INFLUENCE OF SELECTED FACTORS ON STUDENTS' ACADEMIC ACHIEVEMENT IN ENGINEERING COURSES IN KISUMU NATIONAL POLYTECHNIC, KENYA

BY

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DECLARATION

DECLARATION BY THE CANDIDATE

This thesis is my original work and has never been presented to any university for the award of a degree.

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DEDICATION

This thesis is dedicated to my loving children Shalom and Excellent; and my parents Mr. and Mrs. Machachu who encouraged and inspired me to undertake my studies. You mean a lot to me.

ABSTRACT

Engineering courses offered in polytechnics play a critical role in acquisition of practical skills and knowledge relating to industrial development worldwide. In Kenya there were two National polytechnics; Kisumu National Polytechnic (TKNP) and Eldoret National Polytechnic (TENP) as per the time of the study. Through engineering education countries build competence based workforce for key industries. Performance of students in engineering courses in TKNP has been unsatisfactory compared to TENP. 645 candidates sat diploma examination in engineering courses between 2010 and 2014 in TKNP. Forty (6.2%) earned credits, 143(22.2%) passes, 247(38.3%) were referred and 215(33.3%) failed; compared to non-engineering courses in which 22(1%) attained distinctions, 963(44%) credits720 (33%) passes, 400(18.3%) were referred and 106(4.8%) failed while TENP presented 831 candidates during the same period for diploma examination. 110 (13.3%) attained credits, 283(34.1%) pass, 309(37.2%) were referred and 129 (15.5%) failed; compared to non-engineering courses in which 31(1.59%) earned distinctions, 672(34.62%) credits, 744(38.33%) passes, 393(20.3%) were referred and 101(5.2%) failed. The purpose of this study therefore was to determine influence of selected factors on students' academic achievement in engineering courses in TKNP. Objectives of the study were to; establish the influence of institutional facilities; determine the influence of students' entry behavior; establish the influence of lecturer characteristics on student's academic achievement in engineering courses in Kisumu National polytechnic. A researchers' conceptual frame work was used to establish interrelationships between independent variables- (institutional facilities, students' entry behavior and lecturer characteristics) and dependent variable- (students' academic achievement). The study adopted descriptive and correlational research designs. Study population was 645 students, 41 lecturers, 1 librarian, 3 technicians and 1 principal. Fisher's formula was used to determine sample sizes. Simple random was used to select 241 students and 37 lecturers while 1 principal, 3 technicians and 1 librarian were selected by saturated sampling. Questionnaires, interviews and document analysis guide were used to collect data. Face and content validity was determined by experts in Educational Administration. Reliability was established through a pilot test with 4 (9%) lecturers using test-re-test technique whereby Pearson's r coefficient for lecturers' questionnaire was 0.82 at $\alpha < 0.05$. Quantitative data were analyzed using frequency counts, percentages, means and regression analysis. Qualitative data from interviews and open ended items of questionnaires were reported in emergent themes and sub themes. The study established that institutional facilities had low influence (0.042) and accounted for 4.2% of the variation in students' academic achievement, students' entry behavior had an influence of 0.113 and accounted for 11.3% variation while lecturer characteristics had no influencer = 0.125, $p>0.05$ on students' academic achievement in engineering courses. The study concluded that institutional facilities and students' entry behavior had influence while lecturer characteristics had no influence on students' academic achievement. These findings are of help to the management of TKNP area that needs to be improved to enhance students' academic achievement in the engineering courses. Institutional facilities should be provided in adequate numbers to enhance performance; the management should implement the admission policy for engineering courses. The management should assign lecturers duties considering their age and experience for the courses.

TABLE OF CONTENTS

Content **Page**

ACRONYMS

ILO	-	International Labor Organization
KCPE	-	Kenya Certificate of Primary Education
KCSE	-	Kenya Certificate of Secondary Education.
KESSP	-	Kenya Education Sector Support Paper
KIE	-	Kenya Institute of Education
KNEC	-	Kenya National Examination Council
MOEST	-	Ministry of Education Science and Technology
MOHEST	-	Ministry of Higher Education Science and Technology
NACOSTI	-	National Commission for Science, Technology and Innovation.
STEM	-	Science Technology Engineering and Mathematics.
TENP	-	The Eldoret national polytechnic
TKNP	-	The Kisumu national polytechnic
TVET	-	Technical Vocational Education and Training
TEP	-	Technical Education Program
UNESCO	-	United Nations Educational, Scientific and Cultural Organization

LIST OF TABLES

Table **Page**

LIST OF APPENDICES

Appendix **Page**

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Engineering is the discipline and profession of applying scientific knowledge and utilizing natural laws and physical resources in order to design and implement materials, structures, machines, devices, systems and processes that realize a desired objective and meet specified criteria. Fields of engineering include but not limited to; mechanical engineering, electrical and electronic engineering, civil engineering, chemical engineering and automotive engineering (UNESCO, 2010). Polytechnics and institutes of technology train the technicians and technologists in engineering who are the most needed middle level manpower. An engineer therefore is a problem solver who combines the knowledge of science mathematic and economics to solve technical problems that confront society (Mark & Dan, 2005).

Engineering education stimulates a country's economic development by building the technical capacity of the workforce. A competent technical workforce base boosts development by; enabling a country to engage in global economy through - direct foreign investment by technically oriented multi-national companies, effective utilization of foreign funds and providing a legacy of appropriate infrastructure projects and technically competent staff to operate and maintain them, and stimulate job formation through small business startup by technically competent entrepreneurs (Russel, 2011).

Studies have shown that students' academic achievement is dependent on certain factors; Hofstein and Lunnetta, (2004) identified school facilities, Michele, (2003) identified the

library, (Lucke, 2012, Ionescu, 2014, Ojera, Simatwa and Ayodo, 2013) cited the laboratory, (Thomas, Hunderson & Goldfinch, 2013 & Loo & Choy, 2013) identified students entry scores, (Joshua 2014, Abraham and Keith, 2006) identified lecturer characteristics as factors influencing students' performance. This is the literature that informed the choice of three selected factors, namely; institutional facilities, students' entry behavior and lecturer characteristics. Despite the presence of these Factors in TKNP, academic achievement of students in engineering courses has been unsatisfactory compared to social sciences. (Tables 1.1 & 1.2).

Adebola and Abemola (2011) found that the library had an insignificant influence on students' achievement. In contrast Michele, (2003) found a significant influence of the school library on students' achievement. These studies reviewed had contradicting views on the contribution of text books and library to student's performance, this is the knowledge gap this study sought to fill.

The present study used both descriptive and correlational designs with interview and document analysis guide to establish the influence of the library and text books on students' achievement. The study was conducted in one institution using a sample of 283. The study measured the influence of the library in terms of utility- the number of times a student visited the library. On the other hand, Adebola and Abemola (2011) investigated school quality factors that are likely to influence students' achievement. They used descriptive and ex post facto designs. A sample size of 1014 respondents was used. 25 institutions were used. The study used questionnaires to collect data.

According to Lucke (2012) the laboratory learning improved final grades for students in engineering statics and mechanics, similarly, Ionescu (2014) noted that the integration of laboratory experiments enhanced students understanding of the module and their academic performance in mechanical engineering in South Africa. Lyle and Albert (2005), Romanas and Jonas (2007) observed that the laboratory learning developed students' technical skills by promoting active learning and not necessarily their academic performance.

Lyle andAlbert (2005) suggested a further research on the effectiveness of laboratory on students' performance. A knowledge gap this study sought to fill. Romanas and Jonas (2007) did a literature analysis of existing data in South Africa to investigate the importance of working integrated learning and laboratory experiment in engineering teaching. Lucke (2012) developed a practical model and used a survey to collect data. The previous studies did not find a relationship between academic performance and the laboratory but instead found that the laboratory helped develop technical skills, a knowledge gap this study seeks to fill. The present study will use correlational and descriptive survey to establish the influence of laboratory on students' academic achievement in polytechnics.

The number of students enrolled in class relates to the way teachers approach their teaching. When teachers perceive a class to be too large they adopt teacher centered approaches than student focused approaches (Prosser & Trigwell, 1999). In a study on factors affecting students' experiences and performance in engineering, Rafael, Linah and Keith (2013) found a negative significant relationship between students' scores and class

size in engineering courses in the University of Sydney. A sample of 45,467 students were selected, standardized questionnaire was used as an instrument to gather data. Similar finding was recorded by Jack and Partell (2014) and Scott, Sarah, Miles, Michelle and Mary (2013). Larger classes do not allow students to benefit from laboratory sessions while small classes encourage students to participate in laboratory work there by increasing performance.

Jack and Peter (2014) used document analysis to test the hypotheses there is an inverse relationship between class size and student achievement in Watson University School of engineering. The research design was not mentioned. Rafael, et al (2013) studied the factors that affect students' experiences and satisfaction quality in engineering in University they used a quassi experimental longitudinal study. The present study used both descriptive and correlational design with a sample of 241 students from mechanical, electrical and automotive engineering departments in national polytechnics in Kenya. The reviewed studies focused on the relationship between class size and students' academic achievement. They did not address the influence of class room as a facility on students' academic achievement. The knowledge gap this study sought to fill.

Thomas, Henderson, and Goldfinch (2013) carried a study on the influence of University Entry Scores on Student Performance in engineering mechanics and established a weak correlation between university entry scores and mechanical engineering course. Their study adopted a longitudinal design among cohorts and their performance in their first year at the university contradicting the findings by Mckenzie and Schweizer (2001), Cole

and Espinoza (2008) and Peter and Olasumibo (2013) that previous academic performance gives the best indication of performance in first Year University.

The studies reviewed above had differing views on the influence of students past performance in the university and polytechnic, a knowledge gap this study sought to fill. Cole and Espinoza (2008) carried out a longitudinal study with the aim of examining factors that affect academic performance. The sample size of 146 Latino college students majoring in STEM. Peter and Olasumibo (2013) used ex post facto design to establish the relationship between entry qualification and students' performance in electrical engineering in Nigerian polytechnics. A total of 128 students were sampled from the second year in four polytechnics. Secondary data from document analysis was used for the study. They established a weak relationship between students past performance in mathematics and science and performance in polytechnics. Little research has been done in Kenya on the influence of entry behavior on performance in engineering courses in polytechnics a knowledge gap this study sought to fill.

This study used both correlational and descriptive designs to determine the influence of students' entry behavior on academic achievement in polytechnics. Students were sampled from first year to third year in engineering courses. The study hypothesis was that there is no significant relationship between students' aggregate scores at KCSE and scores in cluster subjects and students' academic performance in engineering courses. Questionnaires, interviews and document analysis were used to collect data.

Darling-Hammond (2007) and Glewwe (2008) found a positive relationship between teacher certification and student achievement. Similarly, Michael and William (2013) recorded that instructor characteristics of gender and academic rank affected science engineering technology and average students' course grades. Akinsolu (2010) examined number of qualified teachers and its relationship to students' academic performance in secondary schools in Nigeria, using descriptive design with a post-hoc dataset in 21 public schools found that teacher qualifications and experience significantly determines students' academic performance. However, in contrast, Kane, Rockoff and Staiger (2006), Gerald, Augustine and Lucy (2013) refuted teacher certification as a significant variable in student achievement.

These studies reviewed indicate a contradiction on the influence of teacher certification and experience on learners' performance. Moreover, the studies were focused on teacher contribution to learning algebra and reading in secondary schools and junior schools respectively. This study adopted a correlational design and was based on influence of lecturer qualifications and experience on achievement in engineering courses in Kisumu National polytechnic a knowledge gap the study attempted to fill.

Olurunfemi and Ashaolu (2005) observed that quality of engineering graduates from Nigerian Polytechnics and Universities had been a major concern for most industries in Nigeria. These complaints stemmed from inadequate skill requirement for most cutting edge technology, low practical knowledge and confidence. According to the duo, the problem of engineering education includes factors such as secondary school foundation,

faulty admissions policies, large student enrolment as compared to available infrastructure and the inflexibility of the engineering curricular.

Kenya is working towards becoming a middle level income economy and eventually a knowledge society by implementing vision 2030 (MOEST, 2011). The government viewed a strong Technical Vocational Entrepreneurship Training (TVET) capacity as a necessity for achieving the goals of vision 2030 (Republic of Kenya, 2008). TVET was to provide the bedrock for transformation of requisite human resources skills for technological and industrial transformation that will lead to increased wealth and social well- being as well as enhancement of the country's international competitiveness (Republic of Kenya, 2008). Given this role, high quality training services must be delivered by the TVET Sector. Kisumu and Eldoret National Polytechnics being major stakeholders of TVET were expected to train and produce skilled manpower.

The objective of TVET is to provide and promote lifelong education and training for self-reliance. However, the TVET sector is faced with the following problems; inadequate facilities and capacities, the current TVET Curriculum was inflexible and not responsive enough to the changing needs of the labor market. Therefore, there was a mismatch between the skills learned in training institutions and skills demand from the industry, moreover, equipment were inadequate, old and out dated; most of training and reference materials and text books were sourced from oversees which made them costly and unaffordable (MOEST, 2005).

The rapid increase in enrollment at all levels of education and training without commensurate increase in infrastructure and staff has led to overstretched facilities, overcrowding in learning institutions and high student staff ratios all of which have negatively affected the quality of education (Republic of Kenya, 2008). As at the time of the study there were only two national polytechnics in Kenya- The Kisumu and The Eldoret national polytechnics. Performance of engineering students in national examinations has been below average since 2010 to 2014, as shown in the Table 1.1 This time frame was preferred because both the two polytechnics had presented candidates for examination for five years. This provided the researcher with sufficient time frame to follow the students' academic achievement trend.

From Table 1.1, Kisumu polytechnic presented 645 candidates for KNEC examinations out of this population, there were 0% distinctions, 6.2% credits, 22.2% passes, 38.3% referrals and 33.3% fail. The majority (71.6%) scored below quality grade. Similarly, Eldoret polytechnic presented a total of 831 candidates for KNEC during the same period and there were 0% distinctions, 13.2% credits, 34.1% passes, 37.2% referrals and 15.5% fail. It is evident that only 47.3% attained the quality grades. In 2010 for diploma in automotive, Kisumu polytechnic registered 22 candidates who performed as follows; distinctions 0%, credits 0%, passes 9%, referred 50% and 41% fail. Eldoret polytechnic presented 12 candidates for the same course and realized 0% distinctions, 0% credits, 25% pass, 50% referrals and 25% fail. In 2013, TKNP presented 118 candidates in three courses; mechanical, automotive and electrical. There were only 17 passes, no credits or distinctions, 101 candidates did not pass. From these results, it is clear that students performed decimally.

Table 1.1

Performance of Engineering Students in KNEC Examination from year 2010-2014

Year	Poly	CS	E	Performance				% Pass	FAIL	% Fail
				D	C	P	FR			
2010	**KS**	DAE	17	0	4	4	8	**47**	12	**53**
		DEE	57	0	0	2	2	**3.5**	53	**96.5**
		DME	29	0	1	12	13	**12**	16	**59**
	ELD	DAE	28	0	2	14	16	**41**	12	**43**
		DEE	20	0	7	10	17	**17**	3	**15**
		DME	42	0	6	21	27	**64**	15	**36**
2011	**KS**	DAE	17	0	0	10	10	**58.8**	7	**41.2**
		DEE	74	0	0	20	20	**27**	54	**73**
		DME	27	0	1	6	7	**26**	20	**74**
	ELD	DAE	38	0	6	11	17	**44.7**	21	**55.3**
		DEE	111	0	17	40	57	**51**	54	**49**
		DME	62	0	8	23	31	**50**	31	**50**
2012	**KS**	DAE	10	0	0	1	1	**10**	9	**90**
		DEE	34	0	1	1	2	**6**	32	**94**
		DME	75	0	1	14	15	**20**	60	**80**
	ELD	DAE	25	0	2	11	13	**52**	17	**48**
		DEE	163	0	25	48	73	**45**	90	**55**
		DME	70	0	6	21	27	**38.5**	43	**71.5**
2013	**KS**	DAE	22	0	0	3	3	**13.6**	19	**86.4**
		DEE	68	0	0	8	8	**11.8**	60	**88.2**
		DME	28	0	0	6	6	**21**	22	**79**
	ELD	DAE	12	0	0	3	3	**25**	9	**75**
		DEE	146	0	13	42	55	**38**	91	**62**
		DME	33	0	8	13	21	**63.6**	12	**36.4**
2014	**KS**	DAE	15	0	3	3	6	**20**	9	**80**
		DEE	125	0	26	36	62	**49.6**	63	**50.4**
		DME	36	0	3	17	20	**55.6**	16	**44.4**
	ELD	DAE	23	0	2	5	7	**30**	16	**70**
		DEE	43	0	8	17	25	**58**	18	**42**
		DME	15	0	0	4	4	**26.6**	11	**73.4**

Source: KNEC 2013

KEY: DAE- Diploma in Automotive Engineering,

DEE- Diploma in Electrical and electronics engineering;

DME- Diploma in Mechanical Engineering;

KS-Kisumu polytechnic; **ELD**-Eldoret polytechnic; **Poly**-polytechnic;

CS- course; **E**- Entry; **P**- Pass

D-Distinction; **C**-Credit; **FR**-Frequency

Table 1.2 shows performance of students in all courses offered in TKNP and TENP. It can be seen that engineering courses appears last on the column with the least percentage passes. This implies that students do not perform very well in engineering courses.

Table 1.2

Cumulative performance of students in different courses in the last 5 years (2010-2014)

Course	Poly	E	D	C	P	FR	% Pass	Fail	% fail
Diploma in Social	ELD	900	18	435	310	763	84.7	137	15.3
Development	KS	1335	12	765	386	1163	87.1	193	12.9
Diploma in Food &	ELD	479	0	51	224	275	57.4	204	42.6
Beverage	KS	353	0	61	167	228	64.6	125	35.4
Diploma in Business	ELD	562	13	186	210	409	72.8	153	27.2
Studies	KS	502	10	137	167	314	62.5	188	37.5
Diploma in	ELD	831	0	10	283	293	47.3	438	52.7
Engineering (DEE, DAE & DME)	**KS**	**645**	**0**	**40**	**143**	**183**	**28.4**	**462**	**71.6**

Source; KNEC 2010-2015

KEY: DAE-Diploma in Automotive Engineering **KS**- Kisumu polytechnic

DEE-Diploma in Electrical and Electronics engineering **FR**- Frequency

DME- Diploma in Mechanical Engineering **Eld** –Eldoret Polytechnic

E- Entry D-Distinction- Credit **P** – Pass **F** – Fail **Poly-** Polytechnic

1.2 Statement of the Problem

Despite the government's initiatives to improve education at the technical level the academic performance of the students in these institutions has been of great concern for educators, parents, guardians and the government. This can be linked to performance of engineering students, in national examinations in Kisumu National Polytechnic whereby performance is unsatisfactory. TKNP presented a total of 645 candidates for KNEC examinations for the period between 2010 and 2014. 40(6.2%) scored credits 143(22.2%) ordinary passes, 247(38.3%) referrals and 215(33.3%) failed. Compared to non-engineering courses in which 22(1%) attained distinctions, 963(44%) credits, 720(33%) ordinary passes, 400(18.3%) were referred and 106 (34.62%) failed. While Eldoret national polytechnic presented 831 candidates during the same period for diploma in engineering courses; 110(13.3%) earned credits, 283(34.1%) ordinary passes, 309(20.3%) were referred and 129(15.5%) failed; compared to non-engineering courses in which 31(1.59%) attained distinctions, 672(34.62%) credits, 744(38.33%) ordinary passes, 393(20.3%) were referred and101 (5.2%) failed. This was the justification for TKNP in this study. Those students who are referred or failed are not certified and may not be able to secure any wage employment since employment is pegged on certificate. Some find it difficult to redo the examinations and end up as drop outs. It also causes high repetition rates contrary to goals of education which seeks to achieve high transition rates. This study therefore sought to establish the influence of institutional facilities, students' entry behavior and lecturer characteristics on students' academic achievement.

1.3 Purpose of Study

The purpose of this study was to determine the influence of selected factors on students' academic achievement in engineering courses in Kisumu National Polytechnic.

1.4 Objectives of the Study

The objectives of the study relating to factors influencing student's academic achievement in engineering courses in National Polytechnics were to;

i. Establish the influence of institutional facilities on students' academic achievement.
ii. Determine the influence of students' entry behavior in National polytechnics on students' academic achievement.
iii. Establish the influence of lecturer characteristics on academic achievement of engineering students.

1.5 Null Hypothesis

This study was guided by the following hypothesis;

H_{01} Institutional facilities have no statistical significant influence on and students' academic achievement in engineering courses in Kisumu National polytechnic.

H_{02} Student's entry behavior has no statistical significant influence on students 'academic achievement in engineering courses in Kisumu National polytechnic.

H_{03} Lecturer characteristics has no statistical significant influence on students' academic achievement in engineering courses in Kisumu national polytechnics.

1.6 Conceptual Framework

A conceptual framework developed by the researcher was used to show the influence of dependent variables on the independent variable (Figure 1).

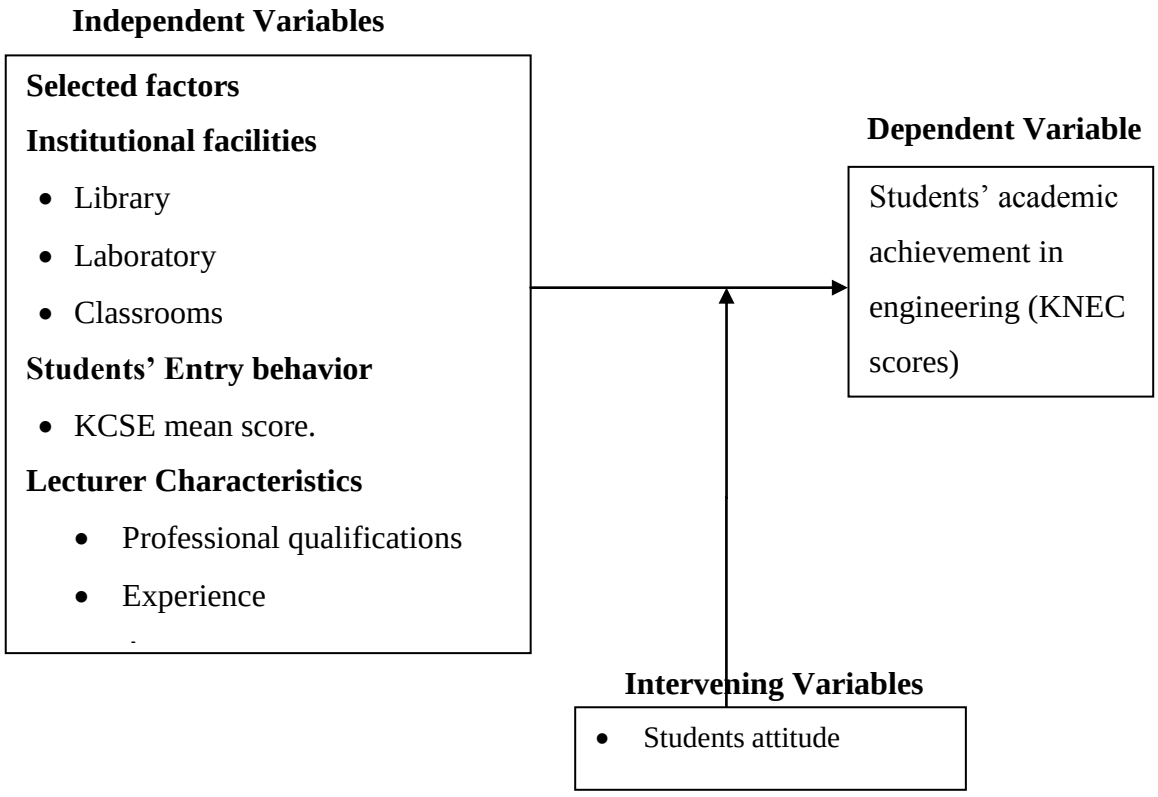


Figure 1: A Conceptual framework showing selected Factors Influencing Students' Academic Achievement in Engineering Courses in Kisumu National Polytechnic. Source; (Researcher).

1.7 Significance of the Study

The findings of this study may inform stakeholders in Kisumu National Polytechnic on areas that need revamping for enhancement of students' academic achievement.

1.8 Scope of the Study

i. The study was confined to diploma in Mechanical, Automotive and Electrical and electronics engineering courses.

ii. The study was based in Kisumu National Polytechnic for the year 2010 to 2014.

iii. The study population was drawn from alumni of 2010-2014 diploma student, lecturers, librarian, technicians and principal.

1.9 Limitations of the Study

Two respondents did not fully fill the qualitative part of the lecturers' questionnaire that required them to state the number of teaching hours per week. This did not really have a big impact on the study since the information was equally obtained through an interview for the principal.

1.10 Assumptions of the Study

This study was guided by the following assumptions.

i. Students have access to institutional facilities to enhance their learning

ii. Students who are enrolled for the engineering courses are qualified.

iii. Lecturers at the polytechnic are qualified in teaching engineering courses

iv. Students' attendance to the classroom, laboratory and the library visit meant that the student was learning.

1.11 Definition of Operational Terms

The following terms are defined in the context that they are used in this study:

Achievement Attainment of a credit and above in KNEC examination.

Course A professional training offered by the polytechnics

Entry behavior students mean score in KCSE.

Lecturer characteristics Attributes possessed by lecturers with regards to professional qualifications, age and experience

Polytechnic A TVET institution that offers competence based courses at certificate and diploma level.

School facilities Textbooks, laboratory and laboratory facilities & classrooms

Selected factors means institutional facilities, students entry behavior and lecturer characteristics.

Technical training An education that equips learners with hands on skills in specific areas.

Vocational education Courses and programs at various educational levels for selected careers in an occupational area. Vocational courses include but are not limited to: Electronics, Drafting, Television Production, Graphic Communications, Carpentry, Electricity, Masonry, Automotive Studies and Horticultural Studies. Basic skills in English, Mathematics and Science are reinforced through classroom instruction and applied laboratory practices

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section is organized into three broad areas, namely; Instructional facilities, students' entry behavior and lecturer characteristics.

2.2 Influence of Institutional Facilities on Academic Achievement of Students

Institutional inputs that influence student's academic achievement include library and text books and laboratory facilities. Research has shown that textbooks availability has a positive effect on school achievement. Jamison (1994) found a positive correlation between undergraduate academic achievement and use of library facilities. A world bank poverty survey in Kenya (1995) revealed that in Kwale District, most people interviewed revealed that academic decline in the district was mainly due to lack of text books among others facilities. According to UNESCO, (1995) report "the provision of textbooks is an effective way of improving results and whether or not pupils have textbooks is one of the criteria by which quality of education can be judged".

Herb (2014) in a survey report concluded that the rising costs of college text books put students at the risk of undermining their education, it was found that 65% of the students decided against buying the text books, 48% said the high cost of books had an impact on what classes they took and 94% of those who did not buy the books said that doing this would hurt their grades in their course. Elsewhere, in a World Bank staff working paper, Stephen, Joseph and Manuel (1978) reported that availability of text books was the single most consistent positive factor in predicting students' academic achievement.

The above reviewed studies concentrated on primary schools and university institutions and tertiary colleges, and not in polytechnics. Herb used survey whereas Jamison did a descriptive study. They also did not study their distribution, equity and the library as a whole a gap this study attempted to fill using a correlational study with questionnaires and interview as methods of collecting data.

Williams (2006) as cited by Ojera (2010) identified the following types of laboratories; chemistry, biochemistry, behavioral biomedical, physics, geography and behavioral research laboratories. Hofstein and Lunetta (2004) points out the lack of research on effect of typical laboratory experiences on student's performance in contrast to research on other variables influencing student's achievement. A Gap this study attempted to fill.

In his study, Oliver (2008) found that students often lack clear understanding of the purpose and goals of their work in the laboratories. Frequently experiments do not match their teacher's goals for the same lessons this in turn leads to negative consequences of learning. Hofstein and Lunneta (2004) using literature review in their study in USA on the influences of laboratory activities have initiative appeal as a way of allowing students to learn with understanding and at the same time engage in the process of constructing knowledge by doing science. Kamilla, Puteh and Daudi (2012) found out that laboratory experiments help students gain skills and experience and practice and not necessarily an improvement in examinations. This was in agreement with Althea and Erick (2015) that laboratory helped students develop technical skills as future employees. In contrast, Lucke (2012) found that laboratory improved final grades for students in engineering statics and mechanics.

Ojera (2011) studied the contribution of science laboratory facilities to students' performance and found that lack of appropriate equipment hindered practical experiments which actually contributed negatively to student's performance. These studies reviewed focused on the relationship between science laboratories the teacher and student learning, they mainly used literature analysis questionnaires and document as methodologies in addition, the studies focused on mathematics and mostly elementary schools and institutes of technology. Ojera used a descriptive survey design with a sample of 120 students, 18 lecturers and 3 principals while Lunetta used observation and interview and his study investigated the role of laboratory science in general. Lucke (2012) developed a practical model for students' research where he recorded observation on a standard course evaluation instrument alongside a student survey to collect data in engineering statics and mechanics in University. Kamila, et.al (2012) similarly developed a model for an experiment at the end of semester to assess practical skills in basic electronic laboratory. The present study focused on laboratories contribution to student achievement in engineering courses in polytechnics using descriptive and correlational design with questionnaires and interviews employed to collect data.

Class sizes are a very important component that influences students' academic achievement. Crosnoe, (2004) and Eamon, (2005) suggested that small class sizes create a more intimate settings and therefore can increase teacher student bonding which has also been shown to have a positive effect on student performance. Rafael, Linah and Keith (2013) found a negative significant relationship between students' scores and class size in engineering courses in the University of Sydney. In a different study (Muganda, 2008) in a study found that schools which had the highest number of candidates in 2008 KCPE had the best mean

score while schools with the least number of candidates had the best score in Kenya. The number of pupil in a class determines the teacher student ratio. The recommended instructor-trainee ratio is 1:7 according to UNESCO (1996) TVET Classes, 1:40 for primary schools in Kenya republic of Kenya (2003).

Athinson's (1983) study in Britain found that smaller classes led to a higher educational attainment. Grinsay and Mahlek (1991) in a study carried out in Malaysia found a significant relationship between low pupil – teacher ratio and pupil performance. Lewin (1987) noted that the quality of education declines as pupil teacher ratio rises. From the various studies reviewed above, there existed a contradiction on influence of class size and academic achievement of students. The reviewed studies focused on the relationship between class size and students' achievement. They did not address the influence of classroom as a facility on students' academic achievement. The knowledge gap this study sought to fill.

2.3 Influence of Students Entry Behavior on Academic Achievement

Students' entry behavior entails past scores in high school, performance in science and mathematics and prior exposure to vocational education. Margaret (2004) studied the influence of vocational education on students' ultimate academic success and established a positive relationship. She used survey and literature review to obtain data among 3 different groups with varying exposure to vocational education in high school and the freshman first year result. Elliot et al (1996) as quoted by Cole and Espinoza noted that academic performance in science related subjects prior to enrolling in college indicated how well or poorly a student will do in science related topics when in college. This was also a conclusion made by Ojera, Simatwa and Ayodo (2013) in their study "perception of staff and students on

factors that influence performance science laboratory technology in institutes of technology in Kenya."

Loo and Choy (2013) using a correlational study found that engineering students with strong and positive judgment about his knowledge in mathematics stood a higher chance of achieving good grades in engineering courses. Drennan and Becky as quoted by Ojera, Simatwa and Ayodo (2013) examined teaching quality performance indicators and their influence on the university scores of students in the United Kingdom and found out that students with better entry grades at the university were better performers in high school. They tested the hypothesis that teaching quality assessment scores may be influenced by the quality of students' intake or students' entry grade; they used document analysis to collect data. Their findings differed with (Mckenzie & Schweitzer's, 2001) findings that demonstrated a weak correlation between previous academic performance and performance in the university; Hughes, Juan, Sylvia, and Eagan (2013) established that a strong high school performance among the sampled engineers increased the probability of completing engineering course in college.

The studies reviewed above had divergent views on the influence of students past performance. Loo and Choy (2013) established a strong relationship between students past performance in mathematics and performance in engineering. Mckenzie and Schweitzer (2001) on the other hand established a weak relationship between past performance and students' performance in engineering courses. The current study sought to address this contradiction. The study tested the hypothesis there is no significant relationship between students' entry behavior and academic achievement in engineering courses in polytechnics.

The study adopted a correlational approach with questionnaires, interviews and document analysis as tools for data collection. The study correlated students' performance in mathematics, physics and overall grade in KCSE and prior exposure to vocational education with achievement in engineering courses in college unlike the past studies which only concentrated on mathematics.

2.4 Influence of Lecturer Characteristics on Academic Achievement of Students

The teacher is the most important resource that influences school's academic performance. The traditional psychometric techniques which basically meant using ability, achievement, other paper-and-pencil tests and others to predict teaching effectiveness in terms of student achievement have failed. In the recent past has proved to be casually related to improved student achievement with most studies postulating that the regularly certified teachers tend to produce high student achievement as compared to the non-certified or the emergency certified teachers. Additionally, teacher experience has generally shown to be positively related to student achievement when other variables are statistically controlled. Little research has been published on the unique characteristic of teachers that enable them to make students perform better.

Jepsen (2005) in his study found a positive relationship between teacher experience and student's academic achievement in mathematics, he however did not find any significant relationship between teacher education and certification and the student's academic achievement. Studies in the 1986 reveal that there is a weak relationship between students' achievement and teacher qualification and experience while studies by Goldhaber (2002) reveal that teacher qualifications and experience influence positively student's academic

achievement, agreeing with Joshua (2014) findings. In their study on "Measuring and Targeting Internal Conditions for Schools effectiveness in the Free State of South Africa," Abraham and Keith (2006), using a questionnaire as the basis for constructing an index of school effectiveness. Their study revealed that teachers were the key drivers of internal school conditions for effectiveness, development and school change.

Oshodi (1991) as quoted by Akinsolu (2010) investigated resource utilization and students' academic performance in Kwara State secondary schools using a questionnaire. Using Spearman rank correlation coefficient to determine the most influential factor on students' academic performance found that the quality of teachers was the most important determinant of students' academic performance in secondary schools. From the studies reviewed, there existed a contradiction on the influence of lecturer qualifications on students 'performance. These studies focused on elementary and secondary schools, they did base on lecturer contribution in engineering courses in polytechnics. A gap this study attempted to fill.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section on research methodology was organized under the following sub headings; research design, target population, sampling techniques and sample size, research instruments, validity and reliability of the instruments, data collection procedures and data analysis techniques.

3.2 Research Design

The study used descriptive and correlational research design approaches. Correlational research describes existing relationship among variables giving the degree to which the variables are related by use of a correlation coefficient. It also allows for the measurement of a number of variables and their relationships simultaneously while Descriptive designs describes the nature of existing conditions or identifies standards against which existing conditions can be compared with (Gall, Borg & Gall, 2007; Frankael & Wallen, 2003). Institutional facilities, students' entry behavior and lecturer characteristics were correlated with the students' performance in technical examinations at the polytechnic. The study described fully the al facilities in terms of adequacy and frequency of use. The study described the distribution of students' entry grades on enrollment, the lecturers' age, their experience and professional qualifications.

3.3 Area of Study

The study was carried out in Kisumu National Polytechnic. Kisumu National Polytechnic is located in Kisumu Central t of the Kisumu County between longitudes 0^0 35' 28" E and $0^0$35'36" E and latitudes 0^0 12' and 0^0 1' 10" South. It has 9 academic departments with a student population of about 4000. The Kisumu National polytechnic was chosen because it is the main stakeholder in the technical training. Kisumu city is located near Lake Victoria and has a major international airport. There is also a vibrant jua kali sector within the city where young men are employed to work as mechanics. The graduates of mechanical engineering are expected to provide their expertise service to the jua kali sector.

3.4 Study Population

The study population consisted of 645students' alumni, 41 lecturers, 3 technicians, 1 librarian and 1 principal. Student alumni were involved as they are the consumers of teaching services offered in the polytechnic, utilize the institutions' facilities and whose academic achievement was the area of interest. Lecturers interacted with students alumni on daily basis as they implemented the curriculum to transmit knowledge whose output was measured in terms of students' academic achievement.

3.5 Sampling Techniques and Sample Size

Samples for student alumni from electrical and electronics, mechanics and automotive courses were dawn using simple random. The researcher randomly sampled student alumni admission files. Samples for lecturers were drawn using simple random sampling. This technique was preferred as it gives every individual in the population an equal chance of being selected and that the sample will have the same composition and characteristics of the

universe (Kothari, 2003; Louis & Lawrence, 1997). Additionally; saturated sampling was used for the principal, librarian and the technicians. A sample size of 283 was used. This consisted of 241 student alumni, and 37 lecturers, 3 technicians, 1 librarian and 1 Principal as shown in Table 3.1. Fishers' formula guided the selection of samples for alumni and lecturers.

$$nf = \frac{n}{1+\frac{n}{N}}$$

The formula is used to calculate sample sizes when the population is less than 10,000 (Mugenda & Mugenda, 2007).

Where nf=desired sample size

N=target population

n = sample size < 10,000

Table 3.1

Sample Frame

Category Respondents	**Target population (N) Kisumu Poly**	**Sample size (n) Kisumu poly**
Alumni		
- Automotive	68	30
- Electrical	391	134
- mechanical	153	77
Lecturers	41	37
Technicians	3	3
Librarians	1	1
Principal	1	1

3.6 Instruments of Data Collection

The research instruments used to collect data were questionnaires, interviews and as stated by Kothari (2003) and Cohen and Manion (1997) that for descriptive studies, these are the methods to be used in collecting data. The researcher observed the library and the laboratories to gain insight on the number of computers connected with internet facilities, the number of desks for students reading, working benches and work stations, number of workshop tools and equipment and the number of laboratories. Document analysis was used to collect data on the students' entry behavior, lecturer characteristics and the frequency of use of the facilities by the students.

3.6.1 Librarian's Interview Schedule

Librarian's interview was used to collect data on the number of relevant text books available, accessibility of internet facilities if any, attendance and the library space.

3.6.2 Students Alumni Telephone Interview Schedule

Interview for the polytechnics' 2010-2014alumni was used to collect data on the frequency of use of the library and laboratory facilities and their influence on academic achievement (Appendix A).

3.6.3 Principal's Interview Schedule

The interview for the polytechnic's principal sought for general information about the polytechnic on the number of staffs and their qualifications, the library, laboratory facilities, lecturers 'loading and student enrollment for engineering courses.

3.6.4 Lecturers' Questionnaire

Lecturers 'questionnaire was used to collect data from lecturers from the engineering department in the polytechnic. This tool aimed at finding out information on the influence of laboratory facilities, library facilities and students' entry behavior on academic achievement of students.

3.6.5 Technician's Interview Schedule

Technician's interview was used to collect data on laboratory and laboratory tools and equipment available for students learning. It also included the adequacy of tools and equipment, the laboratory space and frequency of use of the laboratory.

3.7 Validity of the Instruments

The researcher presented the research instruments to experts in the area of research methodology from the department of Educational Management and Foundations, Maseno University. Their corrections and modifications were incorporated to address face and content validity as recommended by (Mugenda & Mugenda , 2003).

3.8 Reliability of the Instruments

To establish reliability, the lectures' questionnaire was administered to lecturers who were not part of the sample in two weeks 'interval. The responses were correlated using Pearson's r at a set α 0.05, the questionnaire had a coefficient of 0.82. Since the coefficient was above 0.7, the instrument was considered reliable as stated by (Frankeal & Wallen, 2003). Corrections and modifications by the research experts in the area of research methodology from the department of educational management and foundations Maseno University were

incorporated to address reliability of the interviews as recommended by Best (1977) that a valid instrument is considered reliable.

3.9 Data Collection Procedure

Research permit was sought and obtained from NACOSTI to proceed for data collection. Research letter was presented to the TVET county director and the Principal Kisumu National polytechnic to seek further permission to collect data. The lecturers, principal, technicians and the librarian were informed about the purpose of the research and a date was set for data collection.

The lecturers were visited on the days agreed upon to administer the questionnaires. The questionnaires were collected after one week during interviews with the 3 technicians and 1 librarian. Observation in the library and laboratory was conducted during the interviews. The principal was interviewed a week later. The interview responses were recorded in a field note book. Each interview lasted 30 minutes.

The researcher obtained 241 phone numbers for 2010-2014 students whose result was the point of reference from the polytechnic's registry and admission files in order to conduct telephone interviews. This was done alongside the interviews and questionnaires as most of the respondents were available online in the evenings. This took four weeks. Their responses were recorded in a field note book. The researcher requested the registrar for the students' admission files, a date was set for the researcher to be taken to the institutions archive to identify the required files in order to collect data. Document analysis was conducted after the interviews. Students' admission files for 241 student alumni were sampled and their

KCSE mean score were recorded in a field note book, this took one week. Class and laboratory attendance registers for students (Appendix H) were sampled out and the number of times a student attended classroom and laboratory were recorded in a field note book.

3.10 Data Analysis

Data obtained from document analysis on frequency of use (the number of times a student used attendant class room lessons and the number of times a student attendant practical lessons in the laboratory) and data obtained from alumni interviews on frequency of use of the library (Appendix G) was correlated with the students' KNEC score achievement in engineering Regression analysis was computed to determine the influence and prediction and ANOVA to establish whether the institutional facilities were significant.

Students' alumni KCSE mean score was obtained from the admission files. The candidate's score in KNEC technical examination was then worked as an inverse to reduce biasness since the KNEC scores were graded in terms of distinction, credit, pass, referral and fail (Appendix H).

The students' entry behavior was then correlated with the students' performance in the technical examination. Regression analysis was performed to determine the actual influence, Coefficient of determination to estimate the influence in percentage and ANOVA to establish whether the entry behavior was significant predictor or not.

To determine the influence of lecturers' characteristics on students' academic achievement in engineering courses, data on the age, professional qualification and experience for lecturers was obtained from the lecturers' records files. Professional qualification was given as the

highest level of education. Numbers were assigned for each level: diploma was assigned 1, higher national diploma 2, bachelors 3 and masters 4. An average score was worked for students' performance in the subjects taught by the lecturer. This was computed by summing up the scores for the students in the subject divided by the number of students. The lecturers' age, qualification and experience (Appendix I) were then correlated with students' performance in the subject, to determine the influence. Qualitative data from interviews and open-ended items of the questionnaire were reported in emergent themes and sub themes.

3.11 Ethical Consideration

Research permit was sought and obtained from NACOSTI in order to proceed to the field for data collection. The researcher then presented the research letter to the Polytechnic's principal to seek further permission. This was because he was the one to give permission. Upon receiving permission from the principal, a day was set for interviews and questionnaires. The respondents were assured of confidentiality of any information given. They were asked not to write their names on the questionnaires. They were not coerced to participate in the study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings, explanation and discussion of data collected from 241 students, 37 lecturers, 3 technicians, 1 librarian and 1 principal.

The study intended to determine influence of selected factors on students' academic achievement in engineering courses in Kisumu National Polytechnic. The study objectives were to:

i. Establish the influence of institutional facilities on academic achievement of students in engineering courses in Kisumu national polytechnic.
ii. Determine the influence of students' entry behavior on academic achievement in engineering courses in Kisumu national polytechnic.
iii. Establish the influence of lecturer characteristics on academic achievement of students in engineering courses in Kisumu national polytechnic.

4.1.1 Questionnaire Return Rate

The questionnaire return rate for the lecturers was 100%.

4.2 Demographic Characteristics of Respondents

This section brings out the characteristics of students in terms of age and gender. These characteristics were important in reinforcing authenticity and credibility of the responses.

4.2.1 Students Demographic Characteristics

Students' gender and age as obtained from their admission files were as shown in Table 4.1 and Table 4.2 respectively.

Table 4.1: Students' Gender

Gender	Frequency f	Percentage %
Male	211	87.55
Female	30	12.45
Total	**241**	**100**

Source; Field Data, 2016.

Table 4.1 indicates that there were more male students 211(87.55%) for engineering courses as compared to females 30 (12.45%). This implies that either females do not qualify for these courses or they have a negative attitude towards sciences.

Table 4.2: Age Category of Students

Age category in years	Frequency f	Percentage %
17-19	19	7.88
20-22	130	53.94
23-25	82	34.02
Above 25	20	4.16
Total	**241**	**100**

Source; Field Data, 2016

From Table 4.2 it is indicated that largest number of students 130 (53.94%) had age 20-22, followed by age 23-25 with 82 (34.02%), age 17-19 had 19(7.88%) and above age 25 had the lowest number of students 20 (4. 16%). This implies that majority of students join the institution immediately after their form four results are released. These students still need

counselling as they are young and their attention can easily be diverted a factor that can hinder performance.

4.3 Influence of Institutional Facilities on Student Academic Achievement in engineering courses in Kisumu National Polytechnic.

The null hypothesis respondent to was: "institutional facilities have no statistically significant influence on students' academic achievement in engineering courses in Kisumu national polytechnic". To respond to this hypothesis data obtained from the students' class attendance register on the frequencies of use of the laboratory and classrooms was computed as shown in Tables 4.3 to 4.5. Data from student alumni telephone interview on the library was computed as shown in Table 4.3.

Table 4.3: Frequency of use of Library by Students

Frequency of Use	Frequency	Percentage
1-20	122	50.62
21-40	87	36.10
41-60	27	11.20
61-80	5	2.07
Total	**241**	**100**

Source; Field Data, 2016

Table 4.3, indicates that majority of the students 122 (50.62%) visited the library 1 -20 times the period of their study at the institution while only 5 (2.07%) visited the library 61-80 times. This shows that students did not use the library frequently.

Table 4.4: Frequency of use of the laboratory

Frequency of Use	Frequency	Percentage
1-20	17	7.05
21-40	8	3.32
41-60	107	70.53
61-80	56	23.24
81-100	22	9.13
101-120	22	9.13
121-140	9	3.73
Total	**241**	**100**

Source; Field Data, 2016

Table 4.4 shows that 107 (70.53%) of the students used the laboratory 41 – 60 times during their study period at the institution. Only 9 (3.73%) of the students used the laboratory 121 - 140 times.

Table 4.5: Frequency of use of the classroom for 3 years period

Frequency of use	Frequency	Percentage
41-60	7	2.90
61-80	8	3.32
80 -100	7	2.90
101-120	4	1.66
121-140	14	5.81
141-160	62	25.73
161-180	54	22.41
181-200	45	18.67
201-220	18	7.47
221-240	15	6.22
241-260	7	2.90
Total	241	100

Source: Field Data, 2016

Table 4.5 indicates that the classroom was the most frequently used facility with frequencies ranging 41 - 260. Majority of the students 62 (25.73%) used the classroom 141 -160 times, 54(22.41%) used the classroom 161 – 180 times and 45 (18.67%) used the classroom 181 – 200 times during their study period at the institution. Only 7 (2.90%) used the classroom 241 – 260 times. It is worth noting that majority of the students did not attend the maximum number of lessons. This could affect the students' achievement negatively.

To establish the influence of the institutional facilities, regression analysis was performed. The result was shown in Table 4.6.

Table 4.6: Model summary on the influence of institutional facilities on students' academic achievement in engineering courses

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df_1	df_2	Sig. F Change
1	.215	.046	.042	.04008	.046	11.537	1	239	.001

Table 4.6 indicated that institutional facilities influenced students' academic achievement in engineering courses. Therefore, the null hypothesis that "institutional facilities have no statistically significant influence on academic achievement of students in engineering courses in the Kisumu national polytechnic" was rejected. Institutional facilities had a significant influence on academic achievement as indicated by p= .001 Institutional facilities accounted for 4.2% of students' academic achievement as signified by the coefficient .042, the other 95.8% was due to other factors not investigated in this study.

This finding agrees with Lucke (2012) and Ionescu (2012) that laboratory positively influences students' final grades in mechanic and electronics engineering. Lucke (2012) developed a module for teaching engineering, used a survey with 40 second year students in their first semester to collect data. His finding showed that the pass rates for students improved substantially. The finding that institutional facilities influences students' academic achievement in engineering courses disagrees with (Romanas & Jonas, 2007) findings that laboratory work did not necessarily influence academic achievement of students. They used a survey among 40 second year students in their second semester in electronic circuit engineering, students were asked to rank lecturers, tutorials and laboratories in decreasing

order of importance. Students ranked the attendance and attractiveness of the laboratory high. Laboratory was an ideal place for learning. A laboratory equipped with modern instrumentation provides students with first hands –on experience. They found that students' performance in the laboratory was better than performance in examination. They cited lack of motivation for students to study engineering.

The findings that institutional facilities influence students' academic achievement in engineering courses further agrees with (White & Stone, 2010) findings that established that the library had a high influence on students' academic achievement in university. Their study hypothesis was 'there is a statistically significant correlation between library activity data and students' attainment.' Their study design was a survey of library access systems at the University of Hudders field for over 4 academic years in 5 different courses at the institution. They were majorly looking at the e-resources access, number of book loans and number of access to the university library. This differs with the current study where the researcher was interested only in engineering courses at the polytechnic, used both descriptive and correlation design with a sample of 241 students and focused majorly on the number of access to the library by the students.

Through observation and interview for the technicians it was found that automotive had 1 workshop, mechanical 4 and electrical had 3workshops for conducting practical. This limited the number of practical especially for automotive engineering as was stated by the lecturers in their response.

From observation and interviews for the technicians it was established that there was student: tool ratios - automotive had a ratio of 1:18 basic toolsand1:20 basic equipment, mechanical had1:15 basic tools and 1:25 equipment while electrical and electronics had 1:17 tools and 1:30 basic equipment. This is against the policy requirement of 1:4. The researcher was informed by the respondents on further interrogation that students had to share some of the basic tools and equipment thereby limiting the number of practical lessons. The principal and lecturers cited inadequacy of tools and equipment as a factor that hindered students' performance. This was in agreement with Ojera, Simatwa and Ayodo (2011) that lack of appropriate tools and equipment hindered practical experiments which contributed negatively to students' performance.

The workshop space determines the number of students that can carry out a practical at ago. It was observed that automotive had a ratio 1:15 working benches (4), mechanical had 1:33 (5) and electrical and electronics had 1:98 working benches (5) and 1:49 (8) station boards. The researcher was informed that students were grouped for practical and that it could take one week for a lecturer to complete practical session on one topic. In this regard one respondent stated this made it difficult for the lecturers to carry out practical in all the topics. This hinders academic achievement.

The researcher found that both automotive and mechanical departments had 3 while electrical had 4 workshop practical lessons. However, it is worth noting that in some instances all the lessons in a week could be used to cover one topic because of the limited tools and equipment or due to large student population, a factor that might have hindered academic achievement. Reading space in the library determines the number of students that can use the

library at ago. It also helps students read without feeling squeezed and suffocated. From observation it was found that the library had 150 desks that are used by students at ago. The number was not sufficient enough to accommodate all the students as was noted by the librarian during an interview and the lecturers' response. This was also stated by some alumni as a factor that made them not frequent the library. It was also noticed that the library did not have a provision for access by students and staffs with disabilities. During observation, the library had 11 computers connected with internet. These were insufficient as the librarian reported in an interview and therefore students were requested to own personal computers or any other means of accessing the internet while at the institution as was reported by both the librarian and the principal during an interview. Students were only allowed 40 minutes on net during high demand and up to one hour when the library was not on high demand. This time may not be enough for students or lecturers to carry out research effectively as was the views of both the alumni and the lectures. It is worth noting that the library did not have photocopy facility for students or lecturers to copy relevant materials. Internet facilities enables students access online learning materials thus exposing them to wide reading as opposed to the limited number of textbooks and teachers notes.

During an interview with the librarian, it was established that the library had many text books including e-books. Automotive department had a book ratio of 1:2 electrical 1:2 while mechanical had 1:1(copies of both hard text books and e-books). However, students were not allowed to borrow books out of the library, they can only use the books while in the library. A factor that was cited by both the lecturers and the alumni as a factor that hindered academic achievement.

This is in agreement with Shrestha (2008) that the main purpose of library resources can only be achieved if users are able to locate them effectively. In her study she found that majority of students (42%) do visit the library in particular to do assignments while 27% goes to update their knowledge. Students may visit the library for the internet facilities where they access other features other than the academic purposes, some may not know how to access the e-materials which also hinders performance. The lecturers seemingly do not give students enough assignments that will make them frequent the library for references as reflected in Table 4.1 where only 5 students visited the library 61-80 times during their period of study and the majority 122 used the library 1-20 times. This implies that the library was not made use of by the students. This was confirmed by an alumni during the interview who said that they did not frequent the library as he only read the lecturers notes and visited the library during examination period in order to revise.

Institutional facilities were found to be significant predictor of students' academic achievement indicated by ($F(1,239) = 11.537$, $p<.05$) as shown in Table 4.7.

Table 4.7: Analysis of variance for the influence of institutional facilities on students' academic achievement.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.019	1	.019	11.537	.001[b]
	Residual	.384	239	.002		
	Total	.402	240			

A regression analysis was computed to determine the actual influence and prediction; the result was shown in Table 4.8.

Table 4.8: Regression analysis for the influence of institutional facilities on students' academic performance

		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.197	.003		56.817	.000	.190	.204
	Institutional Facility	.000	.000	.215	3.397	.001	.000	.000

Dependent Variable: Performance=**regression: Y= a+bx**

Table 4.8 indicates that an increase of one unit in institutional facilities will have little influence on students' academic achievement. Regression equation **Y=.197+.000x.** This implies that institutional facilities contribute very little to students' performance. Other factors may be working against institutional facilities.

The facilities must be used alongside each other in order to have an influence on performance. A student who uses only the classroom and not the library and the laboratory cannot perform better, similarly a student who only attends classroom lessons without attending practical lessons and using the library cannot perform better. This finding is a true representation of Table 4.3 which shows the frequency of use of the facilities. It was clear that students do not use the library frequently which implies that they do not do extra study apart from the class work and this could have been the reason for the decimal performance.

The study further established the influence of institutional facilities course by course.

Influence of Institutional facilities on student academic achievement in automotive engineering.

A model summary was carried out to establish the influence of institutional facilities on academic achievement of students in automotive engineering, the result was shown in Table 4.9.

Table 4.9: Model summary on Influence of Institutional facilities on student performance in automotive engineering

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df_1	df_2	Sig. F Change
1	.264	.070	.036	.02967	.070	2.095	1	28	.159

Table 4.9 shows that institutional facilities did not influence students' academic achievement in automotive engineering. This is signified by p>.05. Document analysis showed that automotive had a book ratio of 1: 1(138) hard copies and e-books in the library. This shows that the students are not making good use of the books. This was supported by a correspondent who said on further probing in an interview that majority of the students only visited the library towards examination period, lacked good study habits and did not make good use of the library. Though the library has adequate e- books, the internet facilities were limited. There were only 11 computers with internet facility in the library against the institutions population a factor that might have contributed to the poor performance. The library also could only accommodate 150 students at ago which limited the number of students that could use the library.

The workshop tools and equipment were inadequate according to the technicians. This was evidenced by high tool to student ratios. Students were expected to share some of the tools in

the class room at the same time. This limited the number of practical lessons students were exposed to. The technician reported that some students missed practical sessions or did not take their time in the workshops seriously, grouping of students made some not working during class time and that students only considered the workshop lesson important when working on projects. Students' time in the workshop was not properly managed and that students were allowed to do extra work in the workshop near examination period.

The influence of institutional facilities on Students' academic achievement in electrical and electronics

A model summary from regression was performed to establish suitability of the model to account for variation in students' performance Table 4.10.

Table 4.10: Model summary for the influence of institutional facilities on students' performance in electrical and electronics

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df_1	df_2	Sig. F Change
1	.180	.032	.025	.04735	.032	4.423	1	132	.037

From Table 4.10 it is indicated that Institutional facilities had significant influence on students' academic achievement given by p=.037and accounted for 2.5% of the variations in academic achievement as signified by the coefficient .025. The other 97.5% could be due to other factors. The facilities may be there but not adequate so that only very active students have an upper hand in class. This finding disagrees with Kamila et al (2012) findings that laboratory experiments helped students gain skills, experience and practice and not

necessarily an improvement in examination. The current study differs with Kamila et al (2012) study in that they developed a model for teaching an experiment at the end of semester one to assess practical skills in basic electronic laboratory. They were only assessing laboratory skills unlike the current study which sought to establish the contribution of laboratory on students' performance in examinations.

ANOVA was computed to confirm whether institutional facilities was a significant predictor of students' academic performance. The result was shown in Table 4.11.

Table 4.11: Analysis of variance for the influence of institutional facilities on students' academic performance in electrical and electronics engineering

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.010	1	.010	4.423	.037
	Residual	.296	132	.002		
	Total	.306	133			

The result shown in Table 4.11 indicates that institutional facilities was a significant predictor of students 'academic achievement ($F(1,132) = 4.423$, $P < .05$).

To determine the actual influence and prediction of institutional facilities, simple regression analysis was computed. The results were shown in Table 4.12.

Table 4.12: Regression analysis on the influence of institutional facilities on students' academic achievement in electrical and electronics

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.229	.009		24.430	.000
	Institutional facility	-.001	.000	-.180	-2.103	.037

From Table 4.12 it can be noted that an increase of one unit in institutional facilities will reduce students' performance by -.001 units. This relationship can be represented by a regression equation: **Y=. 229-.001x.** This results implies that institutional facilities are detractors not contributing positively to performance. This can be attributed to inadequacy of the facilities.

Influence of institutional facilities on students' academic achievement in mechanical engineering

To estimate the influence, coefficient of determination was computed and results shown in Table 4.13.

Table 4.13: Model summary for influence of institutional facilities on students' performance in mechanical engineering

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.312	.097	.085	.02494	.097	8.078	1	75	.006

The results indicated that institutional facilities had a significant influence on students' academic achievement as signified by p=.006. Institutional facilities accounted for 8.5% of variation in students' academic achievement as given by the coefficient .085 and was a significant predictor of students' academic achievement as indicated by (F (1.75) =8.078,

A simple regression analysis was computed to determine the actual influence and prediction. The results were as shown in Table 4.14.

Table 4.14: Regression analysis for the influence of institutional facilities on students' academic achievement in mechanical engineering

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.173	.007		23.804	.000
	Institutional facility	.001	.000	.312	2.842	.006

The result from Table 4.14 indicates that an increase of 1 unit in institutional facilities will increase students' academic achievement by .001 units. Hence the regression equation **Y=.173+.001x**.

From the interview with the technician, it was found that most students had the habit of missing practical lessons and only showed concern near examination period. Most students were sent away from practical for lack of proper attires, tools and equipment were few therefore shared among students and that those machines that where available were old models. The principal cited inadequate facilities and negative attitudes among students as factors hindering performance.

4.4 Influence of Students Entry Behavior on Academic Achievement of Students in Engineering Courses in Kisumu National Polytechnic

The hypothesis stated that students' entry behavior has no statistically significant influence on academic achievement of students in engineering courses. To achieve this objective, the student entry behavior was analyzed in terms of their performance in the Kenya Certificate of Secondary Education KCSE, which is the entry requirement for the engineering courses. The policy given by the MOEST recommends a mean grade of C- (5) for a candidate to be admitted for engineering courses. The distribution of the students' entry behavior as obtained from their admission files was as indicated in Table 4.15.

Table 4.15: Distribution of students' Entry Behavior

Average Scores	Frequency	Percentage
4	1	4
5	55	22.8
6	74	30.7
7	64	26.6
8	36	14.9
9	8	3.3
10	3	1.2
Total	241	100

Source: Field Data, 2016

The result shows that majority 74(30.7%) of the students had a score 6, 26.6% (64) had 7, 55(22.8%) scored 5, 36(14.9%) had 8, 3 (1.2%) had 10 while 1(0.4%) had an entry score 4.

A model summary was computed to establish the influence of students' entry behavior the result was as shown in Table 4.15.

Table 4.15: Model Summary on the influence of students' entry behavior on academic achievement of students in engineering courses

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.259	.067	.063	.03964	.067	17.115	1	239	.000

The results shown in Table 4.15 indicated that students' entry behavior had a significant influence on academic achievement given by p=.000. Therefore, the null hypothesis that "Students entry behavior has no statistically significant influence on academic achievement of Students in engineering courses" was rejected. Students entry behavior accounted for 6.3% of variation in achievement denoted by Adjusted R square .063.

The finding of this study agrees with Loo and Choy (2013), Cole and Espinoza (2008) Ojera, Simatwa and Ayodo (2013) Mackenzie and Schwitzer (2001) that students' entry behavior positively influences students' academic achievement in college. Loo and Choy (2013) particularly investigated the influence of mathematics on performance in engineering related courses. Their sample size was 146 students from engineering related courses. They carried out a longitudinal study but were particularly interested with the performance of students in the first year university. They obtained a correlation of r=.365 p<0.001.

Mackenzie and Schweitzer (2001) used a sample of 197 first year students from faculties of science and information technology with a questionnaire as a means of collecting data and

established that students' entry behavior highly influences students' academic achievement in the university. The students' entry scores contributed for 39% variance in performance. The present study used both descriptive and correlation design to establish the influence of students' entry behavior on academic achievement in engineering courses. A sample of 241 students in their final year of study was used. The study particularly considered scores for KCSE unlike Loo and Choy (2013) who only considered scores in mathematics.

Students' entry grades were analyzed in terms of their performance in Kenya Certificate of secondary examination (KCSE) which is the entry requirement for engineering courses in National polytechnic. Table 4.16 gives the summary of the findings.

Majority of these students were moderate achievers on admission a factor that might have contributed to the moderate influence. This means some students enrolled for these courses scored low grades a factor that might have contributed to the low performance. This was also singled out as a factor contributing to poor performance by a correspondent in an interview. ANOVA was performed to confirm whether students 'entry behavior was a significant predictor of academic achievement, result was as shown in Table 4.16.

Table 4.16: ANOVA for the influence of students entry behavior on academic achievement.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.027	1	.027	17.115	.000
	Residual	.376	239	.002		
	Total	.402	240			

From Table 4.16 it can be seen that students' entry behavior was a significant predictor of students' academic achievement shown by (F (1,239)17.115, P<.05)

To determine the actual influence of predictor simple regression analysis was performed and the result shown in Table 4.17.

Table 4.17: Regression analysis for the influence of students' entry behavior on performance in engineering courses

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	.147	.014		10.234	.000
	Entry behavior	.009	.002	.259	4.137	.000

Y = Regression: Y= a + bx

From Table 4.17 the result indicated that an increase of one unit in students' entry behavior will increase student academic achievement by .009 units. This can be expressed by the equation **y=0.147+0.009x**

Students' entry behavior contributes moderately as there are other factors that work against the student quality within the system. As already noted some students had a score far below the minimum requirement of 5(C-).

The institution had insufficient facilities which made students to be grouped and this hindered performance. Similarly, students' expectation as they joined the technical courses could be contrary to what the reality is-some come with a mind set to learn the skills and not academics which could also contribute to low performance. During the interview, a respondent said that the students lacked good study habit as they only used the library during

or near examination period. This was echoed by another respondent on further interrogation that students frequent the workshops near or during examination period for individual work, this could have contributed to low performance. The study further interrogated the findings by establishing the influence of students' entry behavior course by course.

4.4.1 Influence of students' entry behavior on academic achievement in automotive engineering

Students' data on entry behavior was obtained from students' admissions files. Their distribution was as shown in Table 4.18.

Table 4.18: Distribution of students' entry behavior in automotive engineering

Scores	Frequency	Percentage
5	13	43.3
6	8	26.6
7	6	20
8	2	6.67
9	0	0
10	1	1.33
Total	**30**	**100**

Source: Field Data, 2016

From Table 4.18 it can be seen that 13(43.3%) of the students had an entry behavior 5(C-), 26.6% (8) had 6, 20% (6) had 7, 6.67 (2) had 8 and 1student (3.3%) had an entry behavior 10. Majority of the students had the minimum qualification for admission.

To establish the influence of students' entry behavior on academic achievement, a model summary was performed and the result was as shown in Table 4.19.

Table 4.19: Model Summary on the influence of students entry behavior on academic achievement

				Std.		Change Statistics			
Model	R	R Square	Adjusted R Square	Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.393	.155	.125	.02828	.155	5.129	1	28	.031

Table 4.19 indicates that students' entry behavior had a significant influence on academic achievement of students p=.031, it accounted for 12.5% of the variation in achievement as given by Adjusted R Square .125. This finding is in agreement with Cole and Espinoza (2008) that entry behavior has a positive influence on students' academic achievement in engineering. Cole and Espinoza (2008) carried out a longitudinal study with aim of examining factors that affect Latino students' performance in STEM majors. A sample size of 146 Latino college students in first year majoring in STEM was used. Notably high school performance had a significant and positive influence on students' performance in the university (β=.365, p<.001) The current study used both descriptive and correlational designs with a sample of 241 students from automotive, electrical and mechanical engineering courses in the polytechnic. Students' final performance in the KNEC examination was used as a reference for performance.

To confirm whether students' entry behavior was a significant predictor, of academic achievement, ANOVA was computed. The result was as shown in Table 4.20.

Table 4.20: ANOVA for the influence of Students Entry Behavior on Academic Achievement in Automotive Engineering

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.004	1	.004	5.129	.031
	Residual	.022	28	.001		
	Total	.026	29			

From Table 4.20, it can be noted that students' entry behavior is a significant predictor of academic achievement. ($F(1, 28) = 5.129$, $p < .05$).

To determine the actual influence and prediction simple regression analysis was computed. The result was as show in Table 4. 21.

Table 4.21: Regression analysis for the influence of students' entry behavior on academic achievement of automotive engineering

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.149	.027		5.614	.000
	Entry behavior	.010	.004	.393	2.265	.031

Dependent Variable: performance **Y= Regression: Y = a + bx**

From Table4.21, it can be noted that an increase of one unit in students' entry behavior will increase students' academic achievement by .010 units. This can be expressed by Regression equation**=0.149+0.010x**. This means that one can predict students' performance given their entry performance, however, there are other factors which work against students' entry

scores. This factors as earlier pointed out include students poor study habits, inadequate institutional facilities.

4.4.2 Influence of students' entry behavior on academic achievement in electrical and electronics engineering

Students' entry scores were obtained from the admission files. Their distribution was as indicated in Table 4.22.

Table 4.22: Distribution of students' entry scores in electrical engineering

Scores	Frequency	Percentage
5	24	17.91
6	48	35.82
7	37	27.61
8	21	15.67
9	3	2.23
10	1	0.76
total	134	100

Source: Field Data, 2016

From Table 4.22, it can be seen that 35.82% (48) of students in electrical had an entry score 6 meaning they were moderate performers. 27.61% (37) scored 7.17.91% (24) had an entry score 5, 2.23% (3) had 9 and only 1(0.76%) had an entry behavior 10.

To estimate the influence, coefficient of determination was computed and results were as shown in Table 4.23.

Table 4.23: Model Summary on the influence of students entry behavior on academic achievement in electrical and electronics.

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.206	.042	.035	.04711	.042	5.836	1	132	.017

The results shown in Table 4.23 indicates students' entry behavior had a significant influence on academic achievement. 3.5 %of variations in performance was explained by students' entry behavior. This is signified by the coefficient **.035**.This finding agrees with the findings of Peter and Olasunmbo (2013) and Loo and Choy (2013). That student's entry behavior positively influences their academic achievement in engineering courses. Peter and Olasunmbo (2013) used an ex post facto design to establish the relationship between entry qualification and students' performance in electrical engineering in Nigerian polytechnics. 128 students in their second year of study were used in the study. Loo and Choy (2013) carried out a survey in which 178 students from electronic related diplomas in their third year of study were used. They administered a questionnaire in which students responded to various items. The only measure they used was mathematics. They suggested a further investigation on whether students' achievement in mathematics can indeed be a strong predictor for their achievement in engineering. The current study used both descriptive and correlation design. Students were sampled from year 3 from three engineering related courses. Students past performance in both mathematics and physics were correlated with performance at the end of their three year course at the polytechnic.

From Table 4.23 it can be observed that 109(81%) of the students enrolled scored 5-7 and only 19% scored 8-9. Thus majority were moderate achievers right from high school, this could have been the cause for the moderate influence.

To confirm whether students' entry behavior was a significant predictor of performance ANOVA was computed and the results shown in Table 4.24.

Table 4.24: ANOVA for the influence of students entry behavior on academic achievement in electrical and electronics.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.013	1	.013	5.836	.017
	Residual	.293	132	.002		
	Total	.306	133			

From Table 4.24, it can be noted that students entry behavior was a significant predictor of students' academic achievement ($F(1,132)=5.836$, $p<.05$). Therefore it is important for any program administrators to ensure that they enroll students with a promising background in order to ensure good performance and completion of the course.

To determine the actual influence and prediction simple regression analysis was computed. The results were as shown in Table 4.25.

Table 4.25: Regression analysis for the influence of students' entry behavior on students' academic achievement in electronic engineering

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.152	.025		6.162	.000
	Students entry scores	.009	.004	.206	2.416	.017

From Table 4.25 it can be seen that an increase of one unit in students' entry behavior increases performance by .003 units. Regression equation **y=.152+0.009x.**

In an interview a respondent said that students were sharing the basic tools and equipment and therefore learning was hindered as students did not concentrate or were not exposed fully to all relevant practical work. The lecturers in the questionnaires said that large numbers of students made it difficult for them to effectively cater for individual learner, they could not administer frequent tests apart from the two stipulated by the institutions calendar of events as it took more time to mark and revise. It was also pointed out that the students lacked good study habits by respondents on further probing during an interview.

4.4.3 Influence of students' entry behavior on academic achievement in mechanical engineering

Data on students' entry scores in mechanical engineering was obtained from the students' admission files. The distribution was as shown in Table 4.26.

Table 4.26: Distribution of students' entry behavior in mechanical engineering

Scores	Frequency	Percentage
4	1	1.29
5	18	23.38
6	21	27.27
7	20	25.97
8	13	16.88
9	4	5.21
10	0	00
Total	77	100

Source: Field Data, 2016

From Table 4.26, it can be observed that 41 (53.24%) had an entry behavior 6-7, 18(23.38%) had 5, 13 (16.88) had, 4(5.21%) had 9 and 1 had 4. This distribution indicates that majority of the students were moderate achievers at the point of entry. Model summary from the regression analysis was performed to establish the suitability of the model to account for variations in performance.

Table 4.27: Model Summary for the influence of students entry behavior on academic achievement in mechanical engineering.

						Change Statistics			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.471	.221	.211	.02316	.221	21.338	1	75	.000

From Table 4.27 it is indicated that students' entry behavior had a statistically significant influence on academic achievement of students in mechanical engineering (P<.05) Students' entry behavior enhanced academic achievement. The entry behavior accounted for 21.1% of the variation in achievement as indicated by coefficient .211. The influence was moderate.

This finding that entry behavior moderately influences students' academic achievement agrees with Thomas, Hunderson and Goldfinch (2013) and Dwight and Carew (2006) who established a positive relationship between university entry score and mechanical engineering course. Their study adopted a longitudinal design among cohorts and their performance in the first year university. The sample size and the subjects in consideration were not mentioned. The current study used both descriptive and correlation designs among 241 engineering students in their final year of study at the polytechnic. The KNEC result was a major determinant. This result agrees with that of Loo and Choy (2013) that student with strong and positive judgment about his knowledge in mathematics stood a high chance of achieving good grades in engineering courses.

Table 4.27 shows that 42(53.24%) of the students enrolled for examination in mechanical course scored 6-7 in KCSE examination, this means that the students were average performers. It is also clear that some of the students scored below the minimum requirement, an indication that the policy for admission was overlooked. This was equally singled out as a challenge by one respondent during an interview Only 22.1% (17) students scored 8-9, this small percentage could not have had any meaningful influence on academic achievement.

ANOVA was computed to confirm whether students' entry behavior was a significant predictor of students' academic achievement in mechanical engineering. The results were as shown in Table 4.28.

Table 4.28: ANOVA for the influence of students entry behavior on academic achievement in mechanical engineering.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.011	1	.011	21.338	.000
	Residual	.040	75	.001		
	Total	.052	76			

From Table 4.28, it can be seen that student entry behavior was a significant predictor of academic achievement. (F (1, 75) =21.338, p<.05). to determine the actual influence, and prediction, simple regression analysis was computed. The result was shown in Table 4.29.

Table 4.29: Regression analysis for the influence of students' entry behavior on academic achievement of students in mechanical engineering

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.129	.014		9.274	.000
	Entry behavior	.010	.002	.471	4.619	.000

Y=Regression: Y= a + bx

From Table 4.29, it can be observed that an increase of one unit in students' entry behavior will increase students' academic achievement by .010 units. Regression equation **Y=.129+0.010x**. Students' entry behavior has a real influence on performance, however other factors may work against the quality of students thereby hindering performance. Availability and adequacy of relevant study books and other learning materials, poor study habits and

their motivation towards mechanical engineering could be some factors that hinder performance.

4.5 Influence of Lecturer Characteristics on Students' Academic Achievement in Engineering Courses in Kisumu National Polytechnic

The hypothesis stated lecturer characteristics has no statistically significant influence on students' academic achievement in engineering courses. The characteristics investigated included professional qualifications, age and experience of the lecturers. This information was obtained through an interview with the principal and document analysis. The information was tabulated and presented in Table 4.30.

Table 4.30: Lecturer Characteristics

Lecturer Characteristics		Frequency	Percentage
Professional qualifications	Diploma	13	31
	Higher national dip	3	7
	Bachelors in tech. education	25	60
	masters	1	2
	Total	**42**	**100**
Age	25-32	-	-
	33-40	14	33
	41-48	18	43
	49-56	7	17
	57-60	3	7
	Total	**42**	**100**
Experience	1-5	3	7
	6-10	9	21
	11-16	3	7
	16-20	10	24
	21-25	10	24
	26-30	5	12
	31-35	2	5
	Total	**42**	**100**

Table 4.30 indicates that 60% of the lecturers had bachelor's degree in technical area, 31% were diploma holders, 7% had higher national diploma while 2% had a master's degree. Regarding their ages 43% were aged 41-48, 33% were between 33and 40, 17% ranged between 49 and 56 while 3 (7%) were between 57 and 60. It is also indicated that 10 (24%) of the lecturers had taught for 16-20 years, 10% for 21-25years,9 (21%) for 6-10 years,5 (12%) for 26-30 years, 3 had taught for 1-5 years, 3 for 11-15 years while 2 (5%) had 31-35 years of experience. From this distribution it is clear that the polytechnic has qualified

lecturers with the necessary professional qualifications and experience and yet the performance does not reflect this, to establish the influence of lecturer characteristics, regression analysis was computed. The result was as shown in Table 4.31.

Table 4.31: Model Summary on Influence of Lecturer Characteristics on Students' Academic Achievement in Engineering courses

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.255	.065	.055	.03152	.065	6.526	1	94	.012
2	.190	.036	.026	.03200	.036	3.507	1	94	.064
3	.336	.113	.104	.03069	.113	11.988	1	94	.001

1. model—age
2. model- qualification
3. model--experience

Table 4.31 indicates that lecturers age has a statistically significant influence on students' performance (p=.012) and accounted for 5.5% of variation in students' academic achievement as signified by the adjusted R.055 therefore, the null hypothesis that "lecturers 'age has no statistically significant influence on students' achievement in engineering courses in Kisumu national polytechnic" was rejected.

Table 4.31 further shows that lecturers' qualification has no statistically significant influence on students' performance (p=. -190) therefore, the null hypothesis that "lecturer qualification has no statistically significant influence on students' achievement in engineering courses in Kisumu national polytechnic" was accepted.

The result in Table 4.31 indicates that lecturers experience has a statistically significance influence on academic achievement of students p=.001 and accounted for 10.4% of the

variation in students' achievement as signified by adjusted R Square .104 therefore, the null hypothesis that "lecturer experience has no statistically significant influence on students' achievement in engineering courses in Kisumu national polytechnic" was rejected.

This finding that lecturer characteristics do not influence students' academic achievement agrees with Rivkins, et.al (2005) who concluded that there is no evidence that having a master's degree improves teacher skills. That it appears important gains in teaching quality occurs in the first year of experience and smaller gains over the next years. The finding however differs with Michael and Williams (2013) findings that instructor characteristics of gender and academic rank affected science engineering technology and average student course grades. He established a statistically significant negative correlation between experience and SET. These findings are in agreement with the finding by (Odiembo, 2013) who found positive moderate relationship between teachers' experience and students' academic achievement in mathematics, a negative moderate relationship between teachers' qualifications and no relationship between teachers' age and students' academic achievement in mathematics in Muhoroni Kenya.

Possessing a higher degree does not necessarily determine the lecturers output. This is because the syllabus or the curriculum the lecturer is supposed to teach does not change it remains the same thus the higher qualification only helps the individual lecturer to rise in position academically. The lecturer may have the academic qualifications yet wanting in classroom delivery skills or the kind of examination students are given may be wanting in terms of syllabus coverage or level of difficulty.

Lecturers can only deliver when they have the necessary facilities in terms of text books and instructional materials which as earlier explained were inadequate and shared amongst students. The principal in an interview reported that the institution had 11 TSC appointed lecturers for automotive, 19 for electrical and 12 for mechanical. She further said that the institution had a shortage of 90 teaching staffs. This meant that the lecturers were overloaded thus hampering time for preparation and giving individual attention to students. This was supported by the responses of the lecturers who were required to give the number of hours for teaching per week, some had up to 36 hours in a week against the18 hours as stipulated by the policy, the lecturers further were required to give the number of students in their classes some had 140 especially in electrical and mechanical engineering. In such a case the teacher only works to complete the syllabus not delivery of the content. The lecturer finds it difficult to give regular tests mark and revise in time. This requires the learner to be self-motivated which is lacking greatly in most students especially given the kind of teaching in high school where the teacher is everything to the learner. ANOVA was computed to confirm lecturers age and experience were significant predictors of students' academic achievement in engineering. The results were as shown in Table 4.32 and 4.33 respectively.

Table 4.32: ANOVA for the influence of lecturers age on academic achievement of students in engineering courses.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.006	1	.006	6.526	.012
	Residual	.093	94	.001		
	Total	.100	95			

From Table 4.32, it can be observed that lecturers age was a significant predictor of students' academic achievement (F (1, 94) =6.526, P<.05)

Table 4.33: ANOVA for the influence of lecturers' experience on students' academic achievement in engineering courses

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.011	1	.011	11.988	.001
	Residual	.089	94	.001		
	Total	.100	95			

Table 4.33 indicates that lecturers experience was a significant predictor of students' academic achievement in engineering courses (F (1, 94) = 11.988, p<.05). Regression analysis was performed to establish the actual prediction and influence of lecturers age and experience. The result was as shown in Table 4.34 and 4.35 respectively.

Table 4.34: Regression analysis for the influence of lecturers age on students' academic achievement in engineering courses

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.110	.026		4.207	.000
	Age	.002	.001	.255	2.555	.012

From Table 4.34, it can be seen that an increase of one unit in lecturers age will increase students' academic achievement by.002 units. This can be expressed by the regression equation **y=.110+.002x**

Table 4.35: Regression Analysis for the Influence of Lecturers Experience on Students Academic Achievement in Engineering Courses.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.153	.007		21.464	.000
	Experience	.001	.000	.336	3.462	.001

From Table 4.35, it can be noted that an increase of one unit in lecturers experience will increase students academic achievement by .001 units. Regression equation **y=.153+.001x**

The study further interrogated the findings by establishing the influence of lecturer characteristics course by course.

4.5.1 Influence of lecturer characteristics on students' academic achievement in Electrical and Electronics engineering

Pearson's r was computed to establish the influence of lecturers' characteristics on students' academic achievement in automotive engineering and the results were as shown in Table 4.36.

Table 4.36: Influence of lecturer's characteristics on academic achievement of students in electrical and electronics engineering

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.260	.068	.039	.02954	.068	2.325	1	32	.137
2	.182	.033	.003	.03008	.033	1.091	1	32	.304
3	.374	.140	.113	.02837	.140	5.191	1	32	.030

Model 1=age Model 2 =qualification Model 3= experience

From Table 4.36 it can be noted that lecturers age has no statistically significant influence on students 'academic achievement p>.05 therefore the null hypothesis that "lecturers' age has no statistically significant influence on students' academic achievement in engineering courses was accepted.

Table 4.36 further shows that lecturer qualification has no statistically significant influence on students' academic achievement in engineering courses p.>.05 therefore the null hypothesis that lecturers' age has no statistically significant influence on students' academic achievement in engineering courses was accepted.

From Table 4.36 it also be noted that lecturers' experience has a statistical significant influence on students' academic achievement in Electrical and Electronics engineering p<.05. This finding however agrees with Gerald, Augustine and Lucy (2013) that teacher certification does not influence students' academic achievement in engineering courses. This finding differs with that of Michael and William (2013) and Darling Hammond (2007) who found a positive relationship between teacher certification and student achievement.

". From interview and document analysis it was established that electrical and electronics department had 19 lecturers. 7 had diploma, 1 higher national diploma and 11 had bachelors

in technical education. The lecturers in the department were experienced only 2 lecturer had one-year experience. Experience makes the lecturers familiar with the practical models and not necessarily the theory lessons which are emphasized by the syllabus. On the other hand, lecturers who have taught for long may overlook preparation on the notion that they know what to do and therefore fail to update their class notes making students to miss on the emerging issues which sometimes are emphasized in the examination.

The presence of lecturers in an institution does not necessarily guarantee performance.

ANOVA was computed to confirm lecturers experience and experience were significant predictors of students' academic achievement in Electrical and Electronics engineering. The results were as shown in Table 4.37.

Table 4.37: ANOVA for the Influence of Lecturers Experience on Students' Academic Achievement in Electrical and Electronics Engineering

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.004	1	.004	5.191	.030[b]
	Residual	.026	32	.001		
	Total	.030	33			

Table 4.37 indicates that lecturers experience was a significant predictor of students' academic achievement in Electrical and Electronics engineering. ($F(1, 32) = 5.191$, $P < .05$). Regression analysis was performed to determine the actual prediction and influence; the result was shown in Table 4.38.

Table 4.38: Regression Analysis for the Influence of Lecturers Experience on Academic Achievement in Electrical and Electronics Engineering

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.144	.011		12.675	.000	.121	.167
	Experience	.002	.001	.374	2.278	.030	.000	.003

From Table 4.38 it can be observed that an increase of one unit in lecturers' experience will increase students' academic achievement in automotive engineering by .002 units, this can be expressed by regression equation**: y=.144+.002x**

4.5.2 Influence of lecturer characteristics on students' academic achievement in Automotive Engineering.

Regression analysis was performed to establish the influence of lecturers' characteristics on students' academic achievement, the result was as shown in Table 4.39.

Table 4.39: Influence of Lecturer Characteristics on Students' Academic Achievement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.316	.100	.057	.03579	.100	2.331	1	21	.142
2	.256	.066	.021	.03646	.066	1.473	1	21	.288
3	.388	.147	.106	.03484	.147	3.612	1	21	,071

in Automotive Engineering

Model 1= age, model 2=qualification, model 3= experience.

From Table 4.39, it can noted that lecturers age has no statistical significant influence on students' academic achievement p .142; Lecturers qualification has no statistically significant

influence on students' academic achievement p.288, and; lecturers experience has no statistically significant influence on students' academic achievement p=.071. Therefore, the null hypothesis that "lecturers' characteristics has no statistically significant influence on students' academic achievement" was accepted.

From an interview with the principal it was established that Automotive had only 11 lecturers who handled students in the department. This implies that the lectures were overloaded and therefore could not perform well. Overloading of lecturers does not give them time for preparation and giving maximum attention to individual students, it also limits the number of assignments a lecturer can give to students, mark and revise which all have a negative influence on students' performance. Students who enroll for Automotive engineering come with different expectations; to learn skills in handling automobiles which is actually contrary to academics therefore may have a negative attitude towards theory which is emphasized by the KNEC examinations.

4.5.3 Influence of lecturer characteristics on students' academic achievement in mechanical engineering.

Lecturers' characteristics were correlated with students' academic achievement in mechanical engineering; the results were as shown in Table 4.40.

Table 4.40: Influence of lecturer characteristics on students' academic achievement in mechanical engineering.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.194[a]	.038	.012	.03073	.038	1.453	1	37	.236
2	.1.014	.014	-.013	.03111	.014	.513	1	37	.478
3	.257	.066	.041	.3027	.066	2.6271	1	37	.114

From Table 4.41 it can be noted that lecturers age, qualification and experience has no statistically significant influence on students' academic achievement in mechanical engineering courses. (P= .236, .478 and .114) respectively therefore, the null hypothesis that "lecturer characteristics has no statistically significant influence on students' academic achievement" was accepted. This means that lecturer characteristics do not influence students' academic achievement in mechanical engineering.

This finding agrees with the findings of Gerald, Augustine and Lucy (2013), and Kane, Rockoff and Staiger (2006) who found that teacher certification and experience do not influence academic achievement in engineering courses. This can be as a result of the shortage of lecturers as was observed by the principal in an interview. The lecturers were overloaded thus they had limited time for preparation and interaction with students. In some cases they were not able to effectively administer continuous assessment tests, mark and revise in time with students. The lecturers could be only concerned with completing the syllabus not necessarily paying attention to specific areas.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study findings, conclusions, recommendations and suggestion for further studies.

5.2 Summary of Findings

5.2.1 Influence of Institutional facilities on Students' Academic Achievement in Engineering Courses in Kisumu National Polytechnic

The study found out that there was a weak positive relationship between institutional facilities and students' academic achievement in engineering courses in Kisumu national polytechnic ($r=.215$, $P<0.05$) The facilities accounted for only 4.2% of the students' performance as signified by R^2 of 0.42. Institutional facilities were found to be significant predictor of students' performance as shown by the calculated P value less than 0.05, however, institutional facilities were found to have a very minimal influence of 0.000 on students' performance as revealed by linear regression analysis. The facilities considered were; library and books, laboratory and equipment and tools and the classrooms. The study measured institutional facilities in terms of utility. When the influence of each individual facility was computed, it was established that no individual facility influenced students' academic achievement on its own as was signified by $r=.-090$, $p>.05$ for library, $r=.075$, $p > 05$ for classroom and $r=.003$, $p>.05$ laboratory.

1t was further established that most of the facilities were inadequate hence the students were required to share. Automotive engineering had a ratio 1:18 basic tools, 1:20 basic equipment and 1:17 working benches, mechanical engineering had a ratio 1:15, 1:25, and 1:31 basic tools, basic equipment and working benches respectively. Electrical and electronics had a ratio 1:17, 1:30 and 1:98 basic tools, basic equipment and working benches respectively. The library had adequate books with book ratio of 1:2, for both automotive and electrical and 1:1 for mechanical engineering. There were only 150 desks for students in the library and 11 computers connected with internet facility and no photocopy facility. It was further established that only 5 students visited the library 61-80 times while the majority 122 used the library 1-20 times during their study.

5.2.2 Influence of Students Entry Behavior on Academic Achievement of Engineering Students in Kisumu National Polytechnic

The study established that there was a positive moderate and statistically significant relationship between students' entry behavior and academic achievement **r=.341 P<.05**. Students' entry behavior accounted for only **11.3%**variation in performance signified by $\mathbf{R^2}$ of **0.113**. Students' entry behavior was found to be a significant predictor of students' academic performance shown by the calculated p value which was less than the set p value .05. Students' entry behavior was found to have an influence of **0.003** on students' performance as revealed by linear regression analysis. Students' entry behavior was computed by summing up students 'score in KCSE, mathematics and physics. It was established that 101(41.91%) scored15-19, 73(30.28%) scored 20-24, 43(17.97%), scored 10-14, 21 (8.71%) scored 25-29 and only 3(1.31%) scored 30-36. This shows that majority of

the students did not have high quality grades on admission, only 97 (40.30%) scored 20-36 on admission.

5.2.4 Influence of Lecturer Characteristics on Students' Academic Achievement in Engineering Courses in Kisumu National Polytechnic.

The study established that there was no statistically significant relationship between the lecturer characteristics and students' academic achievement in engineering courses in Kisumu national polytechnic as was indicated by r =0.128, p>.05. The study further established the influence of the individual lecturer characteristics and found that there was no significant relationship between lecturers age and qualification and students' academic achievement in engineering courses as was signified by r=.255, p>.05 and -.190, P >0.05 value respectively, and a moderate relationship between lecturers' experience and students' academic achievement r=.366, p<0.05.

Through document analysis and descriptive statistics, the study established that 60% of the lecturers had a bachelor's degree, 31% had diploma, 7% had a higher national diploma and 2% had a master's degree in the technical area. It was further established that 43% of the lecturers were aged 41-48, 33% aged 33-40, 17% aged 49-56 and 7% had an age 57-60. Regarding their experience, the study found that 48% had taught for 16-25 years, 21% had an experience 6-10 years, 12% had 26-30 years of experience, both 1-5 and 11-16 years of experience had 7% lecturers each and only 5% of the lecturers had 31-35 years of experience in teaching. The study established that the institution had inadequate lecturers for engineering courses which resulted in overloading.

5.3 Conclusion

Based on the findings of this study the following conclusions were made;

The study concluded that institutional facilities had very little influence on students' academic achievement in engineering in courses. It accounted for 4.2% of the variation in students' academic achievement. Students' entry behavior moderately influenced academic achievement in engineering courses. It accounted for 11.3% of the variation in students' academic achievement.

Lecturer characteristics had no influence on students' academic achievement in engineering courses.

5.4 Recommendations

Based on the findings and conclusions of this study the following recommendations were made;

5.4.1 Influence of institutional facilities on students' academic achievement in engineering courses in Kisumu national polytechnic

i. The management should make a deliberate effort to acquire more classrooms, laboratory tools and equipment.
ii. Allow students to use available tools and equipment during normal lessons so that they can familiarize but also come up with measures to make the students responsible for the tools and equipment.

5.4.2 Influence of students' entry behavior on academic achievement of engineering students in Kisumu national polytechnic

i. The management of The Kisumu National Polytechnic should implement the admission policy for engineering courses.

ii. The MOEST should consider reviewing the admission policy for engineering courses.

5.4.4 Influence of lecturer characteristics on students' academic achievement in engineering courses in Kisumu national polytechnic

i. The management should make a deliberate effort to hire more lecturers either permanently or as part time staff to ease the workload.

ii. The management should base hiring of lecturers on age and experience.

5.5 Suggestions for Further Research

The study exposed the following areas that requires research;

i. Influence of lecturer classroom delivery skills on students' academic achievement as this will help unveil why the lecturers have the necessary qualifications and experience and yet this is not reflected in the students' academic achievement.

ii. Influence of selected factors on students' academic achievement in all the 10 national Polytechnics, this is because 8 of these Polytechnics were upgraded during the time of the study and were therefore not included as part of the study population.

iii. Influence of boarding facilities on academic achievement of students in mechanical engineering. Such a study will help explain whether students who are accommodated have an advantage of using the facilities more than those who seek accommodation from outside.

REFERENCES

Adayemi, B. (2010). Teacher related factors as correlates of pupil achievement in social studies in Southern- Western Nigeria. *Electronic Journal Research in Educational Psychology.*Vol. 8 (1): 313-332.

Akinsolu, A.O. (2010). Teachers and students' Academic Performance in Nigerian Secondary Schools: Implications for planning. *Florida journal of* Educational *Administration and Policy.* Vol. 3 (2).

Alan, B. (2012). *Social Research Methods*. New York. University Press.

Althea, R., & Erick. B. (2015). Understanding practical engagement; perspectives of undergraduate civil engineering students who engage actively in practical. *Caribbean Teaching Scholar* Vol. 5 No.1 April 2015.

Atkinson, G. (1983). The Economics of education; London, flooder and Stoughton.

Awuory, C. (1994). A study quality education in private schools in Siaya and Kisumu Districts. Unpublished M.Phil Thesis, Moi University.

Best, J.W. (1977). Introduction to Educational Research; London, Oxford University press.

Bryce, E., Juan, C., Hurtado, S., & Eagan, K. (2013). *Examining the Tracks that Cause Derailment; Institutional Context and Engineering Degree Attainments*. A paper presented at the American Research Association Annual Forum May 2013.

Calvo, R., Markauskaite, L., & Trigwell, K. (2007). Factors affecting students' experiences and satisfaction about teaching quality in engineering.

Christopher, J. (2004). Teacher characteristic and students' achievement: evidence from Teachersurvey, *Journal of Economics* 2005 (57): 302-319.

Christopher, L.H. (2014). *Test Validity and Reliability*. Retrieved from allpsych.com/research methods on 3/17/2015 at 1745hrs.

Chunghwa, W.B. (2000). Technology education and world development: challenge Opportunity for education in Africa. *The Journal of Education Administration.* Vol. 5(1): 439-460.

Cole, D., & Espinoza, A. (2008). Examining Academic success of Latino Students in STEM Majors. Online www.redorbit.com retrieved 2/16/15 17; 50hrs.

Creswell, J. W. (2014). *Research Design, Qualitative, Quantitative and Mixed Methods.* Singapore. SAGE.

Dan, G. (2002). *The Mystery of Good Teaching*: Vol. 1 (1).

De Jager, K. (2002). Successful students; does the library make a difference in the Performance measurements and merits. *Journal of educating administration.* 3(1): 140-144.

Dorcas, A. (2011). Factors contributing to students' performance in science laboratory Technology in South Nyanza Kenya. Unpublished thesis Maseno University.

Eshiwani, G.S. (1988). *Determination of school achievement in Kajiado district Nairobi*. Bureau of education research Kenyatta University.

Fraenkel, R., & Wallen, N. (2003). *How to design and evaluate research in education*. McGraw-Hill, USA.

Gall, M.D., Borg,W. & Gall, P. (2007). *Educational Research- An Introduction*. Longman, USA.

Gichira, R. (2002). *Ensuring relevance and quality in TIVET education.* Nairobi.

Grisay, A., & Maklck, E. (1991). *Issues and methodologies in educational development*: *A help series for orientation and training*. Paris HEP.

Guga, A. (1998). *The teacher, teacher education and National development*. Paper at the Conference facing challenges in development in Nigeria in the 21st century Organized by the school of Arts and Social Sciences. Federal College of Education, Kistna.

Gunderson, M. (2004). *A Study on the Influence Vocational Education has on Students Ultimate Academic Success*. Online http//www...Mwlun DgCbw retrieved on 2/16/15.

Haddad. (1978). *Educational effects of class size* Washington DC, World Bank staff Working Paper No. 280.

Hallack, P., & Poisson, M. (2007). Corrupt schools, corrupt universities, what can be done.

Hannushek, E. (1999). Some findings from an independent investigation of the Tennessee. STAR experiment and from other investigations of class size effects. *Educational Evaluation and Policy Analysis, Vol. 21(2): 143-164.*

Herb, C. (2014). College books costs more outrageous than ever. Retrieved from www.today.com April 5 2014.1450hrs.

Hofstein, A., & Lunette, V. (2004). The laboratory in science education. Formulation for the 21st Century, *scientific report Journal.* Vol. 45, (4): 23-34.

Ionescu, D. (2014). The importance of working integrated learning and relevant laboratory experiment in engineering teaching. *Journal of behavioral sciences* 174 2015 2825-2830.

Jack, K., & Peter, J. (2012). Effect of class size on engineering student performance at Bingham University. Available on www.classsizematters.org 29th May, 2015 13.30hrs.

James, R. (2009). Effects of leadership style and student academic achievement. Unpublished Master's thesis in education.

Jamison, D. (1982). *Reduce class size and other alternatives for improving school. An Economist view class (Eds) school size and other alternatives for improving schools.* California, Beverly Hills.

Julian, H., & Amy, W. (2010). Inputs and students achievement: An Analysis of Latina/O - serving Urban Elementary schools. *Association of Mexican American Educators Journal* 2010.

Kamila, S., & Daudi, M. (2012). Assessing students' practical skills in basic electronic laboratory psychomotor domain model. *Social behavioral sciences 56 (2012)* 546-555.

Kane, T.J., Rockoff, J., & Staiger, D. (2006).*What does certification tell us about teacher Effectiveness Evidence from New York City.* Working Paper No. 12155. Washington D.C: National Bureau of Economic Research.

Kimani, G.N., Mogeni, A.M.K., & Wanyama, L.N. (2013). Teacher factors influencing Students' academic achievement in secondary schools in Nyandarua County Kenya. *International Journal of Education and Research.Vol. 5.*

Lassa, P. (2000). *Teacher Production-; a focus on Nigeria. The state of education in Nigeria*. (70-83).UNESCO, Abuja.

Lockheed, K. (1989). Teaching quality and student achievement in Africa: The case of Nigeria and Swaziland. *Teaching and Teacher Education.*5:93-113.

Loo, C.W., & Choy, J.L.F. (2013). Sources of self-efficacy influencing academic performance of engineering students. *American journal of education research vol1. No3 86-92.*

Louis, C., & Lawrence, M. (1997). *Research Methods in Education*; London, Routledge.

Lucke, T. (2012). Using hands –on to engage students in engineering mechanics. *Paper presented at the 40th annual conference 23-26th September 2012.*

Lyle, D., & Albert, J. (2005).The role of the laboratory in undergraduate engineering education. *Journal of engineering education.*

Mckenzie, K. (2001).Who succeeds at the university? Factors predicting academic performance in first year Australian university students. *Higher education research and development, 20: 21-33*

Michael, D.A., & William, J. S. (2013). Effects of course and instructor characteristics on student evaluation of teaching across a college of engineering. *Research journal for engineering education Vol. 102, pp. 289-318 April 2013.*

Michele, L. (2003). *Impact of school libraries on student Achievement-Review of research.* ACER, Australia.

Ministry of Education. (2012). *Taskforce on the realignment of the education sector to the Constitution of Kenya.* Nairobi: Government printer.

Ministry of Education. (2006). *Technical Education Programs*. Syllabi regulation KIE, Kenya.

Muganda, A. (2008). Relationship between school performances in primary schools in Butula Division, Unpublished Masters' Proposal, Maseno University.

Mugenda, A.G., & Mugenda, O.M. (2003). *Research Methods. Quantitative and Qualitative approaches.* Nairobi: Acts press.

Mugenda, O.M, &Mugenda, A.G. (2007) *Research Methods: Quantitative and Qualitative Approaches. Nairobi: Acts Press.*

Mwangi, D. (1983). Factors influencing the performance and learning of mathematics among Secondary schools in Kenya. Unpublished MA thesis, University of Nairobi.

Ngau, M. (1991). Grade Retention and school Dropout in Kenya primary schools; a critical. Analysis access equity issues in education, Los Angeles; Unpublished PHD thesis. University of California at Los Angeles.

Odiembo, J.A.E. (2013). Relationship between selected secondary school teacher characteristics and students' academic achievement in mathematics in Muhoroni District . Kenya. An unpublished thesis Maseno University.

Ojera, D.A., Simatwa, E.M.W., & Ayodo, T.M.O. (2013). Perception of Staff and Students on Factors that Influence Performance in Science Laboratory Technology in Institutes of Technology in Southern Nyanza Region, Kenya. *International Journal of Academic Research In Business and Social Science Nov 2013 Vol. 3 No11.*

Olasomibo (2013). Entry Qualification and Performance of Engineering Students in Nigerian polytechnics. Are the admission requirements still relevant? *Frontiers of architectural research Vol. 3 issue 1March 2014 pp. 69-75.*

Olurunfeni, A., & Ashaulu, M. (2006). A pragmatic approach in engineering education, Teaching Methods and industry partnership, Nigeria.

Republic of Kenya. (July-2005) *Kenya education sector support program 2005-2010.* Nairobi. Government printer.

Republic of Kenya. (2002). Kisumu District Development Plan 2002 -2011: *Effective Management for Sustainable Economic Growth and Poverty Reduction* Nairobi: Government Printer.

Republic of Kenya. (2005). *Kenya educational sector support program 2005-2010: Delivering Quality education and training to all Kenyans*. Nairobi: Government printer.

Republic of Kenya. (1998). Ministry of education and human resource development results of 1995 primary census. Nairobi: Government printer.

Rivkins, S.G., Hannushek, E.A., & Kain, J.F. (2005).Teacher Schools and Academic Achievement. Online Available http:/www.utdallas.edu/research Publications.htm.April 10 2014.

Romanas, V.K., & Jonas, K. (2007). Laboratory instruction in engineering education. *Global journal of engineering education Vol 11.No 2*

Russel, C. J. (2010). Engineering capacity building in developing countries. Available www.worldexpertise.com May 23rd 2015 11.30hrs.

Shrestha, N. (2008). A study on students use of library resources and self-efficacy. Available on line eprints.r clis.org retrieved on 18/10/2016 at 4.05pm.

Stephen, P.H., Joseph, P. & Manuel, A. S. (1978) Text books and achievement: What we know. World Bank staff working paper No. 298.Available www.vanderbilt.edu.April 3 2014 1400hrs.

Thomas, G., Henderson, A. & Goldfinch, T. L. (2013). Influence of University Entry Scores on Students Performance in Engineering Mechanics. *Australasian Journal of Engineering Education Vol. 17 No.1*

UNESCO. (2004). *Developing technical and vocational education in sub-Saharan Africa.*

UNESCO. (1996*).Financing technical and vocational education, modalities and Experience.*

UNESCO & ILO (2002).*Technical and Vocational Education and training 21st CenturyParis.*

Williams, J., Lloyd, M., &Spengler, J. (2005).The case for sustainable laboratories. First Steps at Harvard University. *International journal on sustainability in higher education 6 (4): 363-383.*

White, S. &Stone, G. (2010). Maximizing the use of library resources at the University of Huddersfield. A paper presented at the UK 33rd Annual conference and exhibition. Edinburgh. 12-14th April 2010. Available at http://eprints.hud.ac.uk/7248/.

World Bank. (2000). Higher education in developing countries. Task force on Higher education and society. *World Bank 1818H Washington DC Feb 2000*.

Yala, P.O., & Wanjohi, W.C. (2011). Performance Determinants of KCSE Mathematics in secondary schools in Nyamira Division, Kenya *Asian Social Science, 7(20) 107-11*

APPENDIX A

STUDENTS INTERVIEW SCHEDULE

1. Your institution had several facilities to aid in your studies. How did the library influence your performance as engineering students?
2. How many times did you frequent the library while at the polytechnic?
3. How many laboratory practical lessons did you attend while at the polytechnic?
4. How did the practical lessons influence your performance?
5. How many theory lessons did you attend every week while at the polytechnic?
6. How did this influence your performance?

APPENDIX B

LECTURERS' QUESTIONNAIRE

Instructions:

Please put a tick (√) in a box next to the answer of your choice or write in the spaces provided as the case may be. You don't have to include your name or personal number. Any information provided will be treated with confidentiality and only for the purpose of this research.

A. Personal Information

1. Gender Male ( ) female ( )
2. AGE 30-40( ) 40-50 ( ) 50-60 ( )
3. Teaching experience in years……
4. Professional qualification

   ( ) Diploma ( ) Higher diploma ( ) Degree ( ) Masters

   Any other, specify ……..…
5. Course teaching

   Electrical and electronics ( ) Automotive ( ) Mechanical ( )
6. Teaching load-hours per week…….

B. Institutional facilities

1. Class; ( ) year 1 ( ) year 2 ( ) year 3
2. Class size (give the number) ……
3. Does the class size contribute to class performance?

   ( ) yes ( ) no

   Please explain

   ……

   ……

   ……

   ……

4. a) How many times are students expected to attend classroom lessons per week……

b). In your view, how does this influence students' scores in KNEC

…….

.....

……

……

5.a) How does the library influence students' scores in KNEC?

……

……

…….

b). Do students frequent the library?.....

6. How many laboratory practical lessons do you carry out every week…….

b) Do all students attend all the practical lessons in the term? (NO) (YES)

If no in b above,

why?.....

.....

.....

c.) How does attending practical lessons influence students' scores in KNEC?

……

……

……

……

APPENDIX C

LIBRARIAN'S INTERVIEW SCHEDULE

Influence of library and textbooks on students' academic achievement.

1. What are your qualifications?
2. How many staffs do you have?
3. What is the carrying capacity of the library?
4. Number of internet browsing facilities
5. What is the number of relevant books available in the library for automotive, electrical and mechanical engineering courses.
6. How often do students use the library.

APPENDIX D

TECHNICIAN'S INTERVIEW SCHEDULE

Influence of workshops on students' performance in engineering courses

1. What are your qualifications?

2. Number of staffs

3. What is the number of mandatory /basic tools available in the department?

4. How many workshops do you have?

5. What is the carrying capacity of the workshops?

APPENDIX E

STUDENTS ALUMNI TELEPHONE INTERVIEW

1. What is your name?
2. How old were you when you were admitted at the Kisumu National Polytechnic?
3. How many times did you go to the library per week while at the polytechnic?
4. How did the library use influence your performance?
5. probe

APPENDIX F

PRINCIPALS INTERVIEW SCHEDULE

1. What is your highest professional qualification?
2. How long have you been in this institution?
3. How long have you been a principal?
4. What is the current student enrollment for diploma Mechanical, Automotive and Electrical and electronics engineering courses.
5. How many TSC appointed lecturers do you have for Mechanical engineering, Electrical and electronics and Automotive engineering
6. What are their professional qualifications?
7. What factors influences students' performance in mechanical, automotive and electrical and electronics engineering departments?
8. What suggestions do you give in order to improve performance?

THANK YOU

APPENDIX G

DOCUMENT ANALYSIS GUIDE

Facility	Frequency of use	Remarks
Library		
Laboratory		
Classroom		

APPENDIX H

STUDENTS CLASS ATTENDANCE REGISTER.

The Kisumu National Polytechnic.

Department ---------- Course----------

Term---------- date----------

Serial number	**Admission number**	**Name**	**signature**

Number of students present----------Number of students absent----------

Total of student in the class----------

Lecturer----------sign----------

APPENDIX I
COMPUTATION OF PEARSON AND ANOVA FOR INSTITUTIONAL FACILITIES

S/NO	Library Use	Classroom Use	Laboratory Use	Performance in Exams
1	36	180	69	.27
2	40	170	54	.23
3	48	154	60	.19
4	50	134	55	.19
5	15	148	16	.24
6	12	157	17	.24
7	20	180	18	.23
8	17	176	24	.23
9	18	146	15	.22
10	19	154	18	.21
11	20	157	12	.20
12	10	164	15	.23
13	12	173	16	.22
14	14	170	18	.18
15	16	190	14	.17
16	13	180	12	.21
17	15	154	20	.17
18	42	164	48	.27
19	40	173	52	.22
20	30	167	46	.20
21	25	157	63	.19
22	24	159	64	.18
23	23	160	70	.21
24	44	169	58	.22
25	30	154	49	.23
26	16	145	15	.21
27	14	166	14	.20
28	13	158	12	.17
29	15	148	16	.16
30	12	136	14	.15
31	9	180	55	.35
32	10	186	65	.33
33	15	190	56	.30
34	14	150	54	.30
35	18	140	62	.30
36	20	158	53	.29
37	8	148	60	.29
38	10	136	58	.27
39	9	130	65	.27
40	12	126	64	.25
41	12	134	46	.25
42	14	154	57	.24
43	12	183	63	.24

44	14	190	64	.23
45	15	178	53	.22
46	18	188	60	.20
47	19	200	61	.21
48	20	190	50	.21
49	21	198	54	.21
50	29	151	55	.21
51	22	148	56	.21
52	24	201	53	.21
53	33	172	65	.20
54	13	176	62	.20
55	14	180	54	.19
56	22	190	64	.19
57	18	176	53	.19
58	15	154	52	.18
59	20	194	60	.18
60	13	135	59	.18
61	12	120	58	.18
62	10	175	56	.17
63	12	188	67	.17
64	18	160	64	.16
65	18	172	55	.15
66	30	200	60	.38
67	34	230	58	.23
68	27	250	60	.22
69	18	240	59	.20
70	30	180	55	.20
71	40	160	54	.19
72	51	200	58	.17
73	61	220	54	.24
74	53	230	56	.24
75	48	246	48	.23
76	50	255	59	.23
77	30	240	47	.22
78	45	220	60	.20
79	30	225	45	.23
80	35	236	48	.22
81	37	246	59	.18
82	27	200	58	.17
83	29	221	56	.43
84	10	170	62	.33
85	18	180	58	.32
86	19	190	49	.29
87	15	200	52	.29
88	17	201	54	.26
89	16	181	54	.26
90	15	196	56	.26
91	14	176	62	.24
92	18	186	68	.23

93	10	185	49	.23
94	8	199	64	.23
95	10	186	52	.22
96	36	180	69	.27
97	40	170	54	.23
98	48	154	60	.19
99	50	134	55	.19
100	15	148	16	.24
101	12	157	17	.24
102	20	180	18	.23
103	17	176	24	.23
104	18	146	15	.22
105	19	154	18	.21
106	20	157	12	.20
107	10	164	15	.23
108	12	173	16	.22
109	14	170	18	.18
110	16	190	14	.17
111	13	180	12	.21
112	15	154	20	.17
113	42	164	48	.27
114	40	173	52	.22
115	30	167	46	.20
116	25	157	63	.19
117	24	159	64	.18
118	23	160	70	.21
119	44	169	58	.22
120	30	154	49	.23
121	16	145	15	.21
122	14	166	14	.20
123	13	158	12	.17
124	15	148	16	.16
125	12	136	14	.15
126	9	180	55	.35
127	10	186	65	.33
128	15	190	56	.30
129	14	150	54	.30
130	18	140	62	.30
131	20	158	53	.29
132	8	148	60	.29
133	10	136	58	.27
134	25	135	56	.24
135	9	130	65	.27
136	12	126	64	.25
137	12	134	46	.25
138	14	154	57	.24

139	12	183	63	.24
140	14	190	64	.23
141	15	178	53	.22
142	18	188	60	.20
143	19	200	61	.21
144	20	190	50	.21
145	21	198	54	.21
146	29	151	55	.21
147	22	148	56	.21
148	24	201	53	.21
149	33	172	65	.20
150	13	176	62	.20
151	14	180	54	.19
152	22	190	64	.19
153	18	176	53	.19
154	15	154	52	.18
155	20	194	60	.18
156	13	135	59	.18
157	12	120	58	.18
158	10	175	56	.17
159	12	188	67	.17
160	18	160	64	.16
161	18	172	55	.15
162	30	200	60	.38
163	34	230	58	.23
164	27	250	60	.22
165	18	240	59	.20
166	30	180	55	.20
167	40	160	54	.19
168	51	200	58	.17
169	61	220	54	.24
170	53	230	56	.24
171	48	246	48	.23
172	50	255	59	.23
173	30	240	47	.22
174	45	220	60	.20
175	30	225	45	.23
176	35	236	48	.22
177	37	246	59	.18
178	27	200	58	.17
179	29	221	56	.43
180	10	170	62	.33
181	18	180	58	.32
182	19	190	49	.29
183	15	200	52	.29
184	17	201	54	.26

185	16	181	54	.26
186	15	196	56	.26
187	14	176	62	.24
188	18	186	68	.23
189	10	185	49	.23
190	8	199	64	.23
191	10	186	52	.22
192	12	173	16	.22
193	14	170	18	.18
194	16	190	14	.17
195	13	180	12	.21
196	15	154	20	.17
197	42	164	48	.27
198	40	173	52	.22
199	30	167	46	.20
200	25	157	63	.19
201	24	159	64	.18
202	23	160	70	.21
203	44	169	58	.22
204	30	154	49	.23
205	16	145	15	.21
206	14	166	14	.20
207	13	158	12	.17
208	15	148	16	.16
209	12	136	14	.15
210	9	180	55	.35
211	10	186	65	.33
212	15	190	56	.30
213	14	150	54	.30
214	18	140	62	.30
215	20	158	53	.29
216	8	148	60	.29
217	10	136	58	.27
218	9	130	65	.27
219	12	126	64	.25
220	12	134	46	.25
221	14	154	57	.24
222	12	183	63	.24
223	14	190	64	.23
224	15	178	53	.22
225	18	188	60	.20
226	19	200	61	.21
227	20	190	50	.21
228	21	198	54	.21
229	29	151	55	.21
230	22	148	56	.21
231	24	201	53	.21
232	33	172	65	.20

233	13	176	62	.20
234	14	180	54	.19
235	22	190	64	.19
236	18	176	53	.19
237	15	154	52	.18
238	20	194	60	.18
239	13	135	59	.18
240	12	120	58	.18
241	10	175	56	.17

APPENDIX J

COMPUTATION OF PEARSON AND ANOVA FOR STUDENTS' ENTRY BEHAVIOR

S/NO	Entry behavior	Achievement in exam	Transformed achievement
1	10.00	2.83	.35
2	7.00	3.00	.33
3	6.00	3.33	.30
4	7.00	3.33	.30
5	8.00	3.33	.30
6	5.00	3.50	.29
7	6.00	3.50	.29
8	6.00	3.67	.27
9	7.00	3.67	.27
10	8.00	4.00	.25
11	6.00	4.00	.25
12	7.00	4.17	.24
13	8.00	4.17	.24
14	7.00	4.33	.23
15	6.00	4.47	.22
16	6.00	5.00	.20
17	6.00	4.83	.21
18	7.00	4.83	.21
19	6.00	4.83	.21
20	6.00	4.83	.21
21	6.00	4.83	.21
22	6.00	4.83	.21
23	7.00	5.00	.20
24	7.00	5.00	.20
25	5.00	5.17	.19
26	7.00	5.17	.19
27	7.00	5.33	.19
28	5.00	5.67	.18
29	5.00	5.67	.18
30	5.00	5.67	.18
31	6.00	5.67	.18
32	6.00	5.83	.17
33	6.00	5.83	.17
34	6.00	6.33	.16
35	5.00	6.67	.15
36	8.00	2.60	.38
37	6.00	4.40	.23
38	7.00	4.60	.22
39	8.00	4.60	.22
40	8.00	5.00	.20
41	7.00	5.00	.20
42	6.00	5.40	.19
43	5.00	5.80	.17
44	7.00	4.17	.24
45	7.00	4.17	.24
46	8.00	4.33	.23
47	7.00	4.33	.23
48	5.00	4.50	.22
49	6.00	5.00	.20

50	6.00	4.33	.23
51	5.00	4.50	.22
52	7.00	5.50	.18
53	8.00	6.00	.17
54	5.00	2.33	.43
55	7.00	3.00	.33
56	7.00	3.17	.32
57	5.00	3.50	.29
58	6.00	3.50	.29
59	8.00	3.83	.26
60	7.00	3.83	.26
61	6.00	3.83	.26
62	6.00	4.17	.24
63	5.00	4.33	.23
64	7.00	4.33	.23
65	6.00	4.33	.23
66	5.00	4.50	.22
67	6.00	4.67	.21
68	6.00	4.67	.21
69	7.00	4.67	.21
70	6.00	4.67	.21
71	5.00	4.67	.21
72	6.00	4.83	.21
73	6.00	5.00	.20
74	7.00	4.67	.21
75	6.00	4.83	.21
76	6.00	5.17	.19
77	6.00	5.17	.19
78	5.00	5.33	.19
79	7.00	5.50	.18
80	7.00	5.83	.17
81	6.00	5.83	.17
82	7.00	5.83	.17
83	5.00	6.00	.17
84	7.00	5.17	.19
85	8.00	5.67	.18
86	8.00	4.00	.25
87	9.00	4.71	.21
88	5.00	4.86	.21
89	7.00	5.00	.20
90	6.00	5.71	.18
91	9.00	5.29	.19
92	7.00	4.40	.23
93	8.00	5.70	.18
94	8.00	4.60	.22
95	6.00	4.90	.20
96	7.00	4.90	.20
97	8.00	4.70	.21
98	6.00	4.70	.21
99	8.00	4.30	.23
100	6.00	5.00	.20
101	7.00	4.70	.21
102	8.00	5.80	.17

103	5.00	4.30	.23
104	7.00	4.30	.23
105	8.00	5.50	.18
106	7.00	5.50	.18
107	7.00	5.10	.20
108	6.00	4.70	.21
109	6.00	4.40	.23
110	6.00	5.90	.17
111	5.00	5.70	.18
112	7.00	5.00	.20
113	7.00	6.10	.16
114	5.00	6.40	.16
115	7.00	5.70	.18
116	9.00	5.40	.19
117	6.00	5.00	.20
118	6.00	5.40	.19
119	7.00	5.20	.19
120	5.00	5.40	.19
121	5.00	5.90	.17
122	5.00	6.57	.15
123	6.00	6.29	.16
124	6.00	7.70	.13
125	6.00	6.90	.14
126	8.00	6.70	.15
127	6.00	6.90	.14
128	8.00	6.00	.17
129	8.00	5.57	.18
130	7.00	5.71	.18
131	8.00	5.86	.17
132	9.00	5.86	.17
133	6.00	6.00	.17
134	7.00	6.00	.17
135	8.00	6.14	.16
136	8.00	4.71	.21
137	8.00	4.86	.21
138	8.00	4.86	.21
139	6.00	5.00	.20
140	9.00	5.29	.19
141	7.00	5.29	.19
142	7.00	5.29	.19
143	6.00	4.57	.22
144	7.00	5.29	.19
145	5.00	5.57	.18
146	7.00	5.29	.19
147	5.00	6.00	.17
148	7.00	5.43	.18
149	5.00	5.86	.17
150	6.00	6.43	.16
151	6.00	6.43	.16
152	6.00	6.57	.15
153	6.00	6.71	.15
154	8.00	6.68	.15
155	7.00	3.70	.27

156	10.00	4.60	.22
157	6.00	4.60	.22
158	5.00	4.70	.21
159	6.00	5.10	.20
160	5.00	4.60	.22
161	6.00	4.90	.20
162	6.00	5.10	.20
163	7.00	5.60	.18
164	7.00	5.60	.18
165	6.00	5.70	.18
166	8.00	6.10	.16
167	8.00	4.00	.25
168	6.00	4.29	.23
169	9.00	4.57	.22
170	8.00	4.86	.21
171	6.00	5.00	.20
172	7.00	5.29	.19
173	7.00	5.29	.19
174	6.00	5.57	.18
175	7.00	5.57	.18
176	8.00	5.57	.18
177	5.00	6.00	.17
178	5.00	6.00	.17
179	9.00	6.29	.16
180	7.00	4.80	.21
181	8.00	5.80	.17
182	9.00	3.71	.27
183	7.00	4.57	.22
184	7.00	5.00	.20
185	6.00	5.29	.19
186	7.00	5.43	.18
187	6.00	5.57	.18
188	6.00	5.86	.17
189	6.00	5.86	.17
190	5.00	6.14	.16
191	6.00	6.14	.16
192	8.00	6.43	.16
193	6.00	4.57	.22
194	5.00	4.71	.21
195	6.00	4.71	.21
196	8.00	5.29	.19
197	8.00	5.43	.18
198	7.00	4.33	.23
199	7.00	4.33	.23
200	7.00	4.33	.23
201	7.00	4.66	.21
202	5.00	4.83	.21
203	5.00	5.00	.20
204	5.00	5.33	.19
205	5.00	5.33	.19
206	4.00	5.33	.19
207	5.00	5.50	.18
208	5.00	5.83	.17

209	5.00	6.33	.16
210	8.00	6.50	.15
211	5.00	5.00	.20
212	10.00	5.00	.20
213	5.00	3.71	.27
214	5.00	4.43	.23
215	6.00	5.29	.19
216	5.00	5.29	.19
217	7.00	4.17	.24
218	7.00	4.17	.24
219	8.00	4.33	.23
220	7.00	4.33	.23
221	5.00	4.50	.22
222	6.00	4.67	.21
223	6.00	5.00	.20
224	6.00	4.33	.23
225	5.00	4.50	.22
226	7.00	5.50	.18
227	8.00	6.00	.17
228	5.00	4.80	.21
229	6.00	5.80	.17
230	6.00	3.71	.27
231	7.00	4.57	.22
232	6.00	5.00	.20
233	7.00	5.40	.19
234	5.00	5.57	.18
235	5.00	4.66	.21
236	5.00	4.53	.22
237	6.00	4.26	.23
238	5.00	4.86	.21
238	5.00	5.00	.20
239	5.00	6.00	.17
240	5.00	6.17	.16
241	5.00	6.83	.15

APPENDIX K

COMPUTATION OF PEARSON AND ANOVA FOR LECTURER CHARACTERISTICS

Lecturer	Age	Qualification	Experience	Achievement	Transformed Achievement
L1	38	3.00	18.00	6.60	.15
L1	38	3.00	18.00	6.40	.16
L2	36	3.00	3.00	6.60	.15
L3	42	3.00	19.00	4.90	.20
L2	36	3.00	4.00	3.90	.26
L4	39	3.00	2.00	5.70	.18
L1	39	3.00	19.00	4.80	.21
L3	43	3.00	20.00	5.00	.20
L5	50	1.00	20.00	5.70	.18
L2	37	3.00	5.00	7.30	.14
L4	39	3.00	2.00	7.50	.13
L1	40	3.00	20.00	4.40	.23
L3	44	3.00	21.00	5.80	.17
L2	38	3.00	6.00	6.22	.16
L6	46	2.00	10.00	5.70	.18
L1	41	3.00	21.00	6.90	.14
L2	39	3.00	7.00	6.90	.14
L4	39	3.00	2.00	6.90	.14
L1	42	3.00	21.00	4.09	.24
L3	46	3.00	23.00	6.41	.16
L7	58	1.00	24.00	5.07	.20
L8	58	1.00	26.00	4.07	.25
L9	39	3.00	8.00	5.07	.20
L2	43	4.00	18.00	7.50	.13
L1	39	3.00	15.00	5.60	.18
L3	35	3.00	10.00	7.24	.14
L4	43	3.00	10.00	7.60	.13
L1	39	3.00	15.00	5.90	.17
L2	44	4.00	19.00	6.54	.15
L2	44	4.00	19.00	4.66	.21
L5	40	3.00	8.00	6.00	.17
L5	40	3.00	8.00	6.17	.16
L3	36	3.00	11.00	6.50	.15
L6	52	3.00	24.00	4.91	.20
L7	37	3.00	8.00	4.89	.20
L8	32	3.00	1.00	7.27	.14
L9	44	3.00	19.00	5.61	.18
L10	52	3.00	18.00	6.32	.16
L3	37	3.00	12.00	6.32	.16
L2	45	4.00	20.00	6.46	.15
L7	38	3.00	9.00	6.86	.15
L8	33	3.00	2.00	6.92	.14
L9	45	3.00	20.00	6.49	.15
L3	39	3.00	14.00	7.05	.14
L7	39	3.00	10.00	7.05	.14

L3	38	3.00	13.00	6.50	.15
L11	45	3.00	23.00	5.00	.20
L12	42	3.00	20.00	6.75	.15
L13	39	3.00	7.00	5.75	.17
L14	46	1.00	24.00	4.85	.21
L15	52	2.00	28.00	4.85	.21
L1	43	3.00	19.00	5.63	.18
L16	35	3.00	1.00	7.33	.14
L17	51	2.00	20.00	7.33	.14
L12	42	3.00	20.00	5.76	.17
L13	39	3.00	7.00	5.51	.18
L3	39	3.00	14.00	3.71	.27
L1	40	3.00	17.00	6.30	.16
L3	40	3.00	16.00	4.60	.22
L4	45	3.00	23.00	4.80	.21
L5	33	3.00	10.00	4.80	.21
L6	34	3.00	3.00	5.20	.19
L7	40	4.00	17.00	5.07	.20
L3	41	3.00	17.00	4.53	.22
L5	34	3.00	11.00	5.16	.19
L4	46	3.00	24.00	4.90	.20
L1	41	3.00	18.00	5.70	.18
L6	35	3.00	4.00	7.00	.14
L8	36	3.00	11.00	5.92	.17
L9	47	3.00	23.00	6.26	.16
L3	42	3.00	18.00	4.37	.23
L5	36	3.00	10.00	7.47	.13
L4	47	3.00	25.00	5.85	.17
L1	42	3.00	19.00	4.89	.20
L6	36	3.00	5.00	6.90	.14
L7	44	4.00	20.00	6.60	.15
L3	43	3.00	19.00	4.91	.20
L1	43	3.00	20.00	6.64	.15
L5	37	3.00	11.00	6.64	.15
L4	48	3.00	26.00	4.09	.24
L4	48	3.00	26.00	4.45	.22
L1	43	3.00	20.00	5.18	.19
L6	37	3.00	6.00	5.18	.19
L7	43	4.00	19.00	6.18	.16
L3	44	3.00	20.00	5.29	.19
L1	44	3.00	21.00	6.88	.15
L5	38	3.00	12.00	6.88	.15
L3	45	3.00	21.00	6.88	.15
L5	38	3.00	12.00	4.29	.23
L8	39	3.00	14.00	7.53	.13
L6	38	3.00	7.00	7.00	.14
L7	44	4.00	20.00	6.60	.15
L10	44	3.00	19.00	6.30	.16
L11	50	4.00	31.00	5.20	.19

L12	39	1.00	6.00	5.30	.19
L13	53	1.00	32.00	5.30	.19
L1	38	3.00	18.00	6.60	.15
L1	38	3.00	18.00	6.40	.16
L2	36	3.00	3.00	6.60	.15
L3	42	3.00	19.00	4.90	.20
L2	36	3.00	4.00	3.90	.26
L4	39	3.00	2.00	5.70	.18
L1	39	3.00	19.00	4.80	.21
L3	43	3.00	20.00	5.00	.20
L5	50	1.00	20.00	5.70	.18
L2	37	3.00	5.00	7.30	.14
L4	39	3.00	2.00	7.50	.13
L1	40	3.00	20.00	4.40	.23
L3	44	3.00	21.00	5.80	.17
L2	38	3.00	6.00	6.22	.16
L6	46	2.00	10.00	5.70	.18
L1	41	3.00	21.00	6.90	.14
L2	39	3.00	7.00	6.90	.14
L4	39	3.00	2.00	6.90	.14
L1	42	3.00	21.00	4.09	.24
L3	46	3.00	23.00	6.41	.16
L7	58	1.00	24.00	5.07	.20
L8	58	1.00	26.00	4.07	.25
L9	39	3.00	8.00	5.07	.20
L2	43	4.00	18.00	7.50	.13
L1	39	3.00	15.00	5.60	.18
L3	35	3.00	10.00	7.24	.14
L4	43	3.00	10.00	7.60	.13
L1	39	3.00	15.00	5.90	.17
L2	44	4.00	19.00	6.54	.15
L2	44	4.00	19.00	4.66	.21
L5	40	3.00	8.00	6.00	.17
L5	40	3.00	8.00	6.17	.16
L3	36	3.00	11.00	6.50	.15
L6	52	3.00	24.00	4.91	.20
L7	37	3.00	8.00	4.89	.20
L8	32	3.00	1.00	7.27	.14
L9	44	3.00	19.00	5.61	.18
L10	52	3.00	18.00	6.32	.16
L3	37	3.00	12.00	6.32	.16
L2	45	4.00	20.00	6.46	.15
L7	38	3.00	9.00	6.86	.15
L8	33	3.00	2.00	6.92	.14
L9	45	3.00	20.00	6.49	.15
L3	39	3.00	14.00	7.05	.14
L7	39	3.00	10.00	7.05	.14
L3	38	3.00	13.00	6.50	.15
L11	45	3.00	23.00	5.00	.20

L12	42	3.00	20.00	6.75	.15
L13	39	3.00	7.00	5.75	.17
L14	46	1.00	24.00	4.85	.21
L15	52	2.00	28.00	4.85	.21
L1	43	3.00	19.00	5.63	.18
L16	35	3.00	1.00	7.33	.14
L17	51	2.00	20.00	7.33	.14
L12	42	3.00	20.00	5.76	.17
L13	39	3.00	7.00	5.51	.18
L3	39	3.00	14.00	3.71	.27
L1	40	3.00	17.00	6.30	.16
L3	40	3.00	16.00	4.60	.22
L4	45	3.00	23.00	4.80	.21
L5	33	3.00	10.00	4.80	.21
L6	34	3.00	3.00	5.20	.19
L7	40	4.00	17.00	5.07	.20
L3	41	3.00	17.00	4.53	.22
L5	34	3.00	11.00	5.16	.19
L4	46	3.00	24.00	4.90	.20
L1	41	3.00	18.00	5.70	.18
L6	35	3.00	4.00	7.00	.14
L8	36	3.00	11.00	5.92	.17
L9	47	3.00	23.00	6.26	.16
L3	42	3.00	18.00	4.37	.23
L5	36	3.00	10.00	7.47	.13

APPENDIX L

RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MS. HARRIET KHAJEHA
of MASENO UNIVERSITY, 0-40100
Kisumu,has been permitted to conduct
research in *Kisumu County*

on the topic: *INFLUENCE OF SELECTED FACTORS ON STUDENTS' ACADEMIC ACHIEVEMENT IN ENGINEERING COURSES IN KISUMU NATIONAL POLYTECHNIC, KENYA*

for the period ending:
12th April,2018

Permit No : NACOSTI/P/17/44621/16536
Date Of Issue : 12th April,2017
Fee Recieved :USD 9.45

.....
Applicant's Signature

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

CONDITIONS

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

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

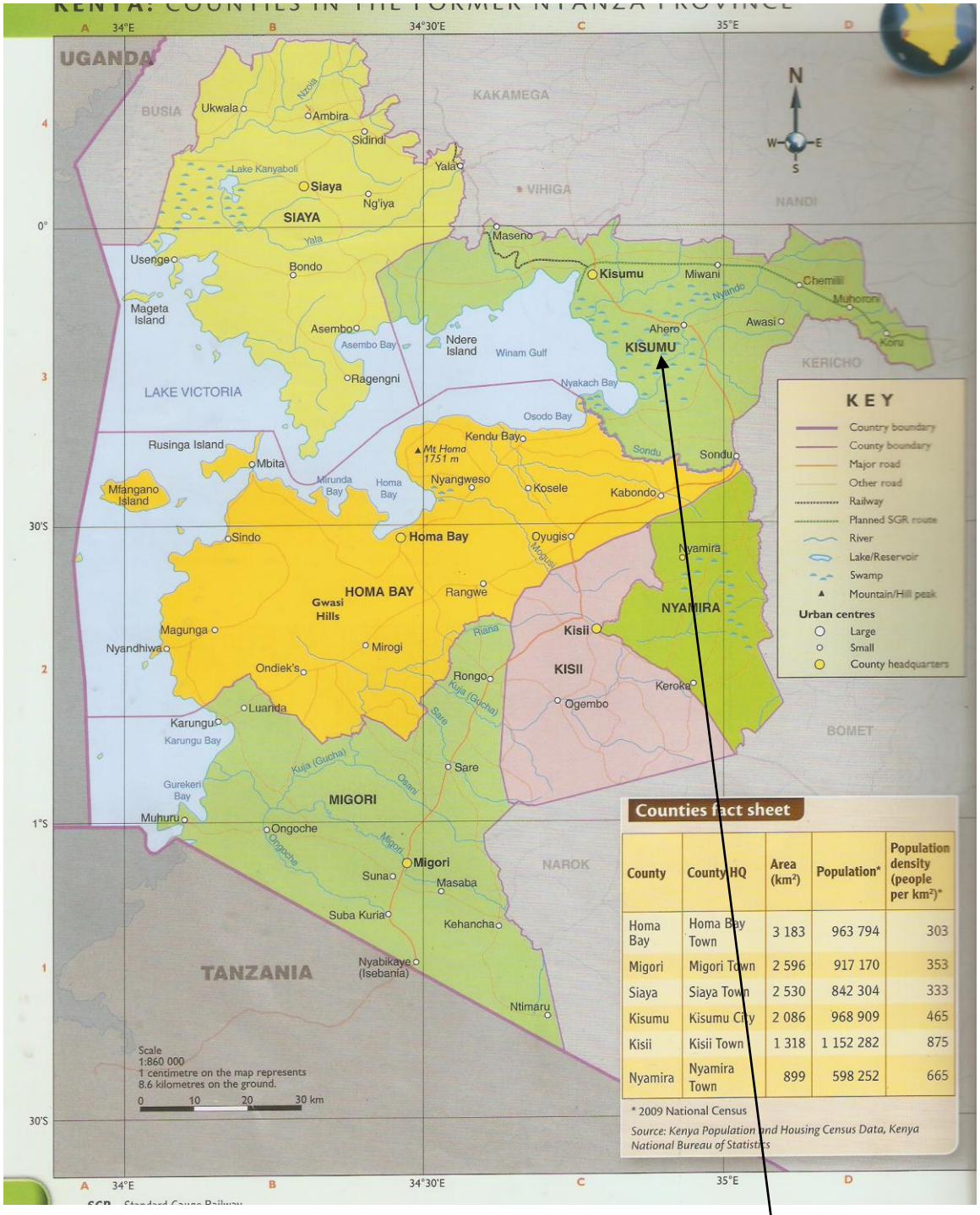
RESEACH CLEARANCE PERMIT

Serial No.A 13724

CONDITIONS: see back page

APPENDIX M

LOCATION OF THE KISUMU NATIONAL POLYTECHNIC



The Kisumu National Polytechnic