test the reliability of research instruments, the researcher conducted a pilot study of the instruments. Sekaran (2003) recommend a number of respondents equivalent to 10% of the sample size to be used in a pilot study. Therefore, 38 form three students from one public secondary school from Laikipia County took part in the pilot study. The secondary schools

in Laikipia County had almost similar academic performance and the county was also a neigbouring county to Nakuru county and therefore the reason for selection in the pilot study. The data obtained from the pilot study was used to test the internal consistency of the research instrument using Cronbach's Alpha coefficient. Mugenda and Mugenda (2013) recommend a Cronbach's Alpha coefficient of at least 0.7 to confirm the reliability of the research questionnaire. The reliability of the research instruments was as shown in the Table 4.

Table 4

Reliability of the Research Instruments

Variable	Number of Items	Cronbach's Alpha
Student-Student Academic Interactions	10	0.870
Student-Teacher Academic Interactions	10	0.871
Student-Parent Academic Interactions	10	0.875
Student Academic Self-Esteem	10	0.873
Overall Questionnaire Reliability	40	0.872

The Cronbach's Alpha coefficient for the student-student academic interactions construct was found to be 0.87 that for Student-teacher academic interactions was 0.871, 0.875 for Student-parent academic interactions and reliability coefficient of 0.873 for Student academic self-esteem construct. The overall questionnaire reliability was 0.872. The achieved reliability coefficient implies that the instruments are able to yield consistent data each time is used on the same group of target respondents. This is according to the recommendation of Mugenda and Mugenda (2003) that a reliability coefficient a research work should be at least 0.7.

3.9 Data Collection Procedures

In preparation for collecting data, the researcher requested a letter of introduction and permission from postgraduate school of Egerton University. The researcher then applied for a permit from the National Commission for Science, Technology and Innovations (NACOSTI) to conduct the study in the selected secondary schools in Nakuru County (Appendix G). The researcher also obtained an Authorization letter from Nakuru County Director of Education (Appendux F). The researcher further sought for an authorization letter from Nakuru County Commissioner (Appendix E). After these permits, the researcher made an introductory visit and further sought permission for data collection from school principals of the selected schools. During this introduction visit, the researcher sought for appointment for data collection. On the appointed dates for data collection, the researcher was accompanied by three trained research assistants to assist in administering the research questionnaires to sampled respondents. The research assistants administered questionnaires

to the sampled students. In filling the questionnaires, the students were also requested to write their admission numbers on the questionnaire for the purposes of obtaining their respective academic achievement results from the school examination records. Once the questionnaires were filled, the researcher then requested the school administration to provide the academic achievement results for the sampled students for the previous three end of term examinations. The researcher personally conducted interviews with the sampled class teachers. Interview responses were recorded upon prior consent approval from the teachers.

3.10 Data Analysis

After collecting data from the field, the researcher checked the questionnaires for completeness. Only questionnaires filled to completeness were used for analysis. The response rate of the questionnaire was calculated as a proportion of completed questionnaires over the total questionnaires issued. The filled questionnaires were then coded and entered into the Statistical Package for Social Sciences (SPSS) version 24 for quantitative data analysis. Shirish (2012) says the software has the capacity to analyze complex data collected from the field. Both descriptive and inferential statistics were used in analyzing the data. For descriptive statistics, frequencies, mean and standard deviation were used to describe basic characteristics of the data. For inferential statistics, Pearson correlation analysis was performed to test the first three research hypothesis of the study.

In order to determine the predictive aspects of the variables in this study, the study used the following three multiple regression models as follows;

$Y_1 = \beta_{01} + \beta_{11}X_{11} + \beta_{21}X_{21} + \varepsilon_1$

$Y_2 = \beta_{02} + \beta_{12}X_{12} + \beta_{22}X_{22} + \varepsilon_2$

$Y_3 = \beta_{03} + \beta_{13}X_{13} + \beta_{23}X_{23} + \varepsilon_3$

Where;

Y_1 = Student Academic Achievement

Y_2 = Student Academic Self-esteem

Y_3 = Student Academic Interactions

$\beta_{01}, \beta_{11}, \beta_{21}, \beta_{02}, \beta_{12}, \beta_{22}, \beta_{03}, \beta_{13}, \beta_{23}$ = Model coefficients

X_{11}, X_{22} = Students' Academic Interactions

X_{21}, X_{13} = Students' Academic Self-Esteem

X_{23}, X_{12} = Students' Academic achievement

ε_1 ε_2 ε_3 = Standard errors of estimate

However, multiple regression analysis makes five assumptions that the researcher endeavored to test before carrying out the regression analysis. The study tested the following five assumptions of multiple linear regression that is linearity, normality, multicollinearity, autocorrelation, and heteroscedasticity (Kothari, 2004). Linearity was tested by plotting observed values against predicted values or plotting of residuals values against predicted values. For data to be used in a multiple regression analysis, the data must be normally distributed, an assumption that was tested by use Histograms and Normal Q-Q plots. Multiple regression analysis also assumes that the independent variables are not correlated highly among themselves (multicollinearity of variables), an aspect that was tested using tolerance and Variance Inflation Factor (VIF). This study used Durbin–Watson statistic to test the presence or absence of autocorrelation (serial correlation) in the model. The absence of heteroscedasticity (homoscedasticity), a condition whereby the residuals are equal across the dependent variable was tested using White's test of heteroscedasticity. The multiple regression analysis was only performed if the data had not violated any of the five assumptions of multiple linear regression. Class teachers' responses from interviews were transcribed and uploaded into Nvivo version 12 for content analysis. This yielded qualitative data for the study. The entire findings of the study were presented by the use of tables and narrative form. Table 5 gives the summary of data analysis.

Table 5

Summary of Data Analysis

Objectives of the Study	**Variables**	**Data Analysis Output**
(i) To establish the relationship between students' academic interaction and achievement in public secondary schools in Nakuru County, Kenya.	Students' academic interaction and academic achievement	Frequencies Means Std. Dev Pearson correlation Narrative form
(ii) To examine the relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya..	Students' academic interaction and academic self-esteem	Frequencies Means Std. Dev Pearson correlation Narrative form
(iii) To determine the relationship between students' academic self-esteem and achievement in public secondary schools in Nakuru County, Kenya.	Students' academic interaction and achievement	Frequencies Means Std. Dev Pearson correlation Narrative form
(iv) To predict students' academic achievement using students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya	Students' academic achievement, interaction and academic self-esteem	Multiple regression

3.11 Ethical Considerations

The researcher sought ethical clearance from Egerton University to facilitate the acquisition of research authorization and permit from National Commission for Science, Technology and Innovations (NACOSTI) (Appendix D and Appendix G). The study further obtained research authorization letters from the County Commissioner and the Ministry of education as shown in Appendix E and Appendix F). The study sought informed consent from all the study respondents and through which the respondents were explained on the purpose of the study and how they were selected to take part in the study. Participation to the study was done on voluntary basis. The respondents were assured of the confidentiality of the information that they provided and, in this case, they were guaranteed that their feedback was for academic purposes and would be treated with utmost confidentiality. The respondents were informed of no psychological torture or embarrassment from the study and allowed to fill in the questionnaire at their own free time and privacy. The research instruments did not seek to collect identifying details of the respondents such as their name and school. This implying that the identity of the respondents remained anonymous throughout the study.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the data analysis, presentation and interpretation of the study findings. The chapter is guided by the specific research objectives. The study sought out to examine students' academic interaction, academic self-esteem and achievement relationships in public secondary schools in Nakuru County, Kenya. The chapter presents the response rate, background information of the respondents such as gender and age of the respondents. The chapter further presents the descriptive statistics for the study as well as the inferential statistics. Discussion of the study findings are also presented in this chapter.

4.2 Response Rate of the study

The study sample comprised of 378 students and 29 class teachers. The students were issued with research questionnaires while interviews were conducted for the class teachers. Table 6 shows the response rate achieved in this study.

Table 6

Response Rate

Respondents	**Sample**	**Response**	**Response Rate**
Students	378	332	87.8%
Class Teachers	29	24	82.8%
Total	**407**	**356**	**87.5%**

Out of the 378 questionnaires that were issued to students, 332 questionnaires were correctly filled and returned to the researcher for analysis. This presents a response rate of 87.8% for the students. On the other hand, the study intended to interview 29 class teachers, however, the study was able to interview only 24 class teachers. The other five class teachers were absent from their respective schools which presented a response rate of 82.8% for the class teachers. Overall, out of the sample of 407 respondents, the study obtained responses from 356 respondents and therefore making a response rate of 87.5%. According to Fitzgerald (2015), a response rate of at least 80% indicates that the study findings can be generalized to the target population. This therefore implied that the data

analyzed was adequate for generalization to the target population. The high response rate achieved was as result of prior visitation to the schools by the research and proper authorization to collect data. This led to proper preparation of students to fill in the questionnaires.

4.3 Sampling Adequacy

The study further sought to establish whether the selected sample size for the study was adequate for generalization. This was done using Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The results for sampling adequacy were presented in Table 7.

Table 7

Sampling Adequacy

Student-Student Academic Interactions	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.636
	Bartlett's Test of Sphericity	Approx. Chi-Square	124.712
		df	45
		Sig.	0.000
Student-Teacher Academic Interactions	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.563
	Bartlett's Test of Sphericity	Approx. Chi-Square	107.458
		df	45
		Sig.	0.000
Student-Parent Academic Interactions	Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.544
	Bartlett's Test of Sphericity	Approx. Chi-Square	78.334
		df	45
		Sig.	0.002
Student Self Esteem	Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.500
	Bartlett's Test of Sphericity	Approx. Chi-Square	58.946
		df	45
		Sig.	0.025
Academic Achievement	Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.500
	Bartlett's Test of Sphericity	Approx. Chi-Square	730.894
		df	1
		Sig.	0.000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy is used to measure the adequacy of a sample for factor analysis as well as the amount of variation shared among the study variables. According to Fitzgerald (2015), high values (close to 1) of Kaiser-Meyer-Olkin Measure of Sampling Adequacy indicate that a sample size is adequate and factor analysis may be useful with the data. Kaiser-Meyer-Olkin Measure of Sampling Adequacy value of less than 0.50 indicate a small sample size and the results of the factor analysis would not be very useful. The obtained values for the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was above 0.5 and therefore implying that the sample size was adequate.

On the other hand, Bartlett's test of sphericity tests the hypothesis that variables in a study are unrelated and therefore unsuitable for structure detection. According to O'Gorman and MacIntosh (2014), Bartlett's test of sphericity of less than 0.05 (or the significance level) indicate that a factor analysis would be useful for the data and that variables in a study are related and therefore suitable for structure detection. The significance for the Bartlett's test of sphericity was less than 0.05 and therefore implying that the sample data was adequate for structure detection and that variables in a study are related.

4.4 Characteristics of the Respondents

The information on the background characteristics of the respondents were presented in Table 8 and Table 9.

Table 8

Gender of Students

Gender	**Frequency**	**Percent**
Boys	187	56.3%
Girls	145	43.7%
Total	**332**	**100.0%**

The study established that 56.3% of the respondents were boys while 43.7% of the respondents were girls. This implied that in public secondary schools in Nakuru County, boys are relatively more than girls. According to Nakuru County Director of Education (2018) there were 23,309 (11,938 boys and 11,371 girls) form three students, from the 294

public secondary schools in Nakuru County and therefore the reason for disparity on student gender. The information on gender was deemed to explain for the student interactions and academic self-esteem. According to Akinyi and Musani (2018), the number of male students enrolling for secondary school in Kenya is higher than that of the female students. This might be due to societal preferences of educating the male students to female students more so in poverty stricken households (Chemagosi, 2014).

The study further sought to establish the age of the respondents. The students were asked to indicate their age in the questionnaire and whose results were presented in Table 9.

Table 9

Age of Students

Years	**Frequency**	**Percent**
13-15 years	18	5.4%
16-18 years	246	74.1%
19-21 years	61	18.4%
Above 21 years	7	2.1%
Total	**332**	**100.0%**

The study revealed that majority (74.1%) of the students were aged between 16 years and 18 years. It was also noted that 18.4% of the students were aged 19-21 years. Only 5.4% and 2.1% of the respondents were aged between 13-15 years and above 21 years respectively. This may be explained by the tendency that in Kenya most learners begin their pre-primary education at the age of 4yrs hence they are likely to around 17 years when they are in their form three classes. The older group of students are likely to have been due to class retention that the Kenyan Government has currently abolished but is still practiced among some schools. The very few students between the ages of 13-15yrs were likely to have started school at an earlier age (Nadenge, 2015). The information on age of the student was considered important since at this stage they are more likely to have been in school long enough to enable shaping the student academic interactions and academic self-esteem (Durmaz, 2016).

4.5 Relationship between Students' Academic Interaction and Academic Achievement

The first objective of the study was to establish the relationship between students' academic interaction and academic achievement. In achieving this objective, the study analyzed both quantitative and qualitative data. For quantitative data, both descriptive and inferential; statistics were used. For qualitative, class teachers' responses from the interviews were thematically analyzed.

4.5.1 Student-Student Academic Interactions

The study used descriptive statistics such a frequencies, percentages, mean scores and standard deviations to evaluate the basic characteristics of data (Vanderstoep & Johnston, 2009). Frequencies were used to show the number of respondents giving a particular response to the questionnaires. The percentages on the other hand were used to show the proportion of the respondents giving a particular response (Hall, 2015). The study used mean scores to show the tendency of the respondents on average in replying to the questions asked (Glăveanu, 2012).

In respect to student-student academic interactions, the study collected data on the frequency in which students interacted with fellow students in diverse ways. This study examine ten ways in which students interacted among themselves. The ways included creation of a positive environment for learning, participation in group work discussion, motivation of one another towards better performance, asking fellow classmates for assistance to understand a concept taught in class, sharing learning resources with fellow students, paying attention to ideas shared by fellow students, consulting fellow students for academic assignments, arguing point out in regard to classwork with peers in class, minding the language student uses in interacting with fellow classmates in all academic aspects, and being accountable to fellow classmates in regard to student academic achievement in school. The above aspect were rated using a five point Likert scale whereby; Never = 0, Rarely = 1, Sometimes = 2, Usually = 3, and Always = 4.

Using a five point Likert Scale whereby; Never = 0, Rarely = 1, Sometimes = 2, Usually = 3, and Always = 4, a mean score of less than 0.5 implied that on average, the aspect being

rated never occurred and a mean score in the range between 0.5 and 1.5 implies that on average, the aspect being rated rarely occurred. On the same context, a mean score in the range between 1.5 and 2.5 implied that on average the aspect being rated sometimes occurred. A mean score between 2.5 and 3.5 implies that on average, the rates aspect usually occurs. By obtaining a mean score of more than 3.5 would implied that on average, the rated aspect always occurs. Standard deviation was used to indicate the level of consensus among the respondents (Neuendorf, 2011). The standard deviation showed the amount of variation of the responses given by the respondents (Research Methods in Theatre and Performance, 2011). In respect to the used Likert scale with a variance of one form one choice to the other, a standard deviation of more than 1.0 would implied large spread of responses from the mean and therefore lack of consensus among the respondents. On the other hand, a standard deviation of less than 0.5 implied a small spread of responses from the mean response and therefore high consensus among the respondents. A standard deviation between 0.5 and 1.0 would implied a moderate spread of responses from the mean and therefore a moderate consensus among the respondents. A small value of standard deviation is therefore desired. Table 10 shows the frequencies and percentages of student-student academic interactions in public secondary schools in Nakuru County.

Table 10

Student-Student Academic Interactions

Description	Frequency and Percentages					Total	
	N	R	S	U	A	Mean	Std. Dev
My fellow students create a positive environment for learning	40 (12.0%)	183 (55.1%)	70 (21.1%)	20 (6.0%)	19 (5.7%)	1.38	0.972
I participate in group work discussions.	12 (3.6%)	24 (7.2%)	34 (10.2%)	196 (59.0%)	66 (19.9%)	2.84	0.945
We motivate one another towards better performance	13 (3.9%)	23 (6.9%)	32 (9.6%)	210 (63.3%)	54 (16.3%)	2.81	0.925
I ask my fellow classmates for assistance to understand a concept taught in class	15 (4.5%)	26 (7.8%)	47 (14.2%)	192 (57.8%)	52 (15.7%)	2.72	0.972
My fellow students shares learning resources with me	11 (3.3%)	28 (8.4%)	47 (14.2%)	179 (53.9%)	67 (20.2%)	2.79	0.969
I pay attention to ideas shared by fellow students	8 (2.4%)	21 (6.3%)	44 (13.3%)	162 (48.8%)	97 (29.2%)	2.96	0.946
I consult my fellow students for academic assignments	10 (3.0%)	22 (6.6%)	32 (9.6%)	169 (50.9%)	99 (29.8%)	2.98	0.966
I argue my point out in regard to classwork with my peers in class.	7 (2.1%)	11 (3.3%)	36 (10.8%)	188 (56.6%)	90 (27.1%)	3.03	0.838
I mind the language I use in interacting with my fellow classmates in all academic aspects	47 (14.2%)	218 (65.7%)	23 (6.9%)	28 (8.4%)	16 (4.8%)	1.24	0.963
I am accountable to my fellow classmates in regard to my academic achievement in school	35 (10.5%)	228 (68.7%)	33 (9.9%)	21 (6.3%)	15 (4.5%)	1.26	0.895
Composite Scores						2.51	0.939

Note: N= Never, R= Rarely, S=Sometimes, U=Usually, A=Always

In respect to whether fellow students created a positive environment for learning, the study indicated that majority (55.1%) of the students responded that rarely did fellow study create a positive environment for learning. This resulted to a mean score of 1.38. The achieved

mean score indicated that on average fellow students rarely created a positive environment for learning. This therefore implied a negative aspect of student-student interaction. The study further achieved a standard deviation of 0.972 in respect to the metric that fellow students created a positive environment for learning. A standard deviation score that was in the range between 0.5 and 1.0 implied a moderate spread of the responses and therefore implying that there was a moderate consensus among the respondents in rating this metric. Mapesa (2013) on peer group prior achievements, peer group composition and peer group teaching environment found that students' learning environment had a positive influence on girl student academic achievement. One of the class teacher interviewed indicated that;

"We implore to the students to maintain silence in order to create a conducive environment for learning. On their own, is hard for the students maintain silence unless is few weeks to examinations"

The study further sought to establish whether the students participated in group work discussion with fellow students. In respect to this, the study achieved a mean score of 2.84. The achieved mean score was within the range of 2.5 to 3.5 and therefore implying that on average students usually participated in group work discussion with fellow students. This mean score was due to majority of the students (59.0%) indicating that they participated in group work discussion. This is therefore a positive aspect of student-student academic interactions. The study further revealed that there was a moderate consensus among the respondents in rating their level of participation in student-student academic interactions. This is due to a standard deviation of 0.945 which was in the range of 0.5-1.0. Rimm-Kaufman, Baroody, Larsen, Curby, and Abry (2015) asserts that group discussion helps to create a bond between students and hence improving their academic self-esteem and academic achievement as well. In respect to the level of student participation in group work discussions, one of the class teacher through interviews said that;

"There are students of different levels and some tend to prefer group discussions hence they are active participants while some seem laid back taking a more reserved approach"

In rating the frequency in which students motivate each other, the study revealed that 63.3% of the students indicated that they usually motivated each other towards better performance. This was further evidenced by a mean score of 2.81which implied that on average the students usually motivated each other towards better performance in school. This further shows that there was fairly good interaction among the students. A standard deviation of 0.925 was achieved and therefore implying that there was a moderate consensus among the respondents in rating the frequency in which motivation among students occurred in their schools. Spengler, Brunner, Damian, Lüdtke, Martin and Roberts (2015) asserts that peer motivation improves the confidence of students in performing academic activities. It creates intrinsic motivation among the students for batter academic outcomes. On the level of encouragement among students towards better achievement, one of the class teacher through interviews reported that;

"The students and more so the top academically performing students and the class leaders normally engage their colleagues in class discussion on academic improvement issues although there are still groups yet to fully pick up on the same aspect"

In respect to whether the students asked for assistance from fellow student to understand a concepts taught in class, the study revealed that majority of the students usually sought for help from fellow students as indicated by a frequency of 57.8%. This is further evidenced by a mean score of 2.72 that shows that on average the students usually sought for assistance from fellow students in understanding the concepts taught in class. A moderate consensus among the students in rating this metric was established due to a standard deviation of 0.972. This further implied that the students' responses were around the mean. Paulina (2015) found out that peer teaching improved the learning outcomes of students in several ways. The author noted that when students attempt academic assignments on their own, they gain a better understanding of the concepts assessed. On seeking academic assistance among students, one of the class teacher through interviews reported that;

"I observe the students actively engaging through small and large group discussions. This happens among selected students as some may experience limitations due to issues like esteem and personality"

The study further sought to find out whether the sampled student shared learning resources. In regard to this, the study revealed that on average the students usually shared learning resources among themselves. This is evidenced by a mean score of 2.79. To further support this, the study revealed that majority (53.9%) of the students indicated that they usually shared the learning resources they had with their fellow students. This therefore indicated that there was an increase in interaction between the students. A standard deviation of 0.969 was achieved in respect to this metric. This therefore implied that there was a moderate spread of the responses given among the study respondents. Aikens, Lee, and Burkam (2015) found out that students overcame background disadvantages by sharing the little learning resources they had such as text books, pens and other key learning resources. In regard to the level of sharing of learning resources among the students, one of the class teachers through interviews said that;

"The learners are from different backgrounds and due to this, there are some who are well-endowed with resources and they tend to share with the less privileged ones"

Another one said that;

"For a day school, it is a bit hard to establish learning resources sharing behaviors among the students since much cannot be said of home based learning resources but a general behavior is observed in resource sharing by the learners, hence good learning resources sharing behaviors"

The study also sought to find out the level in which the students paid attention to ideas shared by fellow students in class. In view of this aspect, the study revealed that majority (48.8%) of the students indicated that they usually paid attention while 29.2% indicated that they always paid attention. This therefore resulted to a mean score of 2.96 and a standard deviation of 0.946. The achieved mean score was in the range between 2.50 and 3.50 and therefore implying that on average, the students paid attention to the ideas raised by fellow student in class. This is an indicator of a good interaction among the students. The achieved standard deviation indicated that there was a moderate spread of responses

among the respondents as well as a moderate consensus among the respondents. This is in line with the study by Chu (2015) who indicated that there was a constructive learning inside classrooms even in the absence of teachers. This was done through group discussion in which students shared their ideas on their level of understating of various aspects of the subject.

A mean score of 2.98 and a standard deviation of 0.966 was achieved in respect to the metric on the frequency in which student consulted among themselves in doing academic assignment given in class. The achieved mean score (ranged between 2.5 and 3.5) implied that on average students usually consulted fellow students in doing academic assignments given by the teachers. This is further evidenced by the majority (50.9%) of the students who indicated that they usually consulted fellow students when given academic assignments. This was considered as a good indicator of student-student interaction. The achieved standard deviation was due to moderately close to the mean as evidenced by 9.6% of the respondents who indicated that they sometimes consulted, 50.9% who indicated they usually consulted and 29.8% who indicated that they always consulted. Nguyen, Cannata, and Miller (2018) indicated that peer consultation among the students helps to speed up learning since teachers may not always be present to help the students. The author noted that peer consultation can take place in time and in any place.

In establishing whether students argued their point out in regard to classwork with their peers in class, the study achieved a mean score of 3.03 and standard deviation of 0.838. This therefore implied that on average, the students argued their point out in regard to classwork with their peers in class. This is further evidenced by majority (56.6%) of the students indicating that they argued their points out during a classwork discussion. A standard deviation achieved in regard to this metric showed a moderate consensus among the respondents which is further supported by 10.8% (sometimes), 56.6% (usually) and 27.1% (always) of the students who indicated that they argued their point out in regard to classwork with their peers in class. This indicated an increased level of student-student academic interactions in the class. Biton and Gonzaga (2019) emphasize on the importance of student to student discussions in class. The researcher found that group discussions

where every participant contributed to the group discussion resulted to higher academic scores. However, one of the class teacher through interviews had these to say;

"Sometimes is no longer a health discussion; it is noise making and few academically gifted students dominating the discussion by trying to prove that they are the best and that their points are correct. When moderated, a lot of learning takes places in the discussions"

The study further sought to establish whether students mind the language they use in interacting with fellow classmates in all academic aspects. A mean score of 1.24 and a standard deviation of 0.963 was achieved in respect to this metric. This therefore implied that on average the students rarely minded the language they used in interacting with fellow classmates in all academic aspects. This is because of the mean score in the range of 0.5 and 1.5. This is further evidenced by a majority (65.7%) of the students who indicated they rarely minded the language they used in interacting with fellow classmates in all academic aspects. Same age groups could have contributed to this observation whereby the same peer groups do not usually consider to accord much respect to each other. This implied unfavorable interaction among the students. There was a moderate consensus among the respondents in rating this metric due to a standard deviation in the range between 0.5 and 1.0. This is in line to Nguyen *et al.* (2018) who indicated elements of indiscipline among the students' interactions in class. The author further found that bullying was evidenced among the big-bodied students against small-bodied students. This is concurred by the interviewed class teachers from which one of them indicated that:

"Honestly students don't respect each other when interacting on academic aspects. You can even hear some demanding assistance from fellow classmates. The only respect they accord in their interactions is that between them and their teacher and not their peers"

Similarly, mean score of 1.26 and a standard deviation of 0.895 was achieved in regard to whether students were accountable to fellow classmates in regard to their academic achievement in school. The achieved mean score implied that on average the students were rarely accountable to fellow classmates in regard to their academic achievement in school. This is further evidenced by 10.5% of the students who indicated that they were never

accountable to fellow classmates in regard to their academic achievement in school and 68.7% who indicated that they rarely did. This also implied a low interaction among the students. The observed standard deviation implied a moderate spread of responses around the mean and therefore a moderate consensus between the sampled students. This is in corroboration with a study by Mokhothu and Callaghan (2016) that noted very few student cared for own academic achievement and did not consider the learning challenges of peers in the class.

Focusing on the composite mean score and standard deviation of the statements assessing the extent of student to student interaction in public secondary schools in Nakuru County, the study revealed that students usually interacted well with their fellow students and that there was a moderate consensus in rating these statements. This is due to a composite mean score of 2.51 and a composite standard deviation of 0.9391. The metric that was highly rated was the aspect of arguing points out in regard to classwork among fellow students in class. On the other hand, the metric indicating that students minded the language they used in interacting with fellow classmates in all academic aspects was poorly rated. The study further established that there was consensus among the respondents in rating the different statements on student-student academic interactions due to a standard deviation less than 1.0. Findings by Linneman (2019) supported the current study by establishing that student centered approaches of learning yielded more fruits than teacher centered approaches.

4.5.2 Student-Teacher Academic Interactions

The study further sought to examine student-teacher interactions using the following aspects; student asking teachers questions during class learning, teachers providing feedback on questions asked, students completing academic assignments given by teachers, availability of teachers for academic consultation, students approaching teachers after class to clear any doubts in concepts taught in class, teachers knowing capabilities and challenges of students, teachers motivating students to work hard for better academic achievement, teachers maintaining order in class during lessons, student minding the language they use to address teachers in class, and teachers responding quickly to the academic needs of students. The aspects were rated using a five pint Likert scale such that; Never = 0, Rarely

= 1, Sometimes = 2, Usually = 3, and Always = 4. Table 11 shows the study results in terms of frequencies, percentages, mean scores and standard deviation.

Table 11

Student-Teacher Academic Interactions

Description	**Frequency and Percentages**					**Total**	
	N	**R**	**S**	**U**	**A**	**Mean**	**Std. Dev**
I ask my teachers questions during class learning	15 (4.5%)	23 (6.9%)	27 (8.1%)	218 (65.7%)	49 (14.8%)	2.79	0.934
My teachers provide a feedback on questions asked	10 (3.0%)	24 (7.2%)	38 (11.4%)	212 (63.9%)	48 (14.5%)	2.80	0.883
I complete the academic assignments given by my teachers	18 (5.4%)	22 (6.6%)	39 (11.7%)	154 (46.4%)	99 (29.8%)	2.89	1.077
My teachers are available for academic consultation.	9 (2.7%)	12 (3.6%)	22 (6.6%)	193 (58.1%)	96 (28.9%)	3.07	0.861
I approach my teachers after class to clear any doubts in concepts tha t were unclear to me	58 (17.5%)	177 (53.3%)	44 (13.3%)	29 (8.7%)	24 (7.2%)	1.35	1.090
My teachers know my capabilities and help me overcome my challenges	10 (3.0%)	29 (8.7%)	17 (5.1%)	227 (68.4%)	49 (14.8%)	2.83	0.891
My teachers motivate me to work hard for better academic achievement	5 (1.5%)	8 (2.4%)	35 (10.5%)	214 (64.5%)	70 (21.1%)	3.01	0.741
My teachers maintain order in class during the lessons	7 (2.1%)	7 (2.1%)	29 (8.7%)	205 (61.7%)	84 (25.3%)	3.06	0.783
I mind the language I use to address teachers in class	11 (3.3%)	23 (6.9%)	24 (7.2%)	223 (67.2%)	51 (15.4%)	2.84	0.883
The teacher responds quickly to my academic needs	14 (4.2%)	39 (11.7%)	21 (6.3%)	213 (64.2%)	45 (13.6%)	2.71	0.984
Composite Scores						**2.75**	**0.913**

Note: N=Never, R=Rarely, S=Sometimes, U=Usually, A=Always

Table 11, it was established that majority (65.7%) of the students asked their teachers questions during class learning. This is also supported by a mean score of 2.79 in respect to this metric. The achieved mean score implied that on average, students usually asked their teachers questions during class lesson. This is because the mean score was in the range between 2.5 and 3.5. The standard deviation on the other hand in respect to this metric was 0.934 and therefore implying that there was close spread of responses from the mean. This further implied that there was a moderate consensus among the respondents in this study. The results in respect to this metric indicates a favorable interaction between the student and teachers. Achonu, Udoh,and Okoro (2019) also noted that an average student tended to ask questions in class to clear their doubts in aspects that seemed unclear. One of the class teacher through interviews said that;

"There is an observation of diversity among the learners with some having an active personality hence consistent in terms of asking questions in the class and others being quite reserved despite doing well academically"

The study further sought to establish whether the teachers provided feedback on questions asked by the students. In respect to this, the study revealed that on average, the teachers usually provided a feedback to the questions asked by the students. This is because of the achieved mean score of 2.80. This is further evidenced by the majority (63.9%) of the students who indicated that their teachers usually answered the questions they asked. The study further revealed that there was a moderate consensus among the respondents in rating this metric due to a standard deviation of 0.883. These results indicate a good interaction between the student and teachers in public secondary schools in Nakuru Country. Mohamed (2012) noted that student-teacher interaction in a classroom played a major role in students' performance in the subject. It was also found out that teacher feedback to student questions in mathematics determined how the students perform in the subject. This is line to class teachers in which one of the class teachers through interviews said that;

"Teachers are there to teach and when asked questions by students, they have a responsibility to give a feedback. This happens always"

A mean score of 2.89 and a standard deviation of 1.077 were achieved in respect to the frequency in which students completed the assignments given by their teachers. The achieved mean score implied that on average the students usually completed the assignment given by their teachers. This is further evidenced by the majority (46.4%) of the respondents who indicated that they completed the assignment given by their teachers. This is an indicator of a good interaction between the students and the teachers. The achieved standard deviation however implied that there was a lack of consensus among the respondents in rating the frequency in which students endeavored to complete the assignments given by their teachers. This is due to a standard deviation of more than 1.0. This indicates a poor interaction between the students and the teachers in respect to this particular metric. These findings are in agreement to the findings by Thng and Xe (2017) who indicated that students submitted their assignments after the due dates and others totally failed to complete the assignments. The researcher also indicated aspects of cheating by copy other students' assignment and submitting for marking. On completing of teachers' assignment, one of the class teachers through interviews said that;

"Well performing students are mostly in the group of assignment completing learners although there are some bright ones who still exhibit lazy tendencies. The other ability learners averagely portray assignment completion characteristics"

Focusing on the frequency in which teachers were available for academic consultation, the study revealed that majority (58.1% indicated usually while 28.9% indicated always) of the students were on the opinion that teachers availed themselves for academic consultation. This was further evidenced by a mean score of 3.07. The standard deviation achieved in respect to this metric was 0.861 and therefore implying that there was moderate consensus among the respondents in rating this metric. This therefore revealed a good interaction between the students and the teachers in respect to academic consultation. This is in line with the study by Kashefpakdel and Hughes (2018) that indicated that teachers were always available when needed by students. This is in agreement to the class teachers interviewed in which one of them said that;

"The teachers are mostly available for academic based interactions but limitations at times set in terms of the huge work load due to staff shortage. In some cases, teachers report in for consultation beyond schooling hours, that is, weekends and after five in the evening"

A mean score of 1.35 and a standard deviation of 1.090 was achieved in respect to the frequency in which students approached teachers after class to clear any doubts in concepts that were unclear to them. The achieved mean score inferred that on average, students rarely approached the teachers after class for any clarification on the concepts taught in class. This is further shown by the majority (53.3%) of the respondents who indicated that they rarely approached their teachers after class for any academic consultation. It was in respect established that their interaction between the students and teachers was unfavorable. In regard to this aspect, it was revealed that there was lack of consensus among the respondents as evidenced by a standard deviation of more than 1.0. These findings are contrary to those by Achonu, Udoh,and Okoro (2019) who indicated that on average students sought clarity from teachers even outside classroom on aspects that seemed unclear to them or follow up questions. In respect to this metric, one of the class teacher through interviews said that;

"Teachers are even available to academic consultation outside the classroom. But rarely would you see students coming to the staff room to ask questions from their subject teachers. Students usually wait for the next lesson to ask questions"

The study further sought to establish whether teachers knew the capabilities of students and whether they helped them to overcome the challenges. In respect to this, the study reviewed that majority (68.4%) of the respondents cited that their teachers usually understood their capabilities and also helped them to overcome their challenges. This resulted top a mean score of 2.89 which implied that on average teachers usually understood the capabilities as well as the challenges of students and tried to help them overcome the challenges. This is therefore an indicator of a good interaction between the students and teachers. A standard deviation in the range of 0.5 and 1.0 (standard deviation of 0.891) was achieved in respect to this metric and therefore the study noted that there was a moderate consensus among the respondents of the study. Ondimu (2016) study found out that meeting students'

physiological needs determined the level of student to teacher interaction and this influenced their academic achievement. One of the class teachers indicated that;

"From time to time and from one exam to another I get to understand the capabilities of my students and establish the appropriate intervention measures to help the weak students towards better academic achievement as well as helping the academically gifted students to attain even much higher grades"

Focusing on the frequency in which teachers motivated students to work hard for better academic achievement, the study established that 64.5% and 21.1% of the students indicated that their teachers were usually and always source of motivation for better academic achievement respectively. This therefore resulted to a mean score of 3.01 and standard deviation of 0.741. The achieved mean score implied that on average, teachers motivated their students to work hard towards better academic outcomes. The achieved standard deviation on the other hand indicated that there was a moderate spread of responses between the respondents of the student and hence a moderate consensus. The results presented here in respect to this metric was an indicator of good interaction between teachers and the students. Fatih (2016) found out that positive teacher–student interactions contributed to a warm classroom environment that facilitates successful adaptation in school and thereby increases students' motivation to learn. On the other hand, negative teacher–student interactions were associated with lower achievement and lower academic self-esteem as well as ongoing relational conflict with peers. In respect to teachers' understanding the capabilities of their students and motivating them for better performance, one of the class teachers through interviews indicated that;

"Teachers are able to evaluate the weaknesses of students as well as their strengths. This is the basis for interventions by teachers to help the students. In some cases, subject teachers have approached me as a class teacher to gain more background information of students. We have even referred some of the students to guidance and counselling department for assistance"

The study further established that on average teachers maintained order in class during the lessons as evidenced by a mean score of 3.06. This is further supported by a majority (61.7%) of the respondents who indicated that teachers usually and 25.3% who indicated that teachers always maintained order in class during the lessons. The study further observed that there was a moderate spread of responses around the mean in rating this metric due to a standard deviation of 0.783. A positive interaction between the student and teachers who concluded from these findings on the maintenance of order in class by the teachers. These findings however differ with the study conducted by Jobo (2016) on student indiscipline. The study revealed that teacher were unable to fully take control on learning activities in the classroom due to noise making, bullying and other indiscipline cases among the learners. One of the class teacher through interviews indicated that;

"This is one of the primary goals of the teacher while teaching. This is ever maintained and I haven't received any complaint on failures to maintain order in the classrooms. Most students are disciplined"

On whether the students minded the language they used to address teachers in class, the study obtained a mean score of 2.84 and a standard deviation of 0.883. The achieved mean score indicated that on average, students minded the language they used in addressing their teachers. This is further supported by the majority (67.2%) of the students who indicated that they usually minded the language they used when addressing teachers. This inferred a good interaction between the students and teachers. The obtained standard deviation implied that there was a moderate consensus among the respondents. This is because the standard deviation ranged between 0.5 and 1.0. One of the interviewed class teacher said that;

"I rarely receive complaints from fellow teachers in regard to student disrespect in my class. However, few issues and complains arise when we have teachers who are on teaching practice"

The study further established that on average, teachers usually responded quickly to academic needs of the students. This was due to a mean score of 2.71, in the range between

2.50 and 3.50. A majority (64.2%) of the respondents supports this by indicating that their teachers responded quickly to their academic needs. The study further revealed that there was a moderate consensus among the respondents in responding to this metric as evidenced by a standard deviation of 0.984. It was in respect the responsiveness of teachers to academic needs of students inferred that there was a good interaction of students and teachers. A study by Early, Berg, Aber, Ryan, and Deci (2016) indicated that teachers were readily available for consultation and received feedback for their questions to teachers. One of the interviewed class teacher indicated that;

"We are always available for academic consultation and we encourage students to ask as many questions as possible. We try as much as possible to provide immediate feedback to students in regard to their questions"

Composite scores for the mean and standard deviations were computed and inferences made on the general interactions between the students and the teachers. A composite mean score of 2.75 was achieved from all the statements rating the interactions between students and teachers. The composite mean score was in the range between 2.5 and 3.5 and therefore implied that usually there was a good interaction between the students and their teachers. The composite standard deviation implied that there was moderate consensus in rating all aspects of teachers and student interactions in public secondary schools in Kenya. The aspect to teachers' availability for academic consultation by students was highly rated while the aspect of approaching teachers after class to clear any doubts in concepts that were unclear to the students in class was poorly rated. This is however in disagreement with a study by Nyaboke (2015) who found out that teacher-student interaction was poor in public secondary schools.

4.5.3 Student-Parent Academic Interactions

The study further examined aspects of student-parent academic interactions such as parental provision of learning resources, learning environment, parental monitoring of student's academic progress in school, attendance of parents meeting, time allocation for students to do school assignments at home, parents ensuring that homework is done, parental understanding of what is best for the students' academic aspiration, parental

understanding of the weaknesses and strengths students' academic journey, parental encouragement for the student to work hard in academic work in school, and parental preparation for student's examinations. Mwaa (2016) noted that parent-child relationships influence the educational outcomes of children. Table 12 presents the descriptive statistics in respect to student-parent academic interactions.

Table 12

Student-Parent Academic Interactions

Description	**Frequency and Percentages**					**Total**	
	N	**R**	**S**	**U**	**A**	**Mean**	**Std. Dev**
My parent provides me with learning resources	10 (3.0%)	30 (9.0%)	17 (5.1%)	229 (69.0%)	46 (13.9%)	2.82	0.889
The learning environment at home is conducive	53 (16.0%)	196 (59.0%)	37 (11.1%)	32 (9.6%)	14 (4.2%)	1.27	0.983
My parent monitors my academic progress in school	42 (12.7%)	250 (75.3%)	17 (5.1%)	14 (4.2%)	9 (2.7%)	1.09	0.764
My parent attends parent meetings or meets my teacher(s) if need be.	29 (8.7%)	37 (11.1%)	39 (11.7%)	175 (52.7%)	52 (15.7%)	2.55	1.145
My parent gives me ample time to do my school assignments	11 (3.3%)	13 (3.9%)	34 (10.2%)	209 (63.0%)	65 (19.6%)	2.92	0.865
My parent makes sure that my homework is done	38 (11.4%)	267 (80.4%)	16 (4.8%)	7 (2.1%)	4 (1.2%)	1.01	0.597
My parents knows what is best for me in my academic aspiration.	8 (2.4%)	18 (5.4%)	32 (9.6%)	195 (58.7%)	79 (23.8%)	2.96	0.877
My parents understands my weaknesses and strengths in my academic journey	10 (3.0%)	44 (13.3%)	56 (16.9%)	170 (51.2%)	52 (15.7%)	2.63	0.997
My parent encourages me to work hard in my academic work in school	6 (1.8%)	10 (3.0%)	19 (5.7%)	204 (61.4%)	93 (28.0%)	3.11	0.781
My parents prepare me well for school examinations	20 (6.0%)	25 (7.5%)	43 (13.0%)	202 (60.8%)	42 (12.7%)	2.67	0.995
Composite Mean Scores						**2.31**	**0.889**

Note: N= Never, R= Rarely, S=Sometimes, U=Usually, A=Always

According to Table 12, the study revealed that on average, parents usually provided learning resources to students. This is evidenced by a mean score of 2.82 and a majority (69.0%) of the respondents who indicated that their parents provided them with learning resources. This inferred good interaction between the parents and their children in respect to provision of learning resources. A standard deviation of 0.889 was achieved in respect to this metric and therefore implying a moderate consensus among the respondents in this study. Weintraub and Sax (2018) notes that parental provision of learning resources improves learning outcomes to a great extent. On the extent of provision of learning resources by parents, one of the class teachers indicated that;

"There is diversity in terms of the financial capacity of the parents hence provision of resources is not equal for all the students. The students' ability to reach the parents and the willingness of the parents towards provision for the learner is also an issue but on average the learners were well provided for"

Focusing on the extent in which learning environment at home is conducive for learning, the study established that majority (59.0%) of the students felt that the learning environment at home was rarely conducive. This is evidenced also by the mean score of 1.27. The lack of conducive environment is due to chores at home, lack of harmony between the parents, noisy neighbourhood or large families and therefore leaving no space for learning as established by the interviewed class teachers. The study achieved a standard deviation of 0.983 in this metric which therefore inferred that there was a moderate consensus among the respondents of the study. Laurito, Lacoe, Schwartz, Sharkey, and Ellen (2019) found learning environments of most families unfavourable for maximum concentration by the students. The environments was characterized by destruction from the family members, family chores, poor lighting and adverse weather conditions as well as poor shelter. This is in line to the comments of class teachers in which one of them indicated that;

"The quality of the learning environment actually varies from student to student. There is a generally good observation of the provision of conducive environment apart from

instances where there are challenges of sufficient home space and where the parents may be uncooperative"

The study further sought to establish whether parents monitored children's academic progress in school. In respect to this, the study revealed that high percentage of parents rarely monitored the academic progress of the students as indicated by 75.3% of the students. This resulted to a mean score of 1.09. The achieved mean score indicated that on average parents rarely monitored the academic progress of the students. This metric achieved a standard deviation of 0.764. This standard deviation indicates that the respondents gave close responses from each other and close to the mean score. This is an indication of moderate consensus among the respondents. Magara (2017) also found out that most single parents were most of the time busy in their occupations thus leaving them with inadequate time to monitor their children's academic progress. On parents' monitoring of children's academic progress, response from one of the parents from the interviews indicated that;

"The current life activities have resulted into quite busy parents but few parents generally make inquiries either through school visits or phone calls about their children performance ion school"

In rating the frequency of attendance of parents meeting if need be, 52.7% of the students indicated that their parents or guardians usually attended parents' meeting in the school while 15.7% of them indicated that their parents always attended the meetings. This is further evidenced by a mean score of 2.55. This is an indication of high level of student-parent academic interactions in academic affairs. It was however established that the standard deviation in respect to this metric was above 1.0 (standard deviation of 1.145). The achieved standard deviation implied that there was lack of consensus among the respondents in rating this metric. Weintraub and Sax (2018) also found out that parental involvement in leaners' education was a key motivator for the learners. The author noted that aspect of parental attendance to school meeting showed a concern of the parents towards learning. In respect to Parent attendance to school meetings, one of the class teachers indicate that;

"Parents attend the meetings in the school in a wide-ranging manner with the trend being above average. There is a however a higher attendance during social based activities like prize giving and prayers day as compared to the class work academic appraisal days"

In respect to whether parents gave ample time for the students to do their assignments, the study reveals that majority (63.0%) of the parents usually gave ample time for their children to do their assignments at home. This is further supported by the mean score of 2.92. This is a positive interaction between the parents and the students. A standard deviation of 0.865 was achieved in regard to this metric. This therefore indicated that there was a moderate consensus among the respondents. As much as parents created ampler time for the students to do assignments at home, majority of the students indicated that the home environment was rarely conducive for the learning. It was also established through the interviews though parents created ample time, the environment was not conducive. This therefore implied that lack conducive environment may not necessarily be an indicator of a negative student-parent interaction. Mwaura (2014) indicated that educated parents assist their students in doing their school work. The study concluded that the home chores influenced the student's academic achievement. One of the interviewed class teachers however indicated that;

"Based on conversation with the students, the parents generally allow their children to have sufficient study times at the expense of restricting some home chores"

A mean score of 1.01 and standard deviation of 0.597 was achieved in respect to the frequency in which parents made sure that the students did their homework. The achieved mean score showed on average parents rarely ensured that their children did their school homework. This was further evidenced by majority of the students who indicated that their parents did not make sure their homework is done. This is a negative interaction between the students and their parents. The achieved standard deviation was an indication of moderate spread of responses among the respondents and moderate consensus. Ntitika (2014) also found out that most of the parents were involved with their homework. Interviews conducted showed that;

"Due to different family background it is difficult for some learners to be assured ample study time by the parents in doing their homework. This is due to factors like large family sizes, the students' engagement in family business and the parent value of the learners' education in general"

According to Table 12, it was revealed that parents knew what was best for their children in their academic aspiration. This is shown by 58.7% (usually) and 23.8% (always) of the students indicating that their parents knew what was best for their children in their academic aspiration. This resulted to a mean score of 2.96 which implied that on average the parents usually knew what was best for their children in their academic aspiration. The metric achieved a standard deviation of 0.877 which therefore implied that there was a moderate consensus among the respondents in rating the statement. Chemagosi (2014) established that parents kept on encouraging students to work hard to achieve their career goals. The researcher also revealed that majority of the parents knew what their children wanted to be eventually after their studies. One class teacher was said that;

"When I invite parents to discuss issues pertaining their children, am able to understand that majority of the parents know what was best for their children in their academic aspiration. To a great extent, some parents help their children in choosing subjects for examinations in KCSE"

The study further sought to establish the frequency in which parents understood their weaknesses and strengths in their academic journey. In respect to this, the study established a mean score of 2.63 and a standard deviation of 0.997. The achieved mean score implied that on average the students tended to agree that usually their parents understood their weaknesses and strengths in their academic journey. This is also evidenced by the majority (51.1%) of the students who indicated that parents understood their weaknesses and strengths in their academic journey. The achieved standard deviation inferred a moderate spread of responses among the respondents. Early *et al.,* (2016) notes that understanding the learning strengths and weaknesses of students is important in establishing intervention measures and also taking a corrective action with the best outcomes results. In an interview excerpt, one class teacher said that;

"Most parents admit that their children are struggling in certain subjects or performing well in certain other subjects even without the aspects being highlighted by the class teacher. This is an indication that parents understand the weaknesses and strengths of their children in their academic journey"

A mean score of 3.11 and a standard deviation of 0.781 were achieved in respect to the extent in which parents encouraged their children to work hard in their academic work in school. This showed that on average parents usually encouraged their children to work hard in their academic work in school. This is also indicated by the majority (61.4%) of the respondents who indicated that this aspect usually occurred while 28.0% rated as always. It therefore indicated that there was a positive relationship between the parents and their children in terms of academic motivation. This is further implied there was a moderate consensus among the respondents in rating the statement. Hines *et al.*, (2017) notes that parental guidance is very crucial in determining the academic achievement of students and their future career prospects. This is because the standard deviation was in the range between 0.5 and 1.0. Interviews showed that;

"We usually hold 'academic clinics' whereby we invite parents to come and discussion with their student subject teachers on the progress of their children. During these platforms we see parents mindful of the future of their children by encouraging them to work hard"

In the context of parental preparation for their students towards school examinations, the study achieved a mean score of 2.67 and a standard deviation of 0.995. The achieved mean score indicated that on average usually parents prepared their children for school examinations. This is further supported by 60.8% of the respondents who indicated that their parents usually prepared their children for school examinations. A standard deviation in the range between 0.5 and 1.0 achieved in this metric implied a moderate consensus among the students in rating parental involvement in preparing them towards school examinations. This is an indication of positive interaction between students and their parents. These findings are also echoed by Kapur (2018) who noted that teachers prepared

their students well through provision of key necessities for undertaking examinations. Interviews indicated that;

"Some parents are very active in terms of making sure that their children have all the necessities for examinations. Some withdraw duties accorded to the children to allow them to prepare for examinations. Even the parents who are financially unstable, make significant efforts to prepare their students in any way possible. We can't complain on this"

Focusing on the composite scores, a composite mean score of 2.31 and a composite standard deviation of 0.889. The achieved composite mean score implied that on average parents sometimes got involved in the academic learning of their children in school. This indicates a moderate student-parent interaction in public secondary schools in Nakuru County. The study further indicated that there was moderate consensus on average in rating all the statements on student-parent interaction. The highly rated aspect of student-parent interaction was that parents encouraged their children to work hard in their academic work in school. This statement had a mean score of 3.11 out of a maximum score of 4.0. On the other hand, the statement that was poorly rated in student-parent interaction was the aspect of parents ensuring that their children do their homework at home. This is a role that was left at the hands of teachers as the interviewed class teachers indicated. It was noted that students were not in one agreement in rating the frequency in which parents attended parent meetings or meets teacher(s) if need be. This calls for a further study to examine the reason for the lack of consensus in rating this aspect.

These findings are in line with those by Fan and Williams (2010) who established that parents who were involved in academic affairs of their children such as providing learning materials and attending parents meeting among others performed relatively higher in their academics as compared to those whose parents were less involved. It was also established that parental involvement in the learning of their children acted as a motivation to the children which resulted to higher academic achievement. Nyaboke (2015) also revealed that parents were concerned about the educational aspects of their children.

4.5.4 Student Academic Achievement

The study obtained the data on student academic achievement from examination records. Academic records for the previous three internal End of Term Examinations was considered in this study. The mean for each of the student from the three exams was computed. Since different schools took different exams that are of different degree in complexity, the examinations mean scores were standardized using both the Z-Score and t-score in order to make the results comparable. The Z-score presented the results in a range of -5 and 5 while the T-score presented the results with a mean of 50 and a standard deviation of 10. (Mourougan & Sethuraman, 2017). The standardized results for the academic achievement were analyzed and the results presented in Table 13.

Table 13

Descriptive Statistics for Academic Achievement

Statistic	**Value**
Minimum	43.75
Maximum	76.25
Mean	60.0546
Median	59.3750
Mode	60.00
Std. Deviation	5.18680
Variance	26.903
Skewness	0.445
Kurtosis	0.274
Valid N (listwise)	332

According to Table 13, the study revealed the lowest academic achievement mean score for the students who participated in this study was 43.75 marks while the highest academic achievement mean score was 76.25 marks. This presents a range of 32.9 marks between the top student sampled in this study and the last bottom student sampled in this study. The mean average marks for the students sampled in this study was 60.0546 marks. This implied that on average students' academic achievement in public secondary schools in Nakuru County was moderately above the average mark of 50 marks. This is evidenced by a mode

score of 60 marks. This implied that majority of the students score 60 marks (standardized scores). The median academic mean score for the sample students was 59.3750. The median value was close to the mean score and the mode which then implied that the academic achievement of the students was normally distributed (Fallon, 2016). A variance of 26.903 and a standard deviation of 5.18680 was achieved in this study which therefore indicated that the academic achievement had a small deviation. This further shows that there is small disparity (Nayak, 2016) in terms of academic achievement of the sampled students in Nakuru County.

Skewness on the other hand was used to show the symmetry of data (Wooldridge, 2017). The obtained skewness was 0.445. For a normally distributed data, the ideal skewness should be zero and therefore a skewness close to zero would imply that the data is normally distributed (Agresti, 2017). According to Clements and Sarama (2016), if the skewness is between -0.5 and 0.5, the data is fairly symmetrical, if skewness is between -1 and – 0.5 or between 0.5 and 1, then the data is moderately skewed and if the skewness is less than -1 or greater than 1, the data are highly skewed. The achieved skewness in this study implied that the academic achievement of public secondary schools in Nakuru County was normally distributed (fairly symmetric). It was therefore inferred that few students had a low academic achievement and few had high academic achievement but majority of the students' achievement was close to the mean score. Kurtosis was also used in this study to examine the combined weight of the tails relative to the rest of the distribution (Myers & Myers, 2017). Similarly, the kurtosis value for normally distributed data should be zero (Agresti, 2017). The achieved kurtosis for the academic achievement of students sampled in this study was 0.274. This further confirmed that the academic achievement of students in public secondary schools in Nakuru County was normally distributed.

Besides the descriptive statistics, inferential statistics was also performed to determine the relationship between academic interaction and academic achievement. Pearson correlation analysis was performed to test the first three research hypothesis of the study. In order to control Type I and Type II errors, the study selected a low significance level of 0.05. The Pearson correlation showed both the direction and strength of the relationship between any two paired variables (Latunde, 2016). Correlations shows the strength of relationship

between any two measured variables, its direction and the significance of the relationship. The strength of a relationship is shown by the Person Correlation coefficient (Briggs et al., 2016). A Pearson Correlation coefficient of between |0.1| and |0.3| implies a weak relation between the two measured variables. A Pearson Correlation coefficient of between |0.4| and |0.6| implies a moderate relationship between the two measured variables. On the other hand, a Pearson Correlation Coefficient of between |0.7| and |0.9| implies a strong relationship between the two measured variables (Latunde, 2016). A Pearson correlation coefficient of zero implies that the two measured variables are not related, a coefficient of 1 implies that the two measured variables are positively and perfectly related and a copy of the other and a Pearson Correlation of -1 implies that the measured variables are negatively and perfectly related (Saunder, Lews, & Thornhill, 2009).

The sign accompanying the correlation coefficient shows the direction of relationship between two measured variables (Nicholson, 2011). A negative sign indicates that the two measured variables are negatively related. This further implies than an increase in one of the variables resulted into a decrease on the second variables and vice versa. In other words, a negative relationship would imply that the two measured variables are inversely related. A positive sign of correlation coefficient indicates that the two measured variables are proportionally related and that an increase on one of the variables causes an increase on the second variable and vice versa (Neuendorf, 2011). The associated *p*-values indicates the significance of the relationship between the two measured variables (Joy, 2008). This is dependent of the chosen significance level by the study. In this study, a significance level of 0.05 was chosen. Table 14 shows Pearson correlation between student-student academic interactions and student-teacher academic interactions.

Table 14

Student-student Academic Interactions and Student-Teacher Academic Interactions

Variable		**Student-Student**	**Student-Teacher**
Student-Student	Pearson Correlation	1	
Interactions	Sig.		
	N	332	
Student-Teacher	Pearson Correlation	0.235**	1
Interactions	Sig.	0.000	
	N	332	332

A Pearson correlation coefficient of 0.235 was achieved between student-student academic interactions and student-teacher academic interactions. A *p*-value less than 0.05 was also achieved. This implied that there was statistically significant weak and positive relationship between student-student academic interactions and student-teacher academic interactions. It further implied that if a student interacted with fellow students academically, it was also likely for the student to interact with their teachers on academic affairs and the vice versa. These results are in line with those by Rimm-Kaufman, Baroody, Larsen, Curby, and Abry (2015) that showed that student-student interaction determined students interactions with their teachers. Contrary to this finding, Shewkani (2016) noted that there was a not significant association between student-student interactions and the student-teacher interactions.

Table 15

Student-student Academic Interactions and Student-Parent Academic Interactions

Variable		**Student-Student**	**Student-Parent**
Student-Student	Pearson Correlation	1	
Interactions	Sig.		
	N	332	
Student-Parent Academic	Pearson Correlation	0.104*	1
Interactions	Sig.	0.007	
	N	332	332

In respect to the relationship between student-student interaction and the interaction between students and their parents, the study established that the two variables were positively related at a correlation coefficient of 0.104 and a *p*-value less than 0.05. This therefore implied there was statistically significant weak and positive relationship between student-student academic interactions and student-parent academic interactions. It further inferred that if a student interacted academically with fellow students, the student also likely to interact with their parents on academic affairs, and the vice versa. This finding was consistent with the finding by Kisangob (2016) that student integration with peers was related to their interaction with their parents. However, Adodo and Oyeniyi (2013) noted that there was no significant relationship between the student-student academic interactions and student-parent academic interactions.

Table 16

Student-Teacher Academic Interactions and Student-Parent Academic Interactions

Variable		**Student-Teacher**	**Student-Parent**
Student-Teacher	Pearson Correlation	1	
Interactions	Sig.		
	N	332	
Student-Parent Academic	Pearson Correlation	0.189**	1
Interactions	Sig.	0.001	
	N	332	332

The study further revealed that there was a statistically significant weak and positive relationship between student-parent academic interactions and student-teacher academic interactions. This is due to a Pearson correlation coefficient of 0.189 which was significant at 5% significance level ($p<0.05$). The achieved correlation coefficient implies that if students interacted with their parents on academic affairs, they were also likely to interact with their teachers academically, and the vice versa. This is in line with the study by Rimm-Kaufman *et al.*, (2015) that indicated that there was a relationship between student-parent interaction and student interactions with their teachers. The study indicated that students that interacted well with their parents at home also related well with their teachers at school. However, a study by Figueroa (2017) noted that there was a negative correlation between

the student-teacher academic interactions and student-parent academic interactions. In respect to this, Figueroa (2017) noted that the student that interacted more with teachers interacted less with their parents on academic aspects and the vice versa.

The first hypothesis of the study stated that; **H_{01}:** There is no statistically significant relationship between students' academic interaction and academic achievement in public secondary schools in Nakuru County, Kenya as shown in Table 17.

Table 17

Students' Academic Interaction and Academic Achievement

Variable		**Student-Student**	**Student-Teacher**	**Student-Parent**	**Academic Achievement**
Academic Achievement	Pearson Correlation	0.630**	0.658**	0.567**	1
	Sig.	0.000	0.000	0.000	
	N	332	332	332	332

According to Table 17, there was statistically significant relationship between student-student academic interactions and student academic achievement in public secondary schools in Nakuru County. This is due to a correlation coefficient of 0.630 and a *p*-value less than the chosen significance level of 0.05 ($P<0.05$). This further implied that if a student had a good interaction with fellow students, the student would likely have a good academic achievement and the vice versa. This is in agreement to a study by Fatokun and Omenesa (2015) that found out that classroom interactions among students was correlated with student academic achievement. Waseka and Simatwa (2016) study also found out that there was a positive relationship between student to student classroom interaction and their academic achievement. Donohue (2017) revealed that the students that interacted more with fellow students in learning activities tended to perform better in academic examinations as compared to those who did not frequently collaborate with the fellow students in doing academic tasks in school. In contrary, a study by Ariani and Mirdad (2015) noted that there was no significant relationship between the student-students

academic interactions and the academic achievement of the students. The author noted that students needed teachers in order to achieve high academic mean scores.

It was also established that there was statistically significant relationship between student-teacher academic interactions and student academic achievement in public secondary schools in Nakuru County because of a correlation coefficient of 0.658 and a $P<0.05$. This is an indication that if a student had a good interaction with teachers, that student is more likely also to have a good academic achievement and the vice versa. This is also supported by a study by Rimm-Kaufman, Baroody, Larsen, Curby, and Abry (2015) that found a positive and significant correlation between student-teacher interaction and the achievement of students. Altun (2015) revealed that there was a positive relationship between student-teacher interactions and the academic achievement of the students. It was further revealed that there were significant differences between the students that had long hours of contact with those teachers that had few hours of contact with their teachers. In respect to this, hours of contact between students and their teachers had a positive impact on the academic achievement of the students. The study finding were however inconsistent with those by Aaronson, Barrow, and Sander (2017) who noted that there was no significant correlation between student-teacher academic interactions and students' academic achievement in secondary school level of education.

The study also established that there was statistically significant relationship between student-parent academic interactions and student academic achievement in public secondary schools in Nakuru County. This was because of correlation coefficient of 0.567 and a *p*-value less than 0.05. This could be inferred that if a student had a good interaction with parents, the student would likely achieve better performance in the academics and the vice versa. Magara (2017) also revealed that student-parent interaction dynamics had a direct correlation with students' academic achievement. Nadenge (2015) the study found out that parent-teacher interaction and their involvement in their children's academic achievement was positively correlated. This is however in disagreement to study by Bean *et al*. (2013) that established that there was no significant differences in the academic achievement of students that were supported academically by their parents and those that

were not. Kimani (2016) found out that there was a significant relationship between student-parent interactions and academic achievement of students.

The study further sought to find out the correlation between student acdemic achivement and the composite scores for acdemic interactions of the students. In doing this, a compiste score for student-stedent interactions, student-teacher interactions and student-parent interactions was computed. The compsite score for student academic interactions was correlated with the standardized scores for academic achivement and whjose resulst are shown in Table 18.

Table 18

Academic achievement and Student Academic Interactions

Variable		Academic Achievement
Student Academic Interactions	Pearson Correlation	0.867**
	Sig. (2-tailed)	0.000
	N	332

The study established that there was a strong positive and significant relationship between between student acdemic interactions and their acdemic achvement at 5% significant level. This is due to a correction coefficient of 0.867 and *p*-value less than 0.05. Based on these correlation results, the first hypothesis (H_{01}) stating that there is no statistically significant relationship between students' academic interaction and achievement in public secondary schools in Nakuru County, Kenya was rejected at 5% significance level. It was therefore revealed that there was significant relationship between students' academic interaction and achievement in public secondary schools in Nakuru County, Kenya.

4.6 Relationship between Students' Academic Interaction and Academic Self-Esteem

The second objective of the study sought to establish relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya.

4.6.1 Student Academic Self-Esteem

Student academic self-esteem was measured in terms of student assertiveness in class tasks, ability to communicate in class, attitudes towards self in regard to learning capabilities and ability to take leadership role in group discussions among others. Academic self-esteem scale was adopted and adjusted using Rosenberg Self-Esteem Inventory. Section two to section five of the research questionnaire was based on a five-point Likert scale as follows; Never = 0, Rarely = 1, Sometimes = 2, Usually = 3, and Always = 4. Table 18 shows the descriptive statistics for the statements rating the level of students' academic self-esteem.

Table 19

Student Academic Self Esteem

Description	**Frequency and Percentages**					**Total**	
	N	**R**	**S**	**U**	**A**	**Mean**	**Std. Dev**
Learning activities in the school is fun	37 (11.1%)	255 (76.8%)	11 (3.3%)	17 (5.1%)	12 (3.6%)	1.13	0.812
I have strong academic capabilities	10 (3.0%)	11 (3.3%)	13 (3.9%)	222 (66.9%)	76 (22.9%)	3.03	0.820
I do academic preparation for examinations in advance	49 (14.8%)	47 (14.2%)	48 (14.5%)	157 (47.3%)	31 (9.3%)	2.22	1.238
I feel good when I am in a class learning	31 (9.3%)	236 (71.1%)	23 (6.9%)	36 (10.8%)	6 (1.8%)	1.25	0.837
I feel good about myself when I attain good academic grades	9 (2.7%)	14 (4.2%)	10 (3.0%)	127 (38.3%)	172 (51.8%)	3.32	0.927
I enjoy spending many hours on academic homework.	35 (10.5%)	210 (63.3%)	29 (8.7%)	41 (12.3%)	17 (5.1%)	1.38	1.002
I try hard to solve an academic problem until I make it	18 (5.4%)	27 (8.1%)	31 (9.3%)	205 (61.7%)	51 (15.4%)	2.73	0.996
I would rather spend most of my time reading as opposed to other activities	70 (21.1%)	189 (56.9%)	48 (14.5%)	13 (3.9%)	12 (3.6%)	1.12	0.908
I voluntarily answer questions (without being called) in class	15 (4.5%)	32 (9.6%)	54 (16.3%)	190 (57.2%)	41 (12.3%)	2.63	0.973
In class, I choose a position which is most visible to the teacher	12 (3.6%)	12 (3.6%)	35 (10.5%)	224 (67.5%)	49 (14.8%)	2.86	0.840
Composite Scores						2.17	0.935

Note: N= Never, R= Rarely, S=Sometimes, U=Usually, A=Always

The study established that majority (76.8%) of the students indicated that rarely are the learning activities in the school a fun. In line to this, a mean score of 1.13 was achieved. This implied that on average the respondents rarely found learning a fun in the school. This is an indication of low academic self-esteem among the students. The metric achieved a standard deviation of 0.812. This is an indication of moderate consensus among the students in rate learning activities in the school. This is evidenced a moderate spread of the responses around the mean as indicated by 11.1% of the respondents who indicated that learning activities in the school is never a fun, 76.8% that is rarely a fun and 3.3% that is sometimes a fun. These findings are consistent those by Alyami, Melyani, Johani, and Ullah (2017) who noted that learning activities in schools did not excite the students to a greater extent. Students preferred outside class activities as compared to in class activities. In line to this, one class teachers indicated that;

"Some student love learning activities in the class and have even taken leadership roles in group discussions. However, some students in a class seem to favour the bright learners in most occasions when in need of leadership roles in group discussions. There are however instances when the group leaders are not necessarily the best performing students. The willingness and assertiveness of the learner also plays an important role in determining the adoption of leadership roles by the learner and this is observed to be the general trend"

The study further sought to establish whether students believe that they have strong academic capabilities. In respect to this endeavour, the study revealed that majority (66.9%) of the students believed that they usually had strong academic capabilities. It was also revealed that 22.9% of the students considered that they had strong academic capabilities. In addition, a mean score of 3.03 was achieved in respect to this metric. This is an indication that on average the students usually had strong academic capabilities. According to the established findings in respect to this metric, it was inferred that students had a high academic specific academic self-esteem. A standard deviation of 0.820 was achieved in rating metric which showed that there was a moderate spread of the responses around the mean score and hence moderate consensus among the respondents. Serati (2015) noted that positive attitudes towards self-capabilities can to a large extent affect what an individual

can be able to actually perform. In respect to student attitude towards self in regard to learning capabilities, one of the class teacher indicated that;

"There are some form three students who seem to be self-driven with a character of consistently willing to take on challenges even when several failed attempts are called for. There are also learners and more so the poor performing ones who indicate an attitude of giving up maybe due to consistent failures"

In examining whether students do academic preparation for examinations in advance, the study achieved a mean score of 2.22 and standard deviation of 1.238. The achieved mean score inferred that on average students sometimes prepared for their examinations in advanced. This is an indication of relatively low academic self-esteem among the students. The achieved standard deviation indicated that there was large spread of responses from the respondents in rating the aspect of exam preparation in advance. A standard deviation of more than 1.0 achieved in this metric indicated a lack of consensus among the respondents in rat6ing the aspect of examination preparation in advance. This is clearly indicated by 14.8% indicating that they never prepared for the examinations in advance, 14.2% that they rarely did that, 14.5% indicating that they sometimes prepared in advance, 47.3% that they usually prepared and 9.3% that they always prepared. This is in line to the findings by Amelia, Ramadan, and Gani (2018) that students prepared well for their examinations especially few weeks to the examinations. This is however in disagreement to the interviews conducted from majority of class teachers in which one of them indicated that;

"During few weeks to examinations, the school goes silent, indiscipline cases significantly reduce, student wastage of time outside the class is reduced and the general environment of the school changes. Students get serious with studies in preparation of their examinations"

A mean score of 1.25 and a standard deviation of 0.837 was achieved in rating the frequency in which student felt good when they were in a class learning. The achieved mean show implied that on average the students rarely felt good when they were in class learning. This

is further evidenced by the majority (71.1%) of the students who indicated that they rarely felt good while learning in class. Only 1.8% of the respondents indicated that they felt good learning in class. From the conducted interviews on class teachers, it was revealed that students enjoyed extra curriculum activities in the field more that class activities. This is an indication of low academic self-esteem in academic affairs in the school among the respondents of the study. The achieved standard deviation implied that there was a moderate consensus among the respondents in rating classroom learning among the students. This concurs with the findings by Burnette, Huang, Maeng, and Cornell (2019) that students did not enjoy learning as they did physical activities and outside school excursions.

The study further sought to establish whether the students felt good about themselves when they attained good academic grades. It was in respect to this metric that the study revealed that 38.3% of the students usually felt good about themselves when they attained good academic grades and 51.8% of them indicated that they always felt good about themselves when they attained good academic grades. A mean score of 3.32 was achieved in respect to this metric which is an indication on average the students usually felt good about themselves when they attained good academic grades. This is favourable academic self-esteem in academics among the students sampled. The standard deviation achieved of 0.927 showed that there was a moderate spread of responses among the students and hence a moderate consensus among the respondents. Masselink *et al*., (2018) noted that good grades and performance among students acts as a motivation for better academic outcomes and realization of full potential of individual. The author noted that poor academic grades among students on the other hand discourage students from achieving their level best.

This study further established that majority (63.3%) of the students rarely enjoyed spending many hours on academic homework. It was also revealed that 10.5% of the students never enjoyed spending many hours on academic homework. This resulted to a mean score of 1.38. This is an indication that on average the students rarely enjoyed spending many hours on academic homework. From the achieved mean score, the study inferred that there was low academic self-esteem in regarding spending many hours on academic homework. A standard deviation of 1.002 which was in above 1.0 implied that there was lack of consensus

in rating the aspect of spending many hours on academic homework. The lack of consensus was caused by respondents giving much varied responses on the same metric. Hisken (2011) further established that students who actively consulted with teachers and fellow peers in doing academic assignments had a higher score on Rosenberg self-esteem scale as compared to those who did academic assignments without consultations. Feedback from one of the class teachers indicated that;

"Honestly, students do not prefer spending many hours in their studies compared to other activities inside and outside the school. The teacher on duty more times than not has to force students to go back to class after the break time is home. P.E is such an admired lesson by the students. When we open schools after school holidays, most students come back worse than they left on closing day"

This study also established on average; students usually tried hard to solve an academic problem until they made it. This is due to a mean score of 2.73 and majority (61.7%) of the respondents who indicated that they usually tried hard to solve an academic problem until they made it. This is an indication of high academic self-esteem among the students sampled in this study. The study further noted that there was a moderate consensus among the students in rating the aspect of solving academic problems. This is due to a mean score of 0.996 which was in the range between 0.5 and 1.0. The moderate consensus is further evidenced by majority of the respondents giving their responses between sometimes and always, that is, 9.3% (sometimes), 61.7% (usually), and 15.4% (always). These results are contrary to the findings for the study by Sahin *et al*., (2014) that established that students were more reluctant to attempt solving mathematical problems in their own. The study revealed that majority of students attempted working out assignments in the presence of their subject teachers. This is in disagreement to majority of class teachers' feedback in which one of them indicated that;

"Most for the students will rarely struggle to answer questions on their own. They will have to wait for the subject teacher to help them. The willingness to fast attempt to solve problems is very low among the students, and especially in mathematics subject"

Focusing on the extent in which students spent their time in reading, the study established that majority (56.9%) of the students would rarely spend most of their time reading as opposed to other activities. It was also revealed that 21.1% of the respondents indicated that they could never prefer spending most of their time reading as opposed to other activities. This resulted to a mean score of 1.12, which implied that students would rarely spend most of their time reading as opposed to other activities. This is an indication of low academic self-esteem among the students. A standard deviation of 0.908 was achieved in regard to this aspect. The achieved standard deviation implied that there was a moderate consensus among the students on how they preferred reading to other activities in the school. This was also confirmed through the interviews conducted that showed that students liked to spent more time on co-curricula activities and extra-curricula activities as opposed to curricula activities. The findings of this study are also in line to the findings by Lazaro and Anney (2016) that noted that students did not spent a lot of time in their studies as compared to other activities.

A mean score of 2.63 and a standard deviation of 0.973 was achieved in respect to the extent in which students voluntarily answer questions (without being called) in class. The achieved mean score showed that on average students usually answered questions (without being called) in class voluntarily. This is evidenced by the majority (57.2%) of the respondents who indicated that they usually voluntarily answered questions (without being called) in class. This showed high academic self-esteem among the students. The standard deviation in the range between 0.5 and 1.0 achieved in respect to this metric implied that students gave moderately close responses to the mean score. This is an indication of moderate consensus among the students in rating this aspect. These findings are in line to those by Adedeji (2007) that noted that students contributed to classroom learning by asking questions as well as answering questions asked by the subject teachers. On ability of students to communicate in class, one of the class teachers indicated that;

"Some students are observed to have good communication skills, in some cases the attribute is associated with bright students but this is not the general case. High and average performers generally communicate much better but there are some low academic students who still achieve well in the communication aspect"

The study further sought to establish whether the students, chose to sit in a position which is most visible to the teacher. In respect to this, a mean score of 2.86 and a standard deviation of 0.840 was achieved. This therefore implied that on average the students chose to sit in a position which is most visible to the teacher. This is further indicated by the majority (67.5%) of the students who cited that they usually chose to sit in a position which is most visible to the teacher. This is an indicator of a high academic specific academic self-esteem. There was a moderate consensus among the respondents in rating the frequency in which students chose to sit in a position which is most visible to the teacher. This is because the standard deviation score ranged between 0.5 and 1.0. Srivastava and Joshi (2014) noted that student behaviours in the class determines the level of learning among the students. The author notes that the position of the student in the class is a key determinant of the performance of the students. It was also noted that the students who choose a front position in the class had a better academic achievement than those who choose a back position. Generally, on assertiveness or aggressiveness of student towards class tasks, interviews showed that;

"Students expresses assertiveness mainly based on their performance and perception of the teacher attitude towards them. Most average and high performing learners tend to show more the character of assertiveness in pursuing their academic interest"

In respect to the composite scores, a composite score for the means was 2.17 and a composite score for the standard deviation was 0.935. The composite mean score implied that there was a moderate level of academic self-esteem due to a value of 2.17 in a range of 0-4. The mid-point for this range is 2.0 and therefore values in the greater than 1.5 but less than 2.5 indicates a moderate extent of the aspect being evaluated. The composite standard deviation implied that on average there was moderate consensus among the students in rating the various statements on student academic self-esteem. The statement that was highly and favourably rated is the statement that the students felt good about themselves when they attained good academic grades. The lowly and poorly rated aspect in student academic self-esteem was the aspect that students would rather spend most of their time reading as opposed to other activities. A study by Njenga (2018) noted that more

needs to be done to improve the academic self-esteem of students in engaging learning activities. The study recommended students to be motivated towards changing their negative attitudes towards learning and embrace right attitudes towards academics. Parents were seen to have a significant role in changing the students' perceptions towards better academic achievements.

The second hypothesis stated that: **H_{02}:** There is no statistically significant relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya. To test this hypothesis, the study examined the relationship between the three types of interactions (Table 10, Table 11 and Table 12) among the students and academic self-esteem of the students (Table 18) as shown in Table 20.

Table 20

Student-Students' Academic Interaction and Academic Self-Esteem

Variable		**Student-Student**
Academic self-esteem	Pearson Correlation	0.194**
	Sig.	0.001
	N	332

According to Table 19, there was statistically significant relationship between student-student academic interactions and student academic self-esteem. This is because of correlation coefficient of 0.194 and a *p*-value less than 0.05. However, the relationship was weak and positive implying that if a student had a better interactions with their peers, the student would likely have favourable academic self-esteem in their studies, and the vice versa. This could be due to instances of disrespect among the students as reported in the study. Hisken (2011) established that there was a strong positive correlation between peer interactions and students' academic self-esteem. Gunnarsdóttir (2014) concluded that there was a significant correlation between peer assistance to perform assignment tasks and level of academic self-esteem of boys and girls respectively. Wai and Osman (2019) further revealed that there was a positive association between student interactions and their academic self-esteem. Handreke and Klemenčič (2018) established that those students who

actively interacted with fellow students as well as the teachers tended to have a positive attitude and perception towards academics. However, Hennessey (2017) found that student-student academic interactions were uncorrelated with academic self-esteem.

Table 21

Student-Teachers' Academic Interaction and Academic Self-Esteem

Variable		**Student-Teacher**
Academic self-esteem	Pearson Correlation	0.184**
	Sig.	0.001
	N	332

In respect to student-teacher academic interactions, the study revealed that there was a significant relationship between student-teacher academic interactions and student academic self-esteem as evidenced by a Pearson Correlation of 0.184 which was significant at 5% significance level. This inferred that if a student had a good interaction with teachers, it was also likely that the student would have favourable academic self-esteem in academic aspects, and the vice versa. Okoko (2012) established that those students who interacted more with their teachers were inspired to obtain their first degree unlike students who did not frequently interact with their teachers. These results however differed with those by Yaduvanshi and Singh (2018) who indicated that student-teacher interactions had no significant effect on the academic self-esteem of the students. Likewise, Lee (2014) found out that there was no significant correlation between teacher-student interactions and the academic self-esteem of the students. The findings were however in disagreement with the those by Gershenson and Brannegan (2015) who noted that student-teacher academic interactions did not have any significant influence on student academic self-esteem.

Table 22

Student-Parents' Academic Interaction and Academic Self-Esteem

Variable		**Student-Parent**
Academic self-esteem	Pearson Correlation	0.159**
	Sig.	0.004
	N	332

Focusing on student-parent academic interactions, the study revealed that there was a positive and significant relationship between the student-parent academic interactions and student academic self-esteem at 5% significance level (r=0.159; P<0.05). This therefore implied that if a student interacts with their parents, the student is also likely to have favourable academic self-esteem and the vice versa. This is in line with Wambui (2015) who established there was a moderate correlation coefficient between student to parent interaction and the level of student academic self-esteem. These results are also in line with those by Gunnarsdóttir (2014) who established that there was a positive and significant correlation between care and warmth interactions with parents and the level of academic self-esteem for boys and girls. The study further established that conversation about personal issues with parents was positively and significantly correlated to level of academic self-esteem of boys and that of girls. It was also noted that parental interaction through advice on studies was correlated to academic self-esteem levels for both boys and girls. Munanu and Kobia (2016) established that time expenditure in interacting with children was positively correlated to level of student academic self-esteem. It was further established that students who interacted more with their mothers as opposed to their fathers had a significantly higher level of academic self-esteem.

In order to test the second hypothesis, the study computed the composite score for student academic interactions by calculating the mean for student-student, student-teachers and student-parents' academic interactions. This resulted to one variable for student academic interactions that was correlated to academic self-esteem of students as shown in Table 23.

Table 23

Student Academic Interaction and Academic Self-Esteem

Variable		Academic Self-Esteem
Student Academic Interactions	Pearson Correlation	0.219**
	Sig. (2-tailed)	0.000
	N	332

The study established that there was a weak positive and significant correlation between the student academic interactions and their academic self-esteem at 5% significance level. This is due to a correlation coefficient of 0.219 and *p*-value less than 0.05 (p <0.05). From these results, the second hypothesis stating that there is no statistically significant

relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, was rejected at 95% confidence interval. It was therefore concluded that there was a significant relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County. Okoko (2012) also established that student interactions with teachers, peers and parents as well as co-curriculum activities influenced students' academic self-esteem. However, Sambe, Avanger, and Agba (2017) found out that there was no significant correlation between the academic interactions of students and students' academic self-esteem.

4.7 Relationship between Students' Academic Self-Esteem and Academic Achievement

The third hypothesis of the study stated that; **H_{03}:** There is no statistically significant relationship between students' academic self-esteem and achievement in public secondary schools in Nakuru County, Kenya. Students' Academic self-esteem is as presented in Table 18 while the academic achievement of the students is presented in Table 13. The correlation analysis between Students' Academic Self-Esteem and Academic Achievement is as shown Table 24.

Table 24

Students' Academic Self-Esteem and Academic Achievement

Variable		**Esteem**	**Academic Achievement**
Academic self-esteem	Pearson Correlation	1	
	Sig.		
	N	332	
Academic Achievement	Pearson Correlation	0.580**	1
	Sig.	0.000	
	N	332	332

According to Table 24, it was established that there was statistically significant relationship between students' academic self-esteem and academic achievement in public secondary schools in Nakuru County due to a correlation coefficient of 0.580 and a *p*-value less than 0.05. Therefore, the third hypothesis of the study was rejected at 95% confidence interval and hence established that there was significant relationship between students' academic self-esteem and academic achievement in public secondary schools in Nakuru County, Kenya. It hence implied that if a student had a favorable academic self-esteem in academic affairs, the student is also likely to have a better academic achievement and the vice versa. This is in line with Muhammad *et al*. (2015) who found out that there was a significant relationship between academic self-esteem and academic achievement of students. Muhammud (2015) also established that there was a significant ($p<0.01$) positive relationship between academic self-esteem and academic achievement.

Maruyana *et al*. (2016) found out that there was significant difference between academic achievement of students with high academic self-esteem and students with low academic self-esteem. Mutua (2014) further established that there was significant relationship between academic self-esteem and academic achievement of the students. On Nigerian context, Akaase and Okpechi (2018) revealed that there was a significant difference in the academic success of students with positive academic self-esteem than those with negative academic self-esteem. It was concluded that academic self-esteem significantly influenced students' academic success. Contrary to the findings in the current study, Amirtha and Jebaseelan (2014) noted that there was no significant relationship between students' academic self-esteem and academic achievement.

4.8 Prediction Equation among Students' Academic Achievement, Academic Interaction and Academic Self-Esteem

The fourth objective of the study sought to establish the prediction equation among students' academic achievement, academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya. In order to determine the predictive aspects of the variables in this study, the study used multiple regression models. The regression models showed the magnitude of influence of any variables when all other factors are held

constant (Bryman, 2012). In respect to this, the study first tested all the assumptions of multiple linear regression in order to establish fitness of the data for such analysis.

4.8.1 Diagnostic Tests for Multiple Regression

The study performed diagnostic tests in order to determine the suitability of the data for multiple regression. The diagnostic test helped in determining the regression models that needed to be performed based on various assumptions of multiple regressions. The study tested the following five assumptions of multiple linear regression that is linearity, normality, multicollinearity, autocorrelation, and heteroscedasticity (Cooper & Schindler, 2013).

4.8.1.1 Multicollinearity of Predictor Variables

Multiple regression analysis assumes that the independent variables are not correlated highly among themselves (multicollinearity of variables) (Molenberghs, 2012). Presence of multicollinearity causes regression coefficients to be more sensitive to small changes in the independent variables (McDonald, 2015). It therefore becomes hard to estimate the dependent variable since change of one independent variable causes changes in other independent variables and hence also the dependent variable. This makes it difficult to choose the correct regression model to fit a certain dataset (Paltridge & Starfield, 2017). In addition, multicollinearity reduces the accuracy of regression coefficients and therefore reducing the statistical power of the regression (Kearney, 2016). This implies that the resultant *p*-values cannot be trusted in identification of significant independent variables. Absence is multicollinearity is therefore desired and this was tested using tolerance and Variance Inflation Factor (VIF) (Smith, 2018). Table 25 shows the results of Multicollinearity test.

Table 25

Tolerance and VIF tests for Multicollinearity

Model	Collinearity Statistics	
	Tolerance	**VIF**
Student-Teacher Academic Interactions	0.899	1.113
Student-Student Academic Interactions	0.938	1.066
Student-Parent Academic Interactions	0.946	1.058
Academic self-esteem	0.947	1.056

Dependent Variable: Student Academic Achievement

According to Table 25, a tolerance level of student-student academic interactions was 0.899 while its Variance Inflation Factor (VIF) was 1.113. On the other hand, a tolerance of 0.938 and Variance Inflation Factor (VIF) of 1.066 was achieved in respect to student-teacher academic interactions. Student-parent academic interactions achieved a tolerance value of 0.946 and Variance Inflation Factor (VIF) of 1.058. Focusing on student academic self-esteem, a tolerance of 0.947 and a Variance Inflation Factor (VIF) of 1.056 was achieved. According to Almalki and Arabia, (2016), a tolerance level of less than 0.2 and VIF value more than 4.0 indicates presence of multicollinearity on the model. In this model, the tolerance values were all more than 0.2 and the VIF values were all less than 3.0. This implied that there was no multicollinearity between the student-teacher academic interactions, student-student academic interactions, student-parent academic interactions and academic self-esteem when used to predict academic achievement of students. It is on these results that absence of multicollinearity was assumed.

4.8.1.2 Test of Linearity of Variables

Linear regression analysis assumes a linear relationship between the predictor variables (independent variables) and the predicted variable (dependent variable) (Neuman, 2014). Lack of linearity in the model can cause erroneous predictions and hence inaccurate conclusions (Mehdi, 2016). Linearity was tested by plotting observed values against predicted values or plotting of residuals values against predicted values. Figure 2 shows the plot of observed values against predicted values.

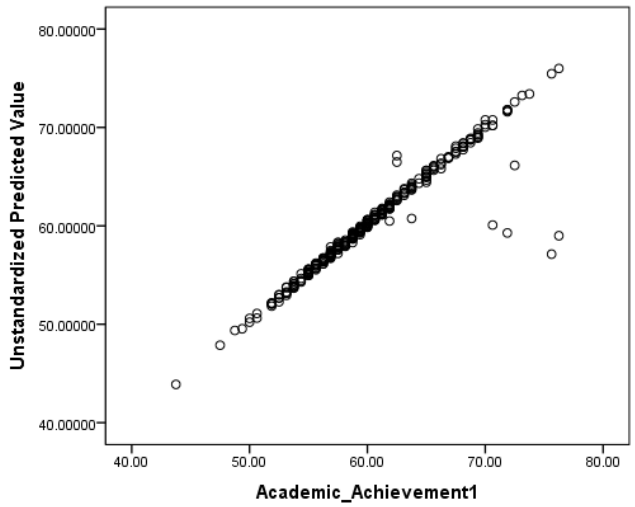

Figure 2: Plot of Observed Academic Achievement versus Predicted Academic Achievement

According to Figure 2, the plot of observed values against predicted values produces a diagonal straight line for majority of the values. According to Sloan and Quan-Haase (2017), a plot of observed values against predicted values in a multiple linear regression, points should be symmetrically distributed around a diagonal line for a linear relationship. This therefore implied that the data was linear in the regression model in this study. The study carried out a confirmatory test to confirm linearity of the regression model by plotting of residuals values against predicted values as shown by Figure 3.

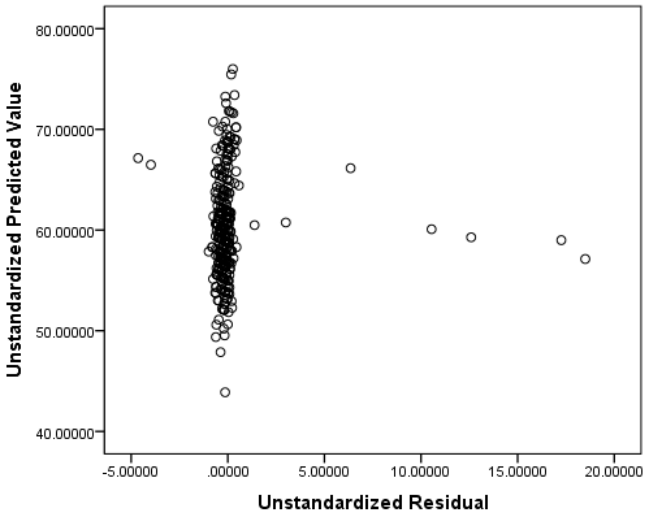

Figure 3: Plot of Residuals versus Predicted Academic Achievement

The results in Figure 3 indicates that points are symmetrically distributed around vertical line with a roughly constant variance. O'Gorman and MacIntosh (2014) asserts that a plot of residuals values against predicted values should have majority of its points in a vertical line for a linear relationship or horizontal line if the position of the variables is switched from x-axis to y-axis and vice versa. This is in line to the current findings and therefore linearity of the relationship was confirmed.

4.8.1.3 Test of Autocorrelation of Regression Model

Autocorrelation is also referred to a serial correlations and it implies that error terms follows a particular pattern on specific conditions (Marti, 2015). Autocorrelation might be as a result of violation of linearity assumption (Ember & Ember, 2009). Autocorrelation implies that residuals are not independent from each other. Presence of autocorrelation in a model implies that the model can perform better than its present state if the errors were not following a given pattern (Bryman, 2015). In other words, presence of autocorrelation indicates that the model needs to be improved and not fit to be used in the current state. In this study, Durbin–Watson statistic was used to test the presence or absence of autocorrelation (serial correlation) in the model. The results showed a Durbin–Watson statistic of 1.728 in regressing academic achievement against academic self-esteem, student-student academic interactions, student-parent academic interactions, and student-teacher academic interactions. According to Hai-jew (2015) the Durbin–Watson statistic ranges between 0 and 4. Absence of autocorrelation is assumed for values ranging from 1.5 and 2.5 (Leung, 2016). The achieved Durbin–Watson statistic was in this range and therefore the absence of autocorrelation was assumed.

4.8.1.4 Test of Homoscedasticity of Model Residuals

Homoscedasticity is a state in which the residuals of a study have a constant variance (Bailey, 2011). Multiple linear regression assumes that all residuals are drawn from a population that has a constant variance (homoscedasticity) (Rogelberg, 2014). Lack of homoscedasticity of residuals is referred to as heteroscedasticity. If the residuals are heteroscedastic, then it implies that the regression assumptions is not satisfied and its results cannot be trusted. A test for homoscedasticity checks whether the variance in residuals in

the regression model used is equal across values of the dependent variable (Das et al., 2010).

The absence of heteroscedasticity (homoscedasticity), a condition whereby the residuals are equal across the dependent variable was tested using White's test of heteroscedasticity. White's test of heteroscedasticity involves regressing the absolute values of residuals or squared values of residuals against the independent variables of a study (McDonald, 2015). Table 26 shows the regression of squared residuals (as dependent variable) against academic self-esteem, student-student academic interactions, student-parent academic interactions, and student-teacher academic interactions.

Table 26

White's Test of Heteroscedasticity

Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	5648.479	4	1412.120	1.949	0.102[b]
	Residual	236918.164	327	724.520		
	Total	242566.643	331			

a. Dependent Variable: Squared Residuals

b. Predictors: (Constant), Esteem, Student_Student, Student_Parent, Student_Teacher Interactions

According to Table 26, a *p*-value greater than 0.05 was achieved. Then hull hypothesis of all the white's test is that: H_0: The data is not heterogeneous in variance. The alternative hypothesis states that: H_1: The data is heterogeneous in variance (Kearney, 2016). Due to the P>0.05, the study concluded that there was no heteroscedasticity of data and therefore homoscedasticity was assumed.

4.8.1.5 Test of Normality of Variables

Multiple linear regression assumes that the data used in the regression comers from normal distribution (Neuman, 2014). This assumption was tested by comparing the mean, mode

and median values of the data as well as through histograms and Q-Q plots. Table 27 shows the normality test using mean, mode and median.

Table 27

Normality Statistics

Statistic	Student-Student	Student-Teacher	Student-Parent	Esteem	Academic-Achievement
Mean	2.4021	2.7349	2.3027	2.1690	60.0546
Median	2.4000	2.7000	2.3000	2.2000	59.3750
Mode	2.20	2.80	2.30	2.30	60.00
Skewness	0.360	0.048	0.276	0.012	0.445
Kurtosis	0.522	0.104	0.030	0.073	0.274

According to Table 27, the mean. Median and mode values for all the four variables were almost equal. Briggs *et al*. (2016) states equality of mean, modes and median is an indication that the data is normally distributed. On these grounds, the study concluded that the data come from a normal distribution. Vanderstoep and Johnston (2009) further indicates that for normal distribution data should roughly fit a bell curve shape. Figure 4 to Figure 8 shows that the data for all the study variables fits a roughly bell-shape and thus normally distributed.

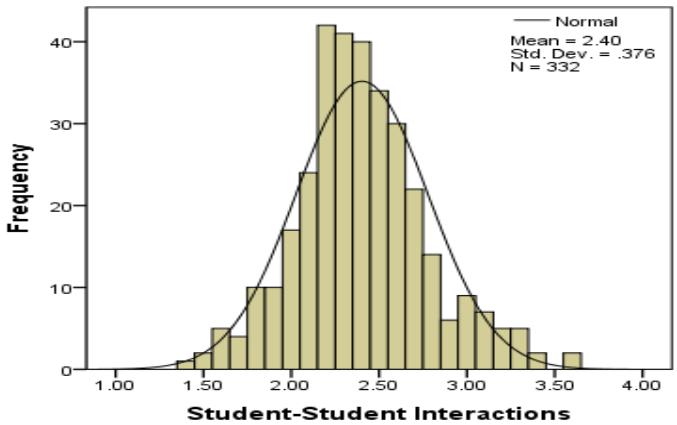

Figure 4: Histogram for Student-Student Academic Interactions

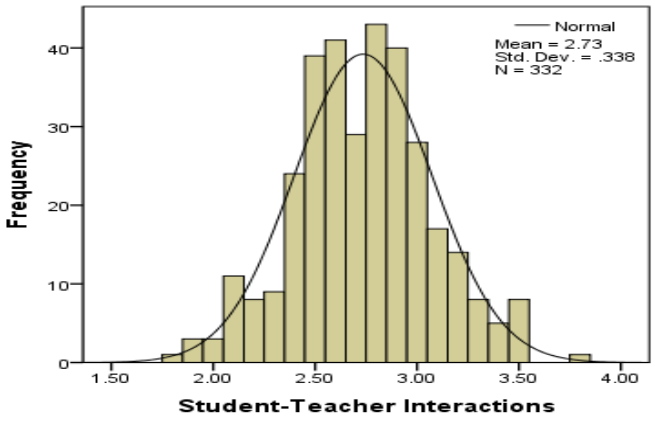

Figure 5: Histogram for Student-Teacher Academic Interactions

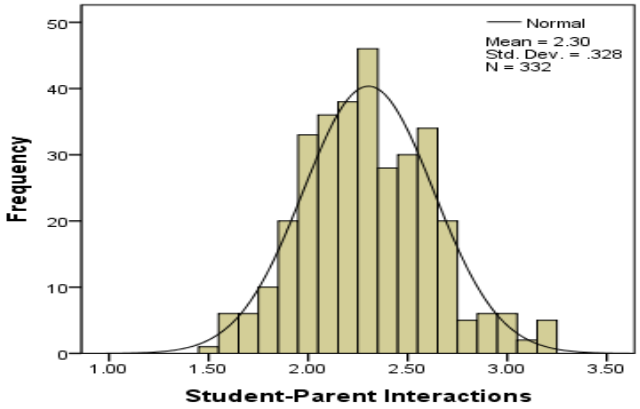

Figure 6: Histogram for Student-Parent Academic Interactions

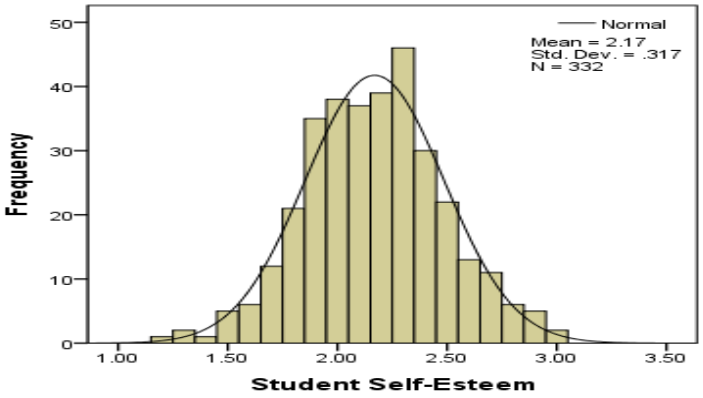

Figure 7: Histogram for Student Academic Self-Esteem

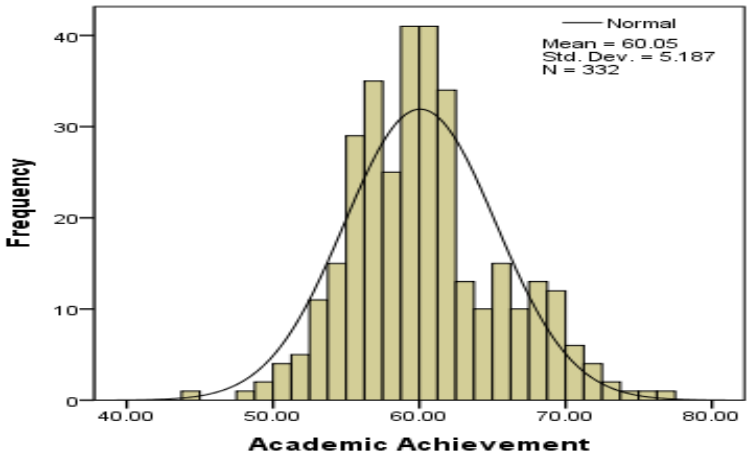

Figure 8: Histogram for Academic Achievement

Similarly, the study used Normal Q-Q plots to test the normality of the data as shown in Figure 9 to Figure 13.

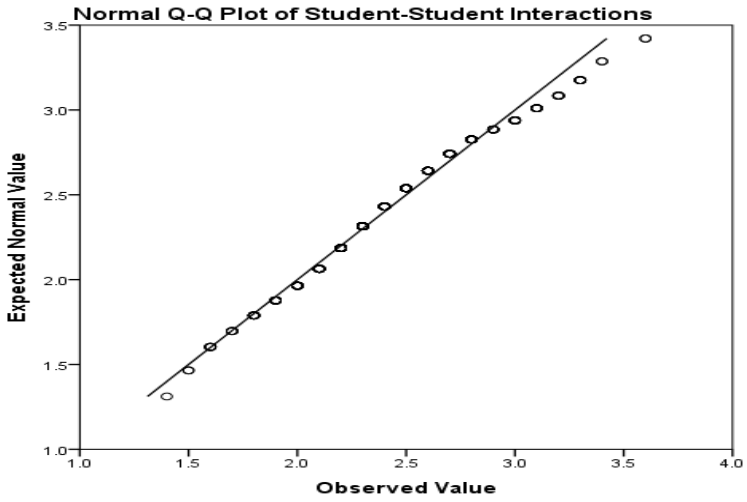

Figure 9: Normal Q-Q plot for Student-Student Academic Interactions

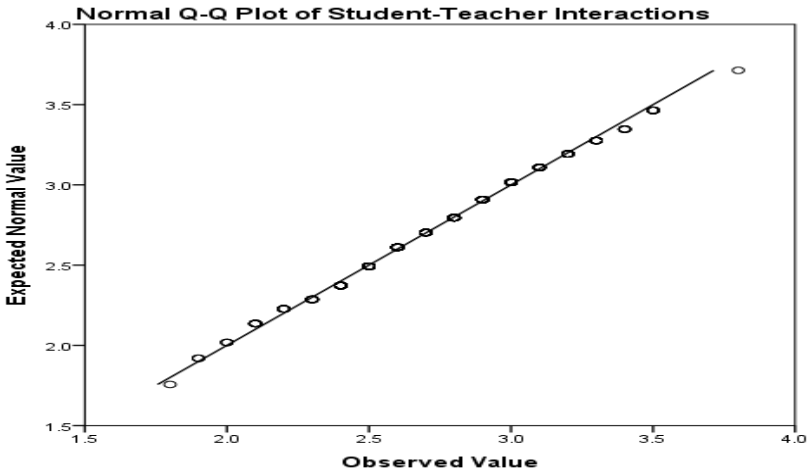

Figure 10: Normal Q-Q plot for Student-Teacher Academic Interactions

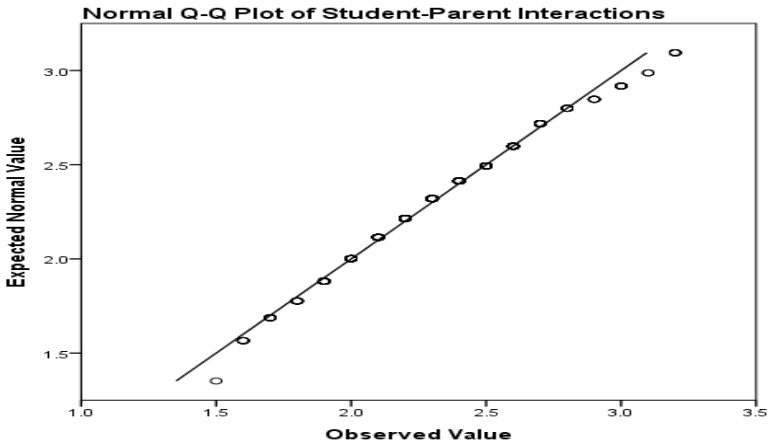

Figure 11: Normal Q-Q plot for Student-Parent Academic Interactions

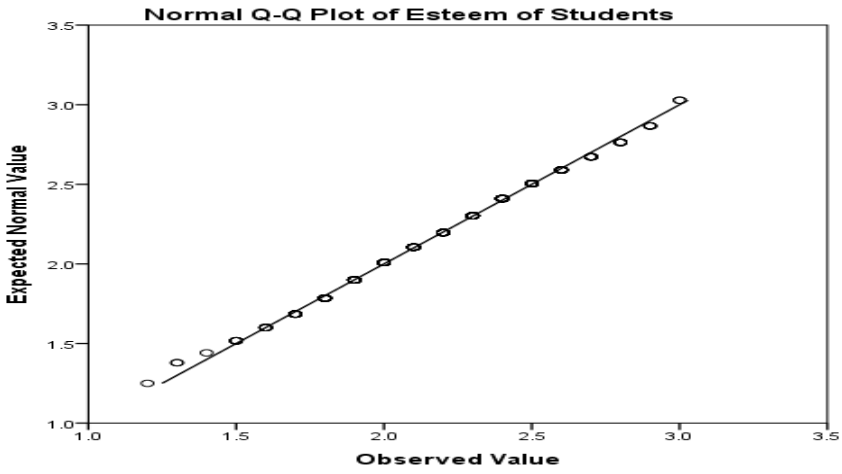

Figure 12: Normal Q-Q plot for Student Academic Self-Esteem

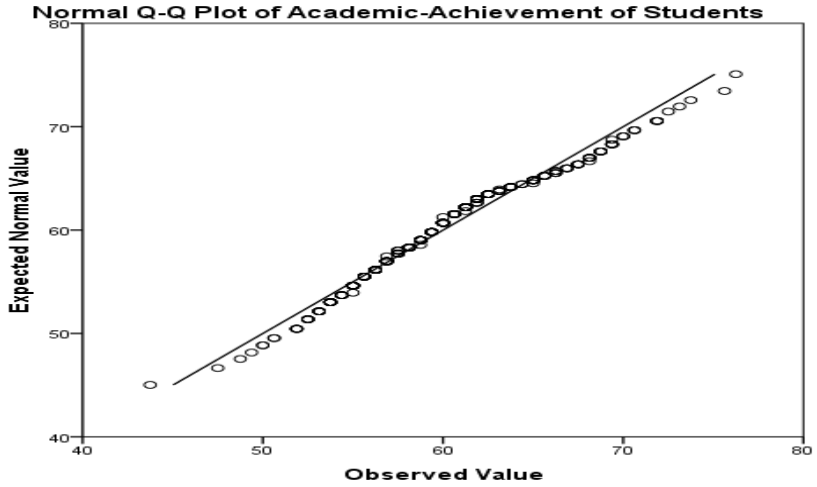

Figure 13: Normal Q-Q plot for Student Academic Achievement

According to Creemers, Kyriakides, and Sammons (2010) a Normal Q-Q plot should have majority of its data points along the diagonal line of a plot against observed values versus the expected normal values. As shown in Figure 9 to Figure 13, the data for each of the study variables was normally distributed. Therefore, the normality assumption of multiple linear regression was confirmed.

4.8.2 Multiple Linear Regression to Predict Academic Achievement

After confirming all the assumptions of multiple linear regression are met, the study used multiple linear regression to predict the academic achievement of student in public secondary schools in Nakuru County. The first regression predicted the academic achievement of student using student interactions and student academic self-esteem as predictor variables. Table 28 shows the summary of the regression model.

Table 28

Model Summary for Academic Achievement

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
1	0.945[a]	0.893	0.892	0.77691

a. Predictors: (Constant), Student-Student, Esteem, Student-Parent, Student-Teacher

According to Table 28, an R value of 0.945, R-Square Value of 0.893, Adjusted R-Square value of 0.892 and standard error of estimate of 0.77691 was achieved. Bivand, Pebesma, and Gomez-Rubio (2015), states that R value represents the correlation coefficient between the observed and predicted values of the dependent variable. Baayen (2013) state that an R value of at 0.7 indicates that the model provides goodness of fit of the data. The R value achieved in this study therefore shows that there was a strong correlation between the observed values of academic achieved and the values predicted using the model. This further indicates that the model provides a good fit for the data.

On the other hand, Reill (2018) states that the R-Square is the coefficient of determination and shows the level of variability in the dependent variable that is explained by the changes in the independent variables. High R-squared values implies that the model explains a higher variability in the dependent variable (Yilmaz, 2013). The achieved R-Square value indicates that Student-Student, Student-Parent, Student-teacher academic interactions and student academic self-esteem cumulatively explained for 89.3% of the variability in the academic achievement of student in public secondary schools in Nakuru County. This implied that the model explains a large percentage (89.3%) of variation in the dependent variable and therefore high quality of model. Only 10.7% was explained by factors that were not studied in this research work.

According to Fallon (2016), Adjusted R Square shows the effect of additional predictors into the model. The achieved Adjusted R Square was lower than the R Square value and therefore this indicates that additional predictors to the model would have improved the model less than expected. This therefore makes the current regression model optimum for prediction of academic achievement in secondary schools in Nakuru County. The standard error of estimate achieved in this study was less than 1.0 which therefore implied that the model is accurate in its prediction. This is a high degree of precision according to the recommendation of Kara (2015) on good model precision. The study further sought to establish whether the regression model was statistically significant in its prediction. This was done using the analysis of variance (ANOVA) of the model as shown in Table 29.

Table 29

ANOVA[a] for Academic Achievement Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8660.309	4	2165.077	685.714	0.000[b]
	Residual	1032.472	327	3.157		
	Total	9692.780	331			

a. Dependent Variable: Academic Achievement

b. Predictors: (Constant), Student-Student, Esteem, Student-Parent, Student-Teacher

The study established that the model was statistically significant due to F-statistic (685.714) greater than the F-critical value (2.399) for 4 degrees of freedom for the regression and 327 degrees of freedom for residuals. This is further evidenced by the $p<0.05$ which results to the rejection of the null hypothesis of F-test. It therefore implies that there is at least one significant predictor of academic achievement in the regression model and that the regression model provides a better fit for the data than a model that contain no predictor variables (Hartwig, 2015). The study however examined the beta coefficients and the significance of each of the predictor variable in the regression model for examination of appropriateness of the predictor variables in the regression model. This is shown in Table 30.

Table 30

Beta Coefficients[a] for Academic Achievement Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.174	1.141		1.029	0.304
Student-Teacher	6.581	0.316	0.386	20.802	0.000
Student-Parent	5.437	0.306	0.330	17.763	0.000
Esteem	6.255	0.305	0.390	20.505	0.000
Student-Student	6.318	0.268	0.440	23.588	0.000

a. Dependent Variable: Academic Achievement

Table 30 further shows that student-teacher academic interactions had unstandardized beta coefficient of 6.581, t-statistic value of 20.802 and a *p*-value of less than 0.05. The achieved unstandardized beta coefficient implied that for every one-unit change in student-teacher academic interactions, academic achievement of student increases with 6.581 units when other factors are held constant. The *p*-value achieved was less than 0.05 (P<0.05) and therefore concluded that student-teacher academic interactions was statistically significant predictor of academic achievement of students in secondary schools in Nakuru County. This is further supported by Rimm-Kaufman, Baroody, Larsen, Curby, and Abry (2015) who found that teacher-student interactions was a significant predict of student performance. Other studies (Bellibaş, 2016; Dimock et al., 2017; Hines et al., 2017; Nisar et al., 2017) noted that student-teacher academic interactions were significant predictors of academic achievement of students. Contrary to this, Fryer (2015) noted that there was no significant influence of student-teacher academic interactions and academic achievement of students.

In respect to student-parent academic interactions, unstandardized beta coefficient of 5.437 was achieved. This implied that when other factors are held constant, a unit increase in student-teacher academic interaction will cause a subsequent increase of 5.437 units in academic achievement of students in public secondary schools in Nakuru County. This influence was found to be statistically significant due to t-statistic value of 17.802. The associated *p*-value was less than 0.05 (P<0.05) and therefore rejecting the null hypothesis of t-test. This concurs with Musili (2015) who revealed that the level in which the teacher interacted with the student affected the students' academic achievement. Juma (2016) found out that parental involvement in education influenced students' academic achievement to a great extent. Koskei (2015) however in a study on the influence of parental involvement on students' academic achievement of public mixed day secondary schools revealed that parental involvement in education did not significantly influence students' academic achievement.

The study further revealed that a unit change in student academic self-esteem resulted to 6.255 units increase in student academic achievement. This is due to unstandardized beta coefficient of 6.255. The associated t-statistic for this variable was 20.505 and p<0.05 and

therefore the null hypothesis for the regression analysis was rejected. This therefore implied that student academic self-esteem significantly predicted academic achievement of students in secondary schools in Nakuru County. This was in line the findings by Maruyana *et al*. (2016) that established that student academic self-esteem was a significant predictor of academic achievement of students. Durmaz (2016) in a study on secondary school student mothers in Turkey revealed that there was a positive and significant correlation between student mothers' academic self-esteem and their level of academic achievement. It was in this regard noted that the student mothers who were positive perception about childbearing and motherhood outperformed those who has a negative perception on motherhood as students.

Alyami, Melyani, Johani, and Ullah (2017) established that there was a moderate correlation (r=0.488) between student academic self-esteem and academic achievement. Students with high academic self-esteem were seen to perform better in academics than those with low academic self-esteem. The researcher recommended that students to be boosted on their academic self-esteem through motivational talks as well as rewarding good academic achievement. Phil, Sattar, Khan, and Phil (2014) established that students with high academic self-esteem tended to achieve higher academic grades than those with low academic self-esteem. This was also in line with a study by Srivastava and Joshi (2014) who found a positive relationship between student academic self-esteem and academic achievement of the students. Contrary to these findings, Dimock *et al*., (2017) found out that there was no significant correlation between student academic self-esteem and student academic achievement.

Unstandardized beta coefficient of 6.318 was achieved in respect to student-student academic interactions. This implied that for a one unit increase in the student-student academic interactions in public secondary schools in Nakuru County would result to an increase of 6.318 units in academic achievement when other variables are held constant. It was also revealed that this influence was statistically significant at 5% significance level due to t-statistic of 23.588 and *p*-value less than 0.05. This is an indication that student-student academic interactions influenced the academic achievement of students in secondary schools in Nakuru Country.

It was further noted that a unit increase in the level academic interactions led to 0.257 units increase in the level of academic self-esteem. The students who interacted less with their teachers, fellow students and parents had a low academic self-esteem compared to those who interacted more. However, some studies (Marrero, 2016; Spencer, 2015; Zhang et al., 2014) noted that there was no significant correlation between student-student academic interactions and academic achievement of students. The findings implied that Student-Teacher Academic Interactions had the greatest influence on academic achievement in public secondary schools in Nakuru County. This is followed by the student-student academic interactions, then student academic self-esteem and the variable that had the least influence on academic achievement of student was found to be student academic self-esteem.

The study further regressed academic achievement with the composite score for student interactions (student-student, student-teacher and student-parent) and academic self-esteem of students. The results are as shown in Table 31

Table 31

Model Summary for Academic Achievement against Esteem and Student Interactions

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.944[a]	0.892	0.891	0.78541

Predictors: (Constant), Esteem, Student Interactions

The study revealed that there was a strong relationship between predicted and observed values of student academic achievement. This is due to an R-value of 0.944. This implied that the regression model provided a good fit for the data. R-Square value of 0.892 was achieved and therefore implying that student academic self-esteem and student academic interactions cumulatively accounted for 89.2% of the variance in academic achievement of students. This implied that 10.8% of the variance in academic achievement is due to variables that the study did not focus on. The study also obtained an adjusted R square value of 0.891 which is less than the R-Square values and thus implying that an additional predictor variable would improve the model less than predicted. This is an indication that

the predictor variables used in the regression were the most appropriate for the model. The standard error of the estimate was 0.78541 which was less than one and thus providing a small range of possible values of predicted values. This implies that the model has good precision. The study further tested whether the regression analysis was significant at 5% significance level whose results are shown in Table 32

Table 32

Model Significance of Academic Achievement against Esteem and Student Interactions

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	8644.036	2	4322.018	1355.854	0.000[b]
Residual	1048.744	329	3.188		
Total	9692.780	331			

Dependent Variable: Academic Achievement

Predictors: (Constant), Esteem, Student Academic Interactions

As evidenced by a F-statistics value ($F(2,329)=1355.854$) which was statistically significant at 5% significance level ($p<0.05$). This implied that the regression model provided a better fir for the data that a regression with zero predictors. It also indicated that at least one of the predictors in the model was significant. The study further examined the beta coefficients to establish with variables significantly predicted academic achievement of students as shown in Table 33.

Table 33

Model Coefficients for Academic Achievement against Esteem and Student Interactions

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.056	1.141		0.926	0.355
Student Academic Interactions	18.135	0.431	0.783	42.105	0.000
Esteem	6.555	0.317	0.384	20.677	0.000

Dependent Variable: Academic Achievement

The study found that both student academic interactions and student academic self-esteem were significant predictors of academic achievement at 5% significance level. This is evidenced by p-values less than 0.05($p<0.05$) for both the predictors. In respect to this, a beta coefficient of 18.135 was achieved in respect to academic interactions of the students. This implied that one unit increase in the student academic interactions would result into an increase of 18.135 marks in the student academic achievement with other variables held constant.

A beta coefficient of 6.555 on the other hand was achieved in respect to the student academic self-esteem. This implied that a unit increase in the academic self-esteem of the students, there would be an increase of 6.555 marks in academic achievement of students with other variables held constant. The findings are also line with the study by Ravinder (2017) that found out that student to student interactions positively influenced the level of academic achievement of the students. In Turkey, Wai and Osman (2019) established that there was a positive association between student interactions and their academic self-esteem. Bathgate (2017) concluded that their student interactions were significant predictors of student academic self-esteem.

4.8.3 Multiple Linear Regression to Predict Student Academic Interactions

The further sought to predict student-student academic interactions using student academic achievement, student academic self-esteem, student-parent and student-teacher academic interactions. However, student academic achievement was highly correlated with the other independent variables. In respect to this, the student academic achievement had a tolerance level of less than 0.2 and VIF value more than 4.0 and therefore indicating presence of multicollinearity on the model (Yilmaz, 2013). This is also evidence on the correlational analysis of the study variables. Bivand, Pebesma, and Gomez-Rubio (2015) states that multicollinearity can be reduced by removing highly correlated variables. In this case, student academic achievement was removed from the regression analysis. Table 34 shows regression model to predict student-student academic interactions using student academic self-esteem, student-parent and student-teacher academic interactions as its predictors.

Table 34

Model Summary for Student-Student Academic Interactions

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
1	0.248[a]	0.062	0.053	0.36631

a. Predictors: (Constant), Esteem, Student-Parent, Student-Teacher

According to Table 34, the correlation between the observed and predicted values of student-student academic interactions was found to be 0.248. This was indicated by the R-value of 0.248, which was considered as weak correlation (Briggs *et al*., 2016). The model was found to explain for only 6.2% of the variation in student-student academic interactions due to R Square Value of 0.062. This therefore implied that 93.8% of the variations in the way student interacted with their fellow students was explained by factors that were not considered for this regression model. The adjusted R value achieved in this study was 0.053 which was lower than the R square value. This indicated that additional variables would have improved the model less than expected (Latunde, 2016). An error term of 0.36631 achieved in this model implied that the model had low deviation from the reality and thus high in precision (Nicholson, 2011). Table 35 indicates the significance of the model at 5% significance level.

Table 35

ANOVA[a] for Student-Student Academic Interactions Model

Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	2.897	3	0.966	7.196	0.000[b]
	Residual	44.012	328	0.134		
	Total	46.909	331			

a. Dependent Variable: Student-Student

b. Predictors: (Constant), Esteem, Student-Parent, Student-Teacher

The study further revealed that the regression model to predict student-student academic interactions using student academic self-esteem, student-parent and student-teacher academic interactions as its predictors was statistically significant. This is due to F(3,328)

= 7.196>F-critical value =2.632 and P<0.05. The null hypothesis of F-test was therefore rejected. This therefore inferred that the model provided good fit for the data. Table 36 shows the significance of individual predictors in the model.

Table 36

Beta Coefficients[a] for Student-Student Academic Interactions Model

Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	1.461	0.221		6.610	0.000
Student-Teacher	0.239	0.061	0.214	3.880	0.000
Student-Parent	0.063	0.063	0.055	1.005	0.316
Esteem	0.066	0.065	0.056	1.013	0.312

a. Dependent Variable: Student-Student

The study revealed student-teacher interaction was a significant predictor of the student-student academic interactions in public secondary school students in Nakuru County. This is due to t-statistic associated *p*-value of less than 0.05. This variable had unstandardized beta coefficient of 0.239. The achieved beta coefficient implied that one unit increase in student-teacher interaction would result to 0.239 units increase in the student-student academic interactions when other factors are held constant. This is in line with the findings by Rimm-Kaufman, Baroody, Larsen, Curby, and Abry (2015) that established that student interactions could be predicted by the way the students interactions with their teachers in school. The reseacher noted that those students that had few contact time with their teachers, they also had few contact time with their fellow students. Njenga (2018) also noted that there was a significant and positive relationshiop between student-student interactions and student-teacher interactions.

It was however noted that student-parent academic interactions and student academic self-esteem were not significant predictors of student-student academic interactions. This is due to *p*-value greater than 0.05 (P>0.05). This is in line Mcgowem (2017) found out that there was no relationship between student-student academic interactions and student-parent

academic interaction. This is contrary to the findings by Duart and Szűcs (2018) who noted that those students who interacted well with their parents also interacted well with their parents and therefore a positive correlation. Bahar (2016) further noted that there was a positive and significant relationship between student-student academic interaction and student-parent academic interactions.

The study also predicted student-teacher academic interactions using student academic self-esteem, student-parent and student-student academic interactions as its predictors. The model summary is shown in Table 37.

Table 37

Model Summary for Student-Teacher Academic Interactions

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
1	0.318[a]	0.101	0.093	0.32165

a. Predictors: (Constant), Student-Student, Esteem, Student-Parent

Table 37 shows that there was a weak relationship between the observed and predicted values of student-teachers interactions as evidenced by an R value of 0.318. The model to predict student-teacher academic interactions using student academic self-esteem, student-parent and student-student academic interactions as its predictors explained 10.1% of the variations in the student-teacher academic interactions. This is due to R Square value of 0.101. This therefore implies that 89.9% of the changes in student-teacher academic interactions are due to variables that have not been considered in the current study. An additional predictor variable would not have improved the model more than expected due to adjusted R Square value (R^2=0.093) less than 0.101. The model had high precision due to a low standard error of estimate of 0.32165. Table 38 shows the significance of the model as a whole.

Table 38

ANOVA[a] for Student-Teacher Academic Interactions Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.821	3	1.274	12.310	0.000[b]
	Residual	33.934	328	0.103		
	Total	37.755	331			

a. Dependent Variable: Student-Teacher

b. Predictors: (Constant), Esteem, Student-Parent, Student-Student

The study found out that the regression model to predict student-teacher academic interactions using student academic self-esteem, student-parent and student-student academic interactions as a whole was statistically significant. This shows that at least one of the predictors was statistically significant at 5% significance level. This is evidenced by F-statistic value of 12.310 which was greater than F-critical value of 2.632. In addition the obtained *p*-value was less than the chosen significance level of 5% ($p<0.05$). This is an indication that the model provided a better fit for the data than a model with no predictor variables. To establish significant predictors in the model, the study examined the beta coefficients and its associated t-statistic values and *p*-values as shown in Table 39.

Table 39

Beta Coefficients[a] for Student-Teacher Academic Interactions Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.627	0.186		8.745	0.000
Esteem	0.149	0.057	0.140	2.626	0.009
Student-Student	0.184	0.047	0.205	3.880	0.000
Student-Parent	0.149	0.055	0.145	2.723	0.007

a. Dependent Variable: Student-Teacher

The study established that student academic self-esteem was a significant predictor of student-teacher academic interactions. This is due to a t-statistic value of 2.625 and its associated *p*-value less than the significance level of 5% ($p<0.05$). The achieved unstandardized beta coefficient was 0.149. The achieved unstandardized beta coefficient implied that for every unit increase in student academic self-esteem, the student-teacher academic interactions increased by 0.149 units when other predictors are held constant. Kpolovie, Joe, and Okoto (2014) established that academic self-esteem of the student predicted the level of academic self-esteem of students. It was in this respect established that an increase in the level of academic self-esteem of students, the academic self-esteem of students also improved significantly. Eremie and Chikweru (2015) also established that peer interaction significantly influenced the level of academic self-esteem of student in secondary schools. Similarly, Fredrick (2017) established that there was a significant relationship between student-teacher academic interactions and student academic self-esteem.

It was also established that student-student academic interactions were a significant predictor of student-teacher academic interactions. This is due to t-statistic value of 3.880 and its associated *p*-value less than 0.05. The variable had unstandardized beta coefficient of 0.184 which implied that when other factors are held constant, for very unit increase in student-student academic interactions, the student-teacher academic interactions increased by 0.184 units when other predictors are held constant. This is in agreement to the findings by Slattery, Simmons, and Miranda (2018) that showed that student-student academic interactions determined how the student also interacted with teachers. Slattery, Simmons, and Miranda (2018) further noted that students who interacted well with fellow students also interacted well with their teachers and the vice versa. Baraza and Gogo (2016) noted that student-student academic interaction had a positive influence on the student-teacher academic interactions.

Similarly, the study found that student-parent academic interactions had a significant prediction on student-teacher academic interactions. This is due to a t-statistic=2.723 and $p<0.05$. The variable had unstandardized beta coefficient of 0.149 which therefore implied that for every unit increase in student-parent academic interactions, the student-teacher

academic interactions increased by 0.149 units when other predictors are held constant. In line to this Skalicka and Stenseng (2015) established that student-teacher academic interactions could be predicted by the extent of interaction of the student and their parents back at home. Skalicka and Stenseng (2015) noted that parents were instrumental in ensuring that their children have fruitful interaction with their teachers at school. However, Katamei and Omwono (2015) noted that there was no significant correlation between student-parent academic interactions and student-teacher academic interactions.

The study also predicted student-parent academic interactions using student academic self-esteem, student-teacher and student-student academic interactions as its predictors. The model summary is shown in Table 40.

Table 40

Model Summary for Student-Parent Academic Interactions

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error Of The Estimate**
1	0.233[a]	0.054	0.046	0.32057

a. Predictors: (Constant), Student-Student, Esteem, Student-Teacher

Table 40 shows that there was a weak relationship between the observed and predicted values of student-parent academic interactions as evidenced by an R value of 0.233. The model to predict student-teacher academic interactions using student academic self-esteem, student-teacher and student-student academic interactions as its predictors explained 5.4% of the variations in the student-teacher academic interactions. This is due to R Square value of 0.054. This therefore implies that 94.6% of the changes in student-teacher academic interactions are due to variables that have not been considered in the current study. An additional predictor variable would not have improved the model more than expected due to adjusted R Square value (R^2=0.046) less than 0.054. The model had high precision due to a low standard error of estimate of 0.32057. Table 41 shows the significance of the model as a whole.

Table 41

ANOVA[a] for Student-Parent Academic Interactions Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.941	3	0.647	6.296	0.000[b]
	Residual	33.706	328	0.103		
	Total	35.648	331			

a. Dependent Variable: Student-Parent

b. Predictors: (Constant), Esteem, Student-Teacher, Student-Student

The study found out that the regression model to predict student-parent academic interactions using student academic self-esteem, student-teacher and student-student academic interactions as a whole was statistically significant. This is evidenced by F-statistic value of 6.296 which was greater than F-critical value of 2.632 and *p*-value was less than the chosen significance level of 5% ($p<0.05$). The null hypothesis of F-test was therefore rejected and this is an indication that the model provided a better fit for the data than a model with no predictor variables. To establish significant predictors in the model, the study examined the beta coefficients and its associated t-statistic values and *p*-values as shown in Table 42.

Table 42

Beta Coefficients[a] for Student-Parent Academic Interactions Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.500	0.188		7.960	0.000
Esteem	0.129	0.057	0.125	2.286	0.023
Student-Student	0.048	0.048	0.056	1.005	0.316
Student-Teacher	0.148	0.054	0.153	2.723	0.007

a. Dependent Variable: Student-Parent

According to Table 42, it was established that student academic self-esteem was a significant predictor of student-parent academic interactions. This is due to *p*-value less than the significance level of 5% ($p<0.05$). The achieved unstandardized beta coefficient was 0.129. The achieved unstandardized beta coefficient implied that for every unit increase in student academic self-esteem, the student-parent academic interactions increased by 0.129 units when other predictors are held constant. Paredes, Gazmuri, and Manzi (2017) noted that students' academic self-esteem was a determinant of interactions including interactions with their parents. Nguyen (2014) noted that academic self-esteem acted as a motivator to students to overcome racial harassments by teachers. Wambui (2015) established there was a moderate influence of student to parent interaction and the level of student academic self-esteem. Munanu and Kobia (2016) established that parental time expenditure in interacting with children positively influenced the level of student academic self-esteem.

It was however noted that student-student academic interactions was not a significant predictor of student-parent academic interactions. This is due to t-statistic value of 1.005 and its associated *p*-value was greater than 0.05 ($P>0.05$). This is in line with Adodo and Oyeniyi (2013) who noted that there was no significant influence of student-student academic on student-parent academic interactions. This is contrary to the findings by Rimm-Kaufman, Baroody, Larsen, Curby, and Abry (2015) that showed that peer interactions among students was an indicator of their interactions back at home with their parents. This finding was further in disagreement with the finding by Kisangob (2016) that student integration with peers was related to their interaction with their parents. Thuo *et al*., (2018) further revealed that those students that interacted well with their parents consequently interacted well with their fellow students back at school.

It was also found that student-teacher academic interactions had a significant prediction on student-parent academic interactions. This is due to a t-statistic=2.723 and $p<0.05$. The variable had unstandardized beta coefficient of 0.148 which therefore implied that for every unit increase in student-teacher academic interactions, the student-parent academic interactions increased by 0.148 units when other predictors are held constant. In agreement to this, Davidson and Major (2014) noted that student interactions with their parents back

at home contributed to the student interactions with their teachers at school and not the other way round. This is also in line with the study by Rimm-Kaufman *et al*., (2015) that indicated that there was an influence of student-parent academic interaction on student-teacher academic interactions. The study indicated that students that interacted well with their parents at home also related well with their teachers at school. However, a study by Figueroa (2017) noted that there was a negative influence of student-teacher academic interactions on student-parent academic interactions.

The study further computed the student academic interactions as one variable by calculating the mean score of student-student, student-teacher and student-parent interactions. The composite student academic interactions was regressed with academic self-esteem as predictor variable as results in Table 43.

Table 43

Model Summary for Student Academic Interactions

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.219	0.048	0.045	0.22819

Predictors: (Constant), Academic Self-Esteem

The study revealed that there was a weak relationship between the predicted and observed values of student academic interactions as shown by R-value of 0.219. This further implied that the model did not provide a better fit for the data. An R-Square value of 0.045 implied that academic self-esteem of student accounted for only 4.8% of the student academic interactions. An additional variable would have improved the model less than expected due to an adjusted R-Square value of 0.045, which I less than the R-Square value. The regression model had a standard error of estimate of 0.22819 (less than 1) and thus implying that the model precision was high. Table shows the significance of the model.

Table 44

Significance of Student Academic Interactions Model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.866	1	0.866	16.625	0.000
Residual	17.183	330	0.052		
Total	18.048	331			

Dependent Variable: Student Interactions
Predictors: (Constant), Esteem

The study found that the model predicting the student academic interactions using student academic self-esteem was significant at 5% significance level. This is due to a p-value of less than 0.05 (p<0.05). The sensitivity of the model as evaluated using the beta coefficients as shown in Table

Table 45

Coefficients for Student Academic Interactions

Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	2.130	0.087		24.581	0.000
Esteem	0.161	0.040	0.219	4.077	0.000

Dependent Variable: Student Interactions

The study established that academic self-esteem was a significant predictor of student interactions as a composite variable. This is due to *p*-value of less than 0.05 (p<0.05). It was in this respect found that a unit increase in academic self-esteem of the students would lead to an increase of 0.161 units in student academic interactions. This is due to unstandardized beta coefficient of 0.161. This implied that when students have high academic self-esteem, there is likelihood that that would improve in their academic interactions with peers, teachers and even parents. Paredes, Gazmuri, and Manzi (2017) noted that students' academic self-esteem was a determinant of interactions including

interactions with their parents. Nguyen (2014) noted that academic self-esteem acted as a motivator to students to overcome racial harassments by teachers.

4.8.4 Multiple Linear Regression to Predict Student Academic Self-Esteem

Table 46 shows the model summary for student academic self-esteem using student-student, student-teacher and student-parent academic interactions as its predictors.

Table 46

Model Summary for Student Academic Self-Esteem Interactions

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
1	0.230[a]	0.053	0.044	0.31014

a. Predictors: (Constant), Student-Student, Student-Teacher, Student-Parent

According to Table 38, there was a weak relationship between the observed and predicted values of student academic self-esteem as evidenced by an R value of 0.230. The model accounted for 5.3% of the variations in the student academic self-esteem. This is due to R Square value of 0.053. It therefore implied that 94.7% of the changes in student academic self-esteem are due to variables that have not been considered in the current study. An additional predictor variable would not have improved the model more than expected due to adjusted R Square value (R^2=0.044) less than 0.053. The model had high precision due to a low standard error of estimate of 0.31014. Table 47 shows the significance of the model as a whole.

Table 47

ANOVA[a] for Student Academic Self-Esteem Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.761	3	0.587	6.104	0.000[b]
	Residual	31.549	328	0.096		
	Total	33.310	331			

a. Dependent Variable: Student Academic Self-Esteem

b. Predictors: (Constant), Student-Teacher, Student-Student, Student-Parent

The study established that the regression model to predict student academic self-esteem using student-student, student-teacher and student-student academic interactions were statistically significant. This is evidenced by F-statistic value of 6.104 which was greater than F-critical value of 2.632. It was also noted that the associated *p*-value was less than the chosen significance level of 5% ($p<0.05$). The null hypothesis of F-test was therefore rejected and therefore the model provided a better fit for the data. To establish whether the predictors in the model were significant, the study examined the beta coefficients and its associated t-statistic values and *p*-values as shown in Table 48.

Table 48

Beta Coefficients[a] for Student Academic Self-Esteem Model

Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	1.398	0.184		7.614	0.000
Student-Student	0.047	0.047	0.056	1.013	0.312
Student-Teacher	0.138	0.053	0.147	2.626	0.009
Student-Parent	0.121	0.053	0.125	2.286	0.023

a. Dependent Variable: Student Academic Self-Esteem

The study established that student-student academic interactions was not a significant predictor of student academic self-esteem. This is due to t-statistic value of 1.013 and its associated *p*-value greater than 0.05 ($P>0.05$). This is in disagreement to the findings by Page (2017) that noted that peer interactions of students resulted to a better academic self-esteem of students. It was further noted that those students who actively interacted with fellow students were able to improve their academic self-esteem. This is also contrary to the findings by Wai and Osman (2019) who established that there was a positive influence between student-student academic interactions on their academic self-esteem. Wai and Osman (2019) further noted that a unit increase in the level academic interactions led to 0.257 units increase in the level of academic self-esteem.

The study further revealed that student-teacher academic interactions had a significant prediction on student academic self-esteem. This is due to a t-statistic=2.626 and $p<0.05$. The variable had unstandardized beta coefficient of 0.138 which therefore implied that for every unit increase in student-parent academic interactions, the student academic self-esteem increased by 0.138 units with other predictors held constant. This is in line with recommendation of Ngqela (2015) that teachers should always embrace students and help them in their challenges in order to improve their academic self-esteem. The findings are also in agreement with findings by Handreke and Klemenčič (2018) who established that those students who actively interacted with their parents tended to have a positive attitude and perception towards academics. Interactions of students with their parents was seen to be a significant booster of the students' academic self-esteem. This was evidenced in the way the students enjoyed the learning sessions and perceived class lesson as fun.

Table 49 further shows that student-parent academic interactions was a significant predictor of student academic self-esteem. This is due to *p*-value less than the significance level of 5% ($p<0.05$). The achieved unstandardized beta coefficient was 0.121. The achieved unstandardized beta coefficient implied that for every unit increase in student-parent academic interactions, the student academic self-esteem increased by 0.121 units when other predictors are held constant. This is echoed by Kilburn, Cannon, Mattox, and Shaw (2014) who noted that parent interactions with their children shape the academic self-esteem of their children.

As summative analysis, the study calculated the composite values for the three student interactions and regressed the composite variable with student academic self-esteem. The results for the regression are as shown in Table 49 to Table 51.

Table 49

Model Summary for Academic Self-Esteem against Student Interactions

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.219[a]	0.048	0.045	0.31000

Predictors: (Constant), Student Interactions

The model summary indicates that there was a weak correlation between the predicted and observed values of academic self-esteem as shown by an R-Value of 0.219. This implied a weak relationship between the model variables and thus not good fit for the model data. The results further showed that student interactions only contributed 4.8% of the variation in the academic self-esteem. This is evidenced by an R-Square value of 0.048. An additional predictor variable could have improved the model less than expected since the Adjusted R-Square value was 0.045, less than the R-Square value. The standard error of estimate was 0.31000; less than one and thus implying minimal error in the model estimation of parameters.

Table 50

Model Significance for Academic Self-Esteem against Student Interactions

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.598	1	1.598	16.625	0.000
Residual	31.713	330	0.096		
Total	33.310	331			

Dependent Variable: Esteem

Predictors: (Constant), Student Interactions

The study established that the regression model was statistically significant at 5% significance level as shown by $p<0.05$. This implied that the regression model provided a good fit for the data than a model without predictor variables. The sensitivity of the model was further measured using the beat coefficients as shown in Table 51.

Table 51

Coefficients for Academic Self-Esteem against Student Interactions Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.431	0.182		7.874	0.000
Student Interactions	0.298	0.073	0.219	4.077	0.000

a. Dependent Variable: Esteem

The study found that student academic interactions was a significant predictor of academic self-esteem as evidenced by $p<0.05$. The results implied that a unit increase in student interactions result to 0.298 unit increase in student academic self-esteem with other variables held constant. This is due to unstandardized beta coefficient of 0.298. This implied that those students who mostly interact with their peers, teachers and parents on academic matter tend to have higher self-esteem compared to those with low interaction levels. Bathgate (2017) revealed that the level of student self-esteem shifted depending on the level in which the students interacted with fellow students, teachers and parents back at home. It was noted that the student interactions improved the level of the academic self-esteem of the students (Wai & Osman, 2019).

The entire regression analysis indicated that academic achievement of students in public secondary schools in Nakuru County could be significantly be predicted by four variables; student-student, student-teacher, student-parent academic interactions and student academic self-esteem. Student to student interactions could only be significantly predicted by one variable; student-teacher academic interactions. On the other hand, student-teacher academic interactions was significantly predicted by three variables; student academic self-esteem, student-parent and student-student academic interactions. Lastly, student academic self-esteem was significantly predicted by two variables; student-teacher, student-parent academic interactions. The model that explained for the highest percentage of variation in the dependent variable was the model to predict academic achievement of students using student-student, student-teacher, student-parent academic interactions and student academic self-esteem as predictor variables. This model explained for 89.3% of the variations in students' academic achievement in public secondary schools in Nakuru County. Therefore, the optimal model in this study was;

$Y_1 = 1.174 + 6.318X_{11} + 6.581X_{21} + 5.437\ X_{31} + 6.255\ X_{41} + 0.77691$

Where;

Y_1 = Student Academic Achievement

X_1 = Student-Student Academic Interactions

X_2 = Student-Teacher Academic Interactions

X_3 = Student-Parent Academic Interactions

X_4 = Student Academic Self-Esteem

It was on this finding that the last hypothesis of the study stating that; **H_{04}:** There are no statistically significant prediction equation among students' academic achievement, interaction and academic self-esteem in public secondary schools in Nakuru County was rejected. It was therefore concluded that student-student, student-teacher, student-parent academic interactions and student academic self-esteem were significant predictors of students' academic achievement in public secondary schools in Nakuru County.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of major findings of this study. The study established that the instruments used were valid and reliable. This chapter also presents the conclusion and recommendations for both policies making and for further studies.

5.2 Summary of Findings

The purpose of this study is to examine students' academic interaction, academic self-esteem and achievement relationships in public secondary schools in Nakuru County, Kenya. This section presents summary of major findings from the study as per research objectives.

5.2.1 Relationship between Students' Academic Interaction and Academic Achievement

The first hypothesis of the study stated that; **H_{01}:** There is no statistically significant relationship between students' academic interaction and academic achievement in public secondary schools in Nakuru County, Kenya. In respect to this, the study established that there was statistically significant relationship between student-student academic interactions and student academic achievement in public secondary schools in Nakuru County. It was also established that statistically significant relationship between student-teacher academic interactions and student academic achievement in public secondary schools in Nakuru County. The study also established that there was statistically significant relationship between student-parent academic interactions and student academic achievement in public secondary schools in Nakuru County. Based on the three interactions, the first hypothesis stating that there is no significant relationship between students' academic interaction and achievement in public secondary schools in Nakuru County, Kenya was rejected at 5% significance level. It was therefore revealed that there was statistically significant relationship between students' academic interaction and academic achievement in public secondary schools in Nakuru County, Kenya.

5.2.2 Relationship between Students' Academic Interaction and Academic Self-Esteem

The second hypothesis stated that: **H_{02}:** There is no statistically significant relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya. The study established that there was statistically significant relationship between student-student academic interactions and student academic self-esteem. In respect to student-teacher academic interactions, the study revealed that there was a significant relationship between student-teacher academic interactions and student academic self-esteem as evidenced by a Pearson Correlation of 0.184 which was significant at 5% significance level. Focusing on student-parent academic interactions, the study revealed that there was a positive and significant relationship between the student-parent academic interactions and student academic self-esteem at 5% significance level. From the correlations between the student academic self-esteem and the three types of student interactions, the second hypothesis stating that there is no significant relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, was rejected at 95% confidence interval. It was therefore concluded that there was a statistically significant relationship between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County.

5.2.3 Relationship between Students' Academic Self-Esteem and Academic Achievement

The third hypothesis of the study stated that; **H_{03}:** There is no statistically significant relationship between students' academic self-esteem and achievement in public secondary schools in Nakuru County, Kenya. The study in this regard established that there was statistically significant relationship between students' academic self-esteem and academic achievement in public secondary schools in Nakuru County due to a correlation coefficient of 0.580 and a *p*-value less than 0.05. Therefore, the third hypothesis of the study was rejected at 95% confidence interval.

5.2.4 Prediction Equation among Students' Academic Achievement, Academic Interaction and Academic Self-Esteem

The study tested linearity, normality, multicollinearity, autocorrelation, and heteroscedasticity assumptions of multiple linear regression. The entire regression analysis indicated that academic achievement of students in public secondary schools in Kenya was significantly be predicted by the four variables; student-student, student-teacher, student-parent academic interactions and student academic self-esteem. The model that explained for the highest percentage of variation in the dependent variable was the model to predict academic achievement of students using student-student, student-teacher, student-parent academic interactions and student academic self-esteem as predictor variables. This model explained for 89.3% of the variations in students' academic achievement in public secondary schools in Nakuru County. Therefore, the optimal model in this study was; $Y_1 = 1.174 + 6.318X_{11} + 6.581X_{21} + 5.437\ X_{31} + 6.255\ X_{41} + 0.77691$, Where; Y_1 = Student Academic Achievement, X_{11} = Student-Student Academic Interactions, X_{21} = Student-Teacher Academic Interactions, X_{31} = Student-Parent Academic Interactions, and X_{41} = Student Academic Self-Esteem. It was on this finding that the last hypothesis of the study stating that; **H_{04}:** There are no statistically significant prediction equation among students' academic achievement, interaction and academic self-esteem in public secondary schools in Nakuru County was rejected. It was therefore established that student-student, student-teacher, student-parent academic interactions and student academic self-esteem were significant predictors of students' academic achievement in public secondary schools in Nakuru County.

5.3 Conclusion of the Study

The following conclusions were drawn from the findings of the study;

i. Significant relationship exists between students' academic interaction and achievement in public secondary schools in Nakuru County, Kenya. It was also noted that students' academic interactions significantly predicted students' academic achievement

ii. Significant relationship exists between students' academic interaction and academic self-esteem in public secondary schools in Nakuru County, Kenya. In addition, it was

found out that student-teacher academic interactions and student-parent academic interactions significantly predicted student academic self-esteem. It was however noted that student-student academic interaction was not a significant predictor of student academic self-esteem.

iii. Significant relationship exists between students' academic self-esteem and achievement in public secondary schools in Nakuru County, Kenya. In addition, it was also revealed that students' academic self-esteem was a significant predictor of students' academic interaction.

iv. The model to predict academic achievement of students using student-student, student-teacher, student-parent academic interactions and student academic self-esteem as predictor variables explained the highest percentage of variation in the dependent variable, and hence the optimal model.

5.4 Recommendations of the Study

The following recommendation were made for policy making;

i. The study established that student-student, student-teacher academic interactions and student academic self-esteem were significant predictors of student academic achievement. It is therefore recommended that teachers use cooperative learning approaches in order to boost these aspects for better academic achievement of students. In respect to this, the study recommends the Kenya Teachers Training Institutions to develop a curriculum or teaching methods that seeks to improve the student-student, student-teacher, student-parent academic interactions and student academic self-esteem in a learning environment like competency-based curriculum (CBC).

ii. The study revealed that student-teacher academic interactions had the greatest influence on academic achievement in public secondary schools in Nakuru County. This was followed by the student-student academic interactions, then student academic self-esteem and the variable that had the least influence on academic achievement of student was found to be student academic self-esteem. It is on this finding that the study recommends Nakuru County Education Office to advise the national government in

policies formulation to prioritize as much as possible the aspects of student-teacher academic interactions.

iii. The study further recommends teachers to ensure that there is positive environment for learning in class for this was aspect was rarely considered as established in this study. The study further recommends teachers to instill discipline among students in order to ensure that students respected each other in interacting both in class and outside this class. This is because it was established that students did not mind the language, they used in interacting with fellow classmates as well as in interacting with their teachers.

iv. The study further recommends teachers to motivate students to adjust their academic self-esteem for better academic achievement in terms of viewing learning activities in the school as fun, feeling good when in a class learning, enjoy spending many hours on academic homework and spend most of their time reading as opposed to other activities. Students are also recommended to approach their teachers after class to clear any doubts in concepts that seem unclear to them. This recommendation is based on poor rating on these aspects by both the students and their class teachers.

v. Since student-parent academic interactions was found to be a significant predictor of academic achievement of students, this study recommends parents to be involved in academic affairs of their children such as provision of learning resources, ensuring that there was a conducive learning environment, monitoring of student's academic progress in school, attendance to parents meeting, allocating time for students to do school assignments at home, encouraging their children to work hard in academics and preparing their children examinations. This is likely to improve the academic achievement of students.

5.5 Suggestions for Further Research

The study recommends further studies to be conducted in filling identified gaps that the current study did not fill.

i. A further study should be done on the influence of family background and parental nurturance on the academic interactions of students as well as their academic achievement.

ii. An investigation should be done to compare student interactions in boarding and Day secondary schools and establish whether the differences if any affect the academic achievement of the students.
iii. A comparative study can also be conducted in other counties to establish whether students' academic interaction, and academic self-esteem affects the level of academic achievement of students in both public and private secondary schools.
iv. A further study should be conducted to also establish the parent's views on the interaction, self-esteem and academic achievement relationships among secondary school students.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR STUDENTS

Introduction:

My name Wilson Ogot Addero and I am a doctorate student at Egerton University leading to the award of Degree of Doctor of Philosophy in Educational Psychology. In partial fulfillment of the requirement for the award of the degree of doctor of philosophy in educational psychology of Egerton University, I am required to carry out a research. I kindly request you to take part in this study by responding to the items in this questionnaire as truthfully as possible. The questionnaire seeks to obtain information on the relationship between students' interactions, academic self-esteem and academic achievement of students in public secondary schools in Nakuru County, Kenya. All your responses shall be treated confidentially, and will only be used for the purpose of this study. **DO NOT** indicate your name anywhere on this questionnaire.

PART I: Background Information

1. Your gender

   Male [ ] Female [ ]

2. Your age

   13-15 years [ ] 16-18 years [ ] 19-21 years [ ] Above 21 years [ ]

PART II: S**tudent-Student Academic Interactions**

In the statements below, rate your academic interaction with fellow students in your school in a scale of 0 to 4 where; 0=Never, 1= Rarely, 2= Sometimes, 3=Usually and 4= Always.

No.	Statement	0	1	2	3	4
3.	My fellow students create a positive environment for learning					
4.	I participate in group work discussions.					
5.	We motivate one another towards better performance					

6.	I ask my fellow classmates for assistance to understand a concept taught in class					
7.	My fellow students shares learning resources with me					
8.	I pay attention to ideas shared by fellow students					
9.	I consult my fellow students for academic assignments					
10.	I argue my point out in regard to classwork with my peers in class.					
11.	I mind the language I use in interacting with my fellow classmates in all academic aspects					
12.	I am accountable to my fellow classmates in regard to my academic achievement in school					

PART III: **Student-Teacher Academic Interactions**

In the statements below, rate your academic interaction with your teachers in your school in a scale of 0 to 4 where; 0=Never, 1= Rarely, 2= Sometimes, 3=Usually and 4= Always.

No.	Statement	0	1	2	3	4
13.	I ask my teachers questions during class learning					
14.	All my teachers provide a feedback on questions asked					
15.	I complete the academic assignments given by my teachers					
16.	My teachers are available for academic consultation.					
17.	I approach my teachers after class to clear any doubts in concepts that were unclear to me					
18.	My teachers know my capabilities and help me overcome my challenges					
19.	My teachers motivate me to work hard for better academic achievement					
20.	My teachers maintain order in class during the lessons					
21.	I mind the language I use to address teachers in class					
22.	The teacher responds quickly to my academic needs					

PART IV: **Student-Parent Academic Interactions**

In the statements below, rate your academic interaction with your parents or guardians in a scale of 0 to 4 where; 0=Never, 1= Rarely, 2= Sometimes, 3=Usually and 4= Always.

No.	Statement	0	1	2	3	4
23.	My parent provides me with learning resources					
24.	The learning environment at home is conducive					
25.	My parent monitors my academic progress in school					

26.	My parent attends parent meetings or meets my teacher(s) if need be.					
27.	My parent gives me ample time to do my school assignments					
28.	My parent makes sure that my homework is done					
29.	My parents knows what is best for me in my academic aspiration.					
30.	My parents understands my weaknesses and strengths in my academic journey					
31.	My parent encourages me to work hard in my academic work in school					
32.	My parents prepares me well for school examinations					

PART V: Student Academic Self-Esteem.

In the statements below, rate your level of academic self-esteem in regard to the following statement in a scale of 0 to 4 where; 0=Never, 1= Rarely, 2= Sometimes, 3=Usually and 4= Always.

No.	**Statement**	**0**	**1**	**2**	**3**	**4**
33.	Learning activities in the school is fun					
34.	I have strong academic capabilities					
35.	I do academic preparation for examinations in advance					
36.	I feel good when I am in a class learning					
37.	I feel good about myself when I attain good academic grades					
38.	I enjoy spending many hours on academic homework.					
39.	I try hard to solve an academic problem until I make it					

40.	I would rather spend most of my time reading as opposed to other activities					
41.	I voluntarily answer questions (without being called) in class					
42.	In class, I choose a position which is most visible to the teacher					

THE END

Thank you.

APPENDIX B: CLASS TEACHERS' INTERVIEW SCHEDULE

Student-Student Academic Interactions

In regard to student-student academic interactions in your class, briefly explain how the following aspects occur;

1. Seeking academic assistance among students
2. Level of encouragement among students towards better achievement
3. Level of student participation in group work discussions
4. Level of sharing of learning resources among the students

Student-Teacher Academic Interactions

In respect to student-teacher academic interactions in your class, how would you describe the following aspects?

5. Asking and answering questions by students
6. Students completing of teachers' assignment
7. Availability of teachers for academic consultation

Student-Parent Academic Interactions

How would you describe the following aspects of student-parent academic interactions in your class?

8. The extent of provision of learning resources by parents
9. The extent in which parents create time to do school assignments
10. Quality of the learning environment at home
11. Parents' monitoring of children's academic progress
12. Parent attendance to school meetings

Student Academic Self-esteem

In view of student academic self-esteem towards academic achievement, how would you describe the following aspects in your class?

13. Assertiveness or aggressiveness of student towards class tasks
14. Ability of students to communicate in class
15. Student attitude towards self in regard to learning capabilities
16. Ability to take leadership role in group discussions

Thank you for your time and feedback.

APPENDIX C: ACADEMIC ACHIEVEMENT PROFORMA TABLE

ADM. NO	END OF TERM EXAMINATION MEAN SCORE			AVERAGE SCORE	STANDARDIZED T-SCORE
	TERM 1	TERM 2	TERM 3		

APPENDIX D: INTRODUCTION LETTER FROM THE UNIVERSITY

EGERTON UNIVERSITY
Tel: Pilot: 254-51-2217620
254-51-2217877
254-51-2217631
Dir.line/Fax: 254-51-2217847
Cell Phone

P.O. Box 536 - 20115
Egerton, Njoro, Kenya
Email: bpgs@egerton.ac.ke
www.egerton.ac.ke

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

ED16/14681/15

Ref:.....

Date: 3rd May, 2019

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

Dear Sir,

RE: REQUEST FOR RESEARCH PERMIT – MR. WILSON OGOT ADDERO REG. NO. ED16/14681/15

This is to introduce and confirm to you that the above named student is in the Department of Psychology, Counseling & Educational Foundations, Faculty of Education & Community Studies, Egerton University.

He is a bona-fide registered PhD student in this University. His research topic is **"Students' Academic Interaction, Self-Esteem and Achievement Relationships in Public Secondary Schools in Nakuru County, Kenya."**

He is at the stage of collecting field data. Please issue him with a research permit to enable heim undertake the studies.

Your kind assistance to him will be highly appreciated.

Yours faithfully,

DIRECTOR, BOARD OF POST GRADUATE STUDIES
03 MAY 2019

Prof. Nzula Kitaka
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

NK/vk

Transforming Lives Through Quality Education

APPENDIX E: RESEARCH AUTHORIZATION FROM THE COUNTY COMMISSIONER

THE PRESIDENCY
MINISTRY OF INTERIOR AND
CO-ORDINATION OF NATIONAL GOVERNMENT

Telegram: "DISTRICTER" Nakuru
Telephone: Nakuru 051-2212515
When replying please quote

COUNTY COMMISSIONER
NAKURU COUNTY
P.O. BOX 81
NAKURU.

Ref No. CC. SR .EDU 12/1/2 VOL.1V/114 — 20th June, 2019

Deputy County Commissioners
NAKURU COUNTY

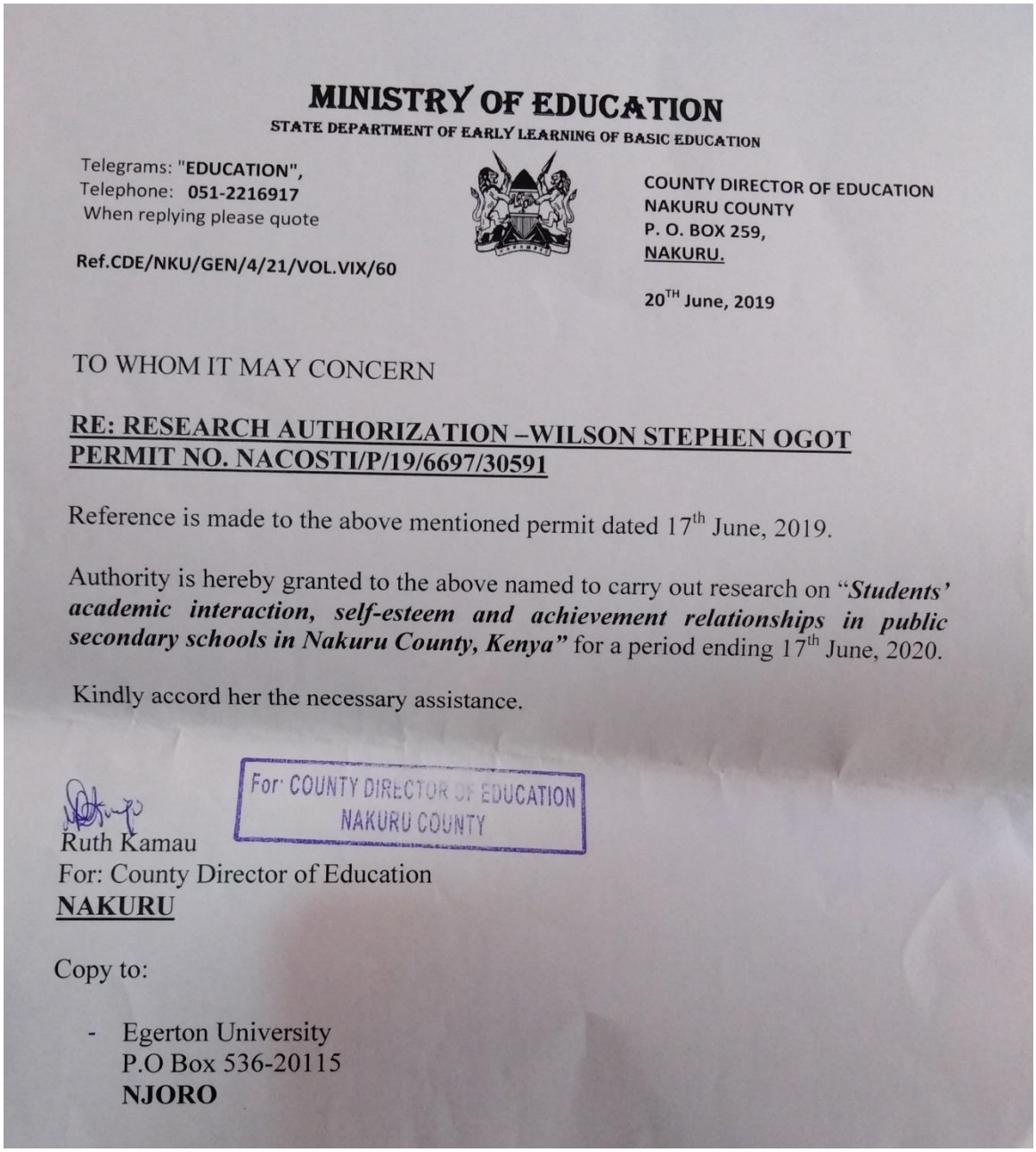
RE:- RESEARCH AUTHORIZATION – WILSON STEPHEN OGOT

The above named student from Egerton University has been authorized to carry out research on "**students' academic interaction, self-esteem and achievement relationships in public secondary schools "** in Nakuru County for a period ending 12th June, 2020

Please accord him all the necessary support to facilitate the success of his research.

MARY W. MWANGI
FOR COUNTY COMMISSIONER
NAKURU COUNTY

APPENDIX F: RESEARCH AUTHORIZATION FROM THE MINISTRY OF EDUCATION



MINISTRY OF EDUCATION

STATE DEPARTMENT OF EARLY LEARNING OF BASIC EDUCATION

Telegrams: "**EDUCATION**",
Telephone: **051-2216917**
When replying please quote

Ref.CDE/NKU/GEN/4/21/VOL.VIX/60

COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY
P. O. BOX 259,
NAKURU.

20TH June, 2019

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION –WILSON STEPHEN OGOT
PERMIT NO. NACOSTI/P/19/6697/30591

Reference is made to the above mentioned permit dated 17th June, 2019.

Authority is hereby granted to the above named to carry out research on "***Students' academic interaction, self-esteem and achievement relationships in public secondary schools in Nakuru County, Kenya"*** for a period ending 17th June, 2020.

Kindly accord her the necessary assistance.

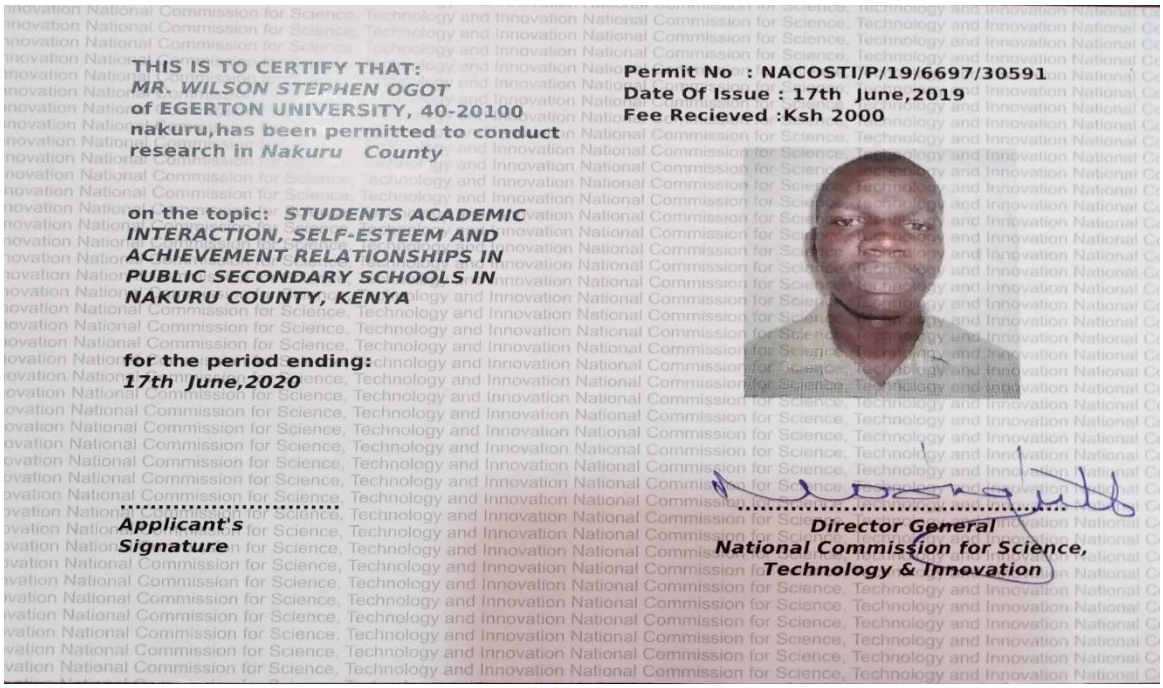
For: COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY

Ruth Kamau
For: County Director of Education
NAKURU

Copy to:

- Egerton University
  P.O Box 536-20115
  NJORO

APPENDIX G: RESEARCH PERMIT FROM NACOSTI



THIS IS TO CERTIFY THAT:
MR. WILSON STEPHEN OGOT
of EGERTON UNIVERSITY, 40-20100
nakuru,has been permitted to conduct
research in *Nakuru County*

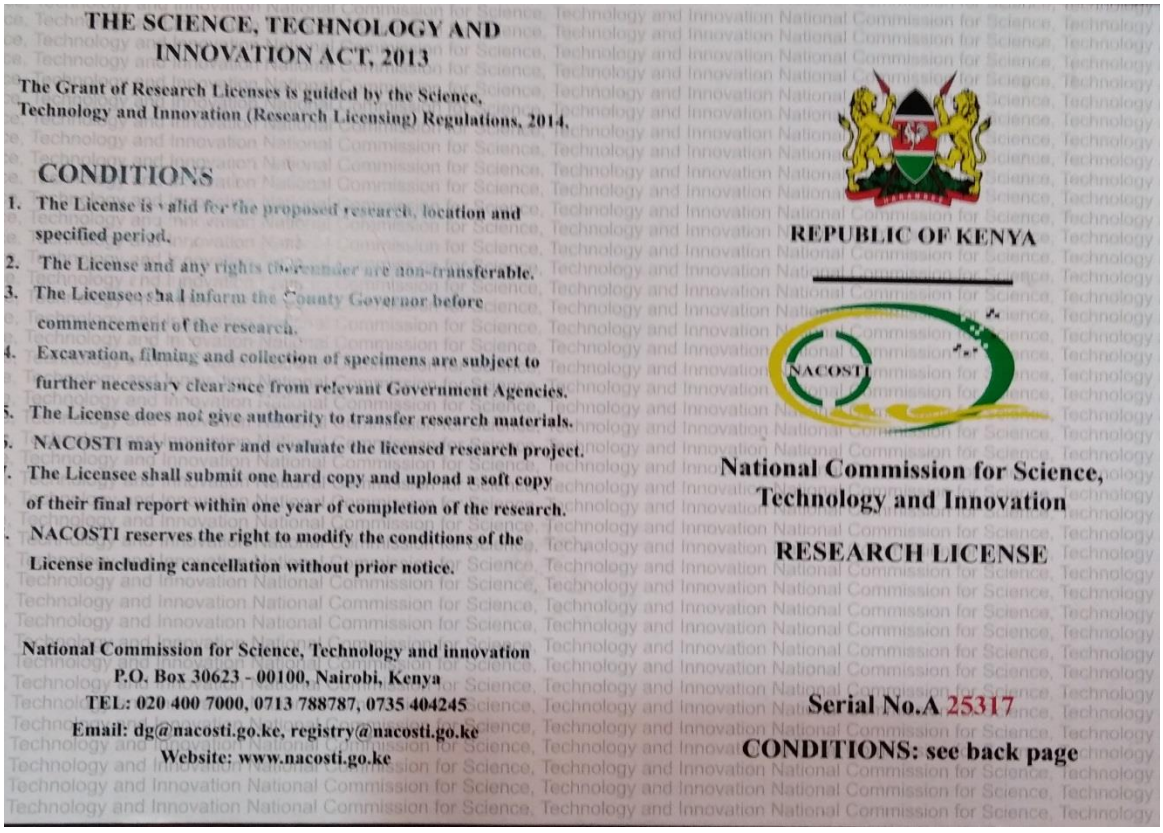
on the topic: *STUDENTS ACADEMIC INTERACTION, SELF-ESTEEM AND ACHIEVEMENT RELATIONSHIPS IN PUBLIC SECONDARY SCHOOLS IN NAKURU COUNTY, KENYA*

for the period ending:
17th June,2020

Permit No : NACOSTI/P/19/6697/30591
Date Of Issue : 17th June,2019
Fee Recieved :Ksh 2000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation



THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
5. The License does not give authority to transfer research materials.
6. NACOSTI may monitor and evaluate the licensed research project.
7. The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice.

National Commission for Science, Technology and innovation
P.O. Box 30623 - 00100, Nairobi, Kenya
TEL: 020 400 7000, 0713 788787, 0735 404245
Email: dg@nacosti.go.ke, registry@nacosti.go.ke
Website: www.nacosti.go.ke

REPUBLIC OF KENYA

NACOSTI

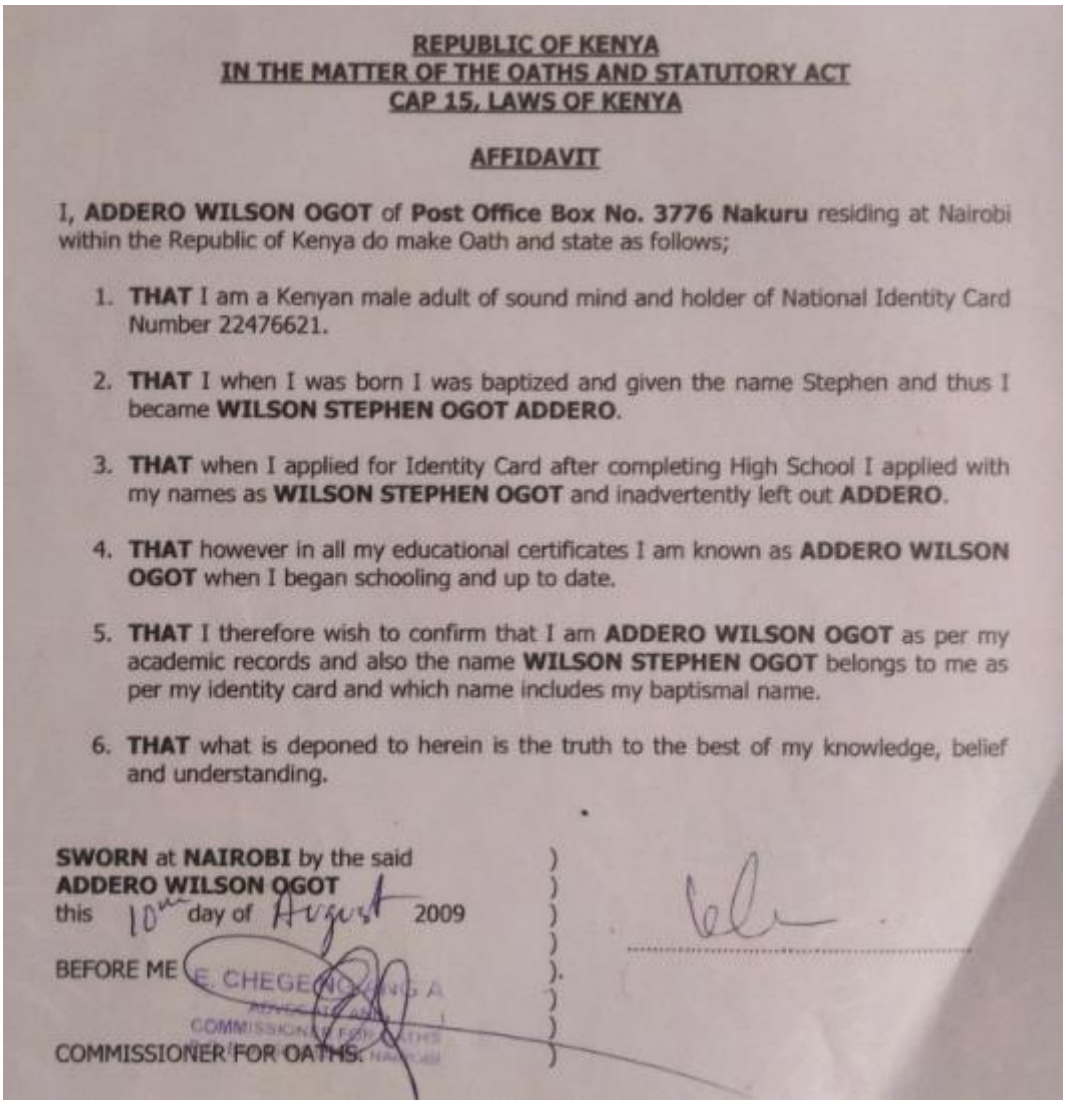
National Commission for Science, Technology and Innovation

RESEARCH LICENSE

Serial No.A 25317

CONDITIONS: see back page

APPENDIX H: NAME AFFIDAVIT



REPUBLIC OF KENYA
IN THE MATTER OF THE OATHS AND STATUTORY ACT
CAP 15, LAWS OF KENYA

AFFIDAVIT

I, **ADDERO WILSON OGOT** of **Post Office Box No. 3776 Nakuru** residing at Nairobi within the Republic of Kenya do make Oath and state as follows;

1. **THAT** I am a Kenyan male adult of sound mind and holder of National Identity Card Number 22476621.
2. **THAT** I when I was born I was baptized and given the name Stephen and thus I became **WILSON STEPHEN OGOT ADDERO**.
3. **THAT** when I applied for Identity Card after completing High School I applied with my names as **WILSON STEPHEN OGOT** and inadvertently left out **ADDERO**.
4. **THAT** however in all my educational certificates I am known as **ADDERO WILSON OGOT** when I began schooling and up to date.
5. **THAT** I therefore wish to confirm that I am **ADDERO WILSON OGOT** as per my academic records and also the name **WILSON STEPHEN OGOT** belongs to me as per my identity card and which name includes my baptismal name.
6. **THAT** what is deponed to herein is the truth to the best of my knowledge, belief and understanding.

SWORN at **NAIROBI** by the said)
ADDERO WILSON OGOT)
this 10th day of August 2009)
)
BEFORE ME E. CHEGE NGANGA)
ADVOCATE)
COMMISSIONER FOR OATHS)
NAIROBI)
COMMISSIONER FOR OATHS.)