ISSN: 0975-833X

Availableonlineathttp://www.journalcra.com

International Journal of Current Research
Vol. 11, Issue, 06, pp.5038-5046, June, 2019

DOI: https://doi.org/10.24941/ijcr.35709.06.2019

INTERNATIONAL JOURNAL OFCURRENTRESEARCH

RESEARCH ARTICLE

INFLUENCE OF STUDENTS' ENTRY BEHAVIOR ON ACADEMIC ACHIEVEMENT IN NATIONAL POLYTECHNICS IN KENYA - A CASE STUDY ACROSS ENGINEERING COURSES

***[1]Enose M.W. Simatwa, [2]Khajeha Hariet and [2]Olive T. Baraza**

[1]Department of Education Policy and Management, Tom Mboya University College, (A Constituent College of Maseno University), Kenya
[2]Department of Educational Management and Foundations, Maseno University, Kenya

ARTICLE INFO

Article History:
Received 20th March, 2019
Received in revised form
23rd April, 2019
Accepted 26th May, 2019
Published online 30th June, 2019

Key Words:

Students' Entry Behavior, Academic Achievement, National Polytechnics, Kenya. A Case Study across Engineering Courses.

ABSTRACT

Engineering education is not attracting enough secondary school leavers and often it is not attracting the diversity of backgrounds needed, namely; persons with mild disabilities, girls and the talented among others. The main obstacle is the way engineering is perceived by prospective students, teachers, counselors and parents. In fact engineers are perceived as "nerds" without interpersonal skills, doing narrowly focused jobs that are prone to being outsourced. Most high school girls believe engineering is for boys who love mathematics and science. At diploma level the admission criteria is low compared to degree level, where engineering education is highly competitive. Notwithstanding this scenario quite a number of students pursue engineering education in National Polytechnics at diploma level. Engineering courses offered at Diploma level in the polytechnics play a critical role in acquisition of practical skills and knowledge relating to industrial development worldwide. Through engineering education, countries build competence based workforce for key industries. Performance of students in engineering courses in national polytechnics was unsatisfactory and a serious concern. The unsatisfactory performance could have been due to a myriad of factors such as students' attitude, students entry behaviour, teaching learning resources, infrastructure, lecturer characteristics, location of the polytechnics and the nature of curricula as suggested by the literature review. The objective of this study was to determine the influence of students' entry behavior on students' academic achievement in engineering courses in National Polytechnics in Kenya. The study established that students' entry behavior accounted for 6.3% of the variation in students' academic achievement in engineering courses. This means that statistically for every one unit improvement in performance in Kenya Certificate of Secondary Education mean scores the respective students' academic achievement improved by about. 01 units. The practical significance is that entry behaviour is a significant predictor of students' academic achievement in engineering courses. The study concluded that students' entry behavior influences students' academic achievement in polytechnics in Kenya. Going forward, the entry behaviour of students joining engineering course should be revised upward to reduce wastage in engineering courses.

Corresponding author:
Enose M.W. Simatwa

Citation: Enose M.W. Simatwa, Khajeha Hariet and Olive T. Baraza, **2019.** "Influence of students' entry behavior on academic achievement in national polytechnics in Kenya - A case study across engineering courses", *International Journal of Current Research*, 11, (06), 5038-5046.

INTRODUCTION

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 are 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. 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, 2010). Studies have shown that students' academic achievement is dependent on certain

factors; Hofstein and Lunetta, (2004) identified school facilities, Michele, (2003) identified the library, (Lucke, 2012, Ionescu, 2014, Ojera, Simatwa and Ayodo, 2013) cited the laboratory, (Thomas, Hunderson and Goldfinch, 2013; Loo and Choy, 2013) identified students entry scores, (Joshua 2014, Abraham and Keith, 2006) identified lecturer characteristics as factors influencing students' performance. It is against this backdrop that the study sought to establish the influence of Students' Entry Behavior on Academic Achievement in engineering courses in National Polytechnics in Kenya. 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 Adewale and Adhuze (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. 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 Science Technology Engineering and Mathematics. Adewale and Adhuze (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. 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 Kenya Certificate of Secondary Education examination and scores in cluster subjects and students' academic performance in engineering courses. Questionnaires, interviews and document analysis were used to collect data.

Research Objective

The research objective was: To determine influence of Students' Entry Behavior on Academic Achievement in engineering courses in National Polytechnics in Kenya

Synthesis of literature on 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. Gunderson (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 and 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 Kenya Certificate of Secondary Education examination and prior exposure to vocational education with achievement in engineering courses in college unlike the past studies which only concentrated on mathematics.

Conceptual Framework: The conceptual framework (Figure 1) postulates that students entry behaviour, that is, students performance in Kenya Certificate of Secondary Education examination has influence on their academic performance in engineering courses in national polytechnics. Kenya Certificate of Secondary Education examination is used in Kenya for selection of students who qualify to proceed to tertiary education, university education inclusive. In which case students should have passed Kenya Certificate of Secondary Education examination with acceptable mean score and individual subject scores as set out in the Ministry of Education guidelines to join National polytechnics. In Kenya, a Kenya Certificate of Secondary Education examination mean score of C Minus (C-) and above is a requirement to join Diploma courses in the national polytechnics. Besides the candidate is also required to meet the departmental requirements and in engineering courses they are expected to have passed Physics and / or Mathematics with a D plus (D+) and above. It is therefore hypothesized that there is a link between students' performance in Kenya Certificate of Secondary Education examination and academic achievement in national polytechnics. However, intervening variables such as attitude are bound to moderate the influence. When the

students' attitude is positive the influence escalates and when the students attitude is negative the influence declines. The conceptual framework therefore helped the researchers to focus on the variables of the study to establish the hypothesized link.

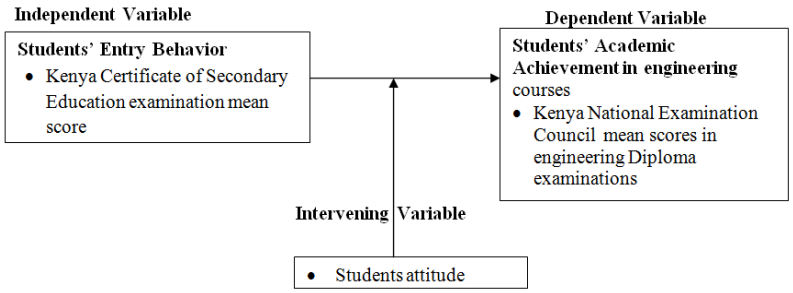

Figure 1. A Conceptual framework showing influence of Students' Entry Behaviour on Students' Academic Achievement in Engineering Courses in National Polytechnics

Table 1. Distribution of Students' Entry Behavior 2010 to 2014

Kenya Certificate of Secondary Education examinations scores	Frequency	Percentage
4	3	0.36
5	188	22.7
6	256	30.9
7	220	26.6
8	123	14.9
9	28	3.4
10	10	1.2
Total	828	100

Table 2. Cumulative Academic Performance of Students in Engineering Courses 2010 to 2014

Kenya National Examination Council mean scores in engineering Diploma examinations	Frequency	Percentage
Distinction 1 (1 point)	0	0
Distinction 2 (2 points)	0	0
Credit 3 (3 points)	12	1.4
Credit 4 (4 points)	28	3.4
Pass 5 (5 points)	53	6.3
Pass 6 (6 points)	90	10.8
Referral 7 (7 points)	183	22.1
Fail 8 (8 points)	462	56.0
Total	828	100

Table 3. Model Summary on the influence of Students' Entry Behavior on Academic Achievement of Students 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	.259	.067	.063	.03964	.067	17.115	1	826	.000

Predictor: (Constant), Entry behaviour

RESEARCH METHODOLOGY

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 (Mugenda and Mugenda, 2003) 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 using test-retest technique whereby Pearson's r coefficient for lecturers' questionnaire was 0.82 at p value of .05. Quantitative data were analyzed using frequency counts, percentages, means and regression analysis. Qualitative data from interviews and open ended items of questionnaires were transcribed, analyzed and reported in emergent themes and sub themes.

RESULTS

Students Academic Performance: The students' academic performance in Kenya Certificate of Secondary Education examinations results and Kenya National Examination Council were established as shown in Table 1 and 2. This was necessary in order to respond to the null hypothesis: Student's entry behavior has no significant influence on their academic achievement in engineering courses. From Table 1 it can be observed that all the students generally met the requirements for joining national polytechnics and therefore were expected to achieve the required mean scores in their Diploma examinations. Majority of the candidates had the mean score of six and seven. Only 3(0.36%) had a score of D plus. From Table 2, it can be observed that the performance was generally unsatisfactory because majority of the students had very low achievement as signified by the mean grades in Kenya National Examination Council examinations results, where most students failed. To determine the influence of students entry behaviour on their academic achievement in engineering courses, regression analysis was computed. The data on students academic achievement in the engineering courses in the national polytechnic was regressed against the data on entry behavior of the students (Table and 1 and 2). The results

were as shown in Table 3. The results shown in Table 3 indicated that students' entry behavior had a significant influence on academic achievement (r = .259, N = 828, p>.05). Therefore, the null hypothesis that "Students entry behavior has no significant influence on academic achievement of Students in engineering courses" was rejected. Students entry behavior accounted for 6.3% of variation in achievement as signified Adjusted R square .063. The other 93.7% was due to other factors which were not the subject of this study. ANOVA was computed to confirm whether students 'entry behavior was a significant predictor of academic achievement. The results were as shown in Table 4.

students entry behaviour in specific engineering courses was established and regression analysis computed with the data on students performance in engineering courses at the polytechnic. The specific engineering courses were automotive engineering, electrical and electronics engineering and mechanical engineering.

Influence of Students' Entry Behavior on Students Academic Achievement in Automotive Engineering Courses: Students' data on entry behavior was obtained from students' admissions files.

Table 4. ANOVA for the influence of Students Entry Behavior on Students' Academic Achievement in Engineering Courses

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.027	1	.027	17.115	.000
	Residual	.376	826	.002		
	Total	.402	827			

Dependent Variable: Students' Academic Achievement in Engineering Courses
Predictor: (Constant), Entry behaviour

Table 5. Regression Analysis for the influence of Students' Entry Behavior on students performance in Engineering Courses

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

Dependent Variable: Students' Academic Achievement in Engineering Courses
Regression Equation: $Y = \beta_0 + \beta_1 X_1 +$ ----------ε

Table 6. Distribution of Students' Entry Behavior in Automotive Engineering Course

Kenya Certificate of Secondary Education Mean 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

Table 7. Model Summary on the influence of Students Entry Behavior on Academic Achievement in Automotive Engineering Course

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	.393	.155	.125	.02828	.155	5.129	1	28	.031

Predictor: (Constant), Students' Academic Achievement in Automotive Engineering Courses

From Table 4 it can be observed that students' entry behavior was a significant predictor of students' academic achievement in engineering courses (F (1,826) 17.115, P<.05). To determine the actual influence of entry behaviour on students academic achievement in engineering courses, linear regression analysis was computed and the results were as shown in Table 5. From Table 5 the results indicate that and increase in students' entry behavior (Kenya Certificate of Secondary Education school examination mean score) by one unit improved student academic achievement by .009 units. The regression equation is as follows: Students academic achievement in engineering courses =0.147+0.009X. This means that students who had higher mean scores in Kenya Certificate of Secondary Education performed better in engineering courses than students who had lower mean scores. The samples of students who learned without any form of interruption were selected for the specific courses in engineering in order to fully interrogate the influence of students' entry behaviour on their academic achievement. Data used was from Tables 1 and 2. The results were as shown in Tables 6 to 17. To achieve this data on

Their distribution was as shown in Table 6. From Table 6 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 seven 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 computed and the result was as shown in Table 7. Table 7 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. The other 87.5% were due to other factors that were not the subject of this study. To confirm whether students' entry behavior was a significant predictor, of academic achievement, ANOVA was computed. The result was as shown in Table 8. From Table 8, 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 9.

Table 8. ANOVA for the influence of Students Entry Behavior on Academic Achievement in Automotive Engineering Course

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

Dependent Variable: Students' Academic Achievement in Automotive in Engineering Courses
Predictor: (Constant), Entry behaviour

Table 9. Regression analysis for the Influence of Students' Entry Behavior on Academic Achievement of Automotive Engineering course

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: Students' Academic Achievement in Automotive Engineering Courses
Regression Equation:$Y = \beta_0 + \beta_1 X_1 +$ ----------ε

Table 10. Distribution of Students' Entry scores in Electrical Engineering

Kenya Certificate of Secondary Education Means 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

Table 11. Model Summary on the influence of Students Entry Behavior on Students' Academic Achievement in Electrical and Electronics Engineering course

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	.206	.042	.035	.04711	.042	5.836	1	132	.017

Predictor: (Constant), Students' Academic Achievement in Electrical and Electronics Engineering Courses

Table 12. ANOVA for the influence of Students Entry Behavior on Students Academic Achievement in Electrical and Electronics Engineering Courses

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

Dependent Variable: Students' Academic Achievement in Electrical and Electronics Engineering Courses
Predictor: (Constant), Entry behaviour

From Table 9, 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 as students academic achievement in Automotive engineering Diploma examinations $=0.149+0.010X_1$. 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.

Influence of Students' Entry Behavior on Students Academic Achievement in Electrical and Electronics Engineering courses: Students' entry scores were obtained from the admission files. Their distribution was as indicated in Table 10. From Table 10, 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 five, 2.23% (3) had 9 and only 1(0.76%) had an entry behavior 10. From Table 10 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 estimate the influence, coefficient of determination was computed and results were as shown in Table 11. The results shown in Table 11 indicates students' entry behavior had a significant influence on academic achievement ($r = .206$, $N = 134$ $P < .05$) thus 3.5 % of variations in students' academic performance was explained by students' entry behavior. This is signified by the coefficient .035. To confirm whether students' entry behavior was a significant predictor of performance ANOVA was computed and the results shown in Table 12. From Table 12, 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 13.From Table 13, it can be seen that an increase of one unit in students' entry behavior increases performance by .003 units.

Table 13. Regression analysis for the influence of Students' Entry Behavior on Students' Academic Achievement in Electrical and Electronics 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

Dependent Variable: Students' Academic Achievement in Electronics Engineering Courses
Regression Equation:$Y = \beta_0 + \beta_1 X_1 +$ ----------ε

Table 14. Distribution of Students' Entry Behavior in Mechanical Engineering

KCSE Mean 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

Table 15. Model Summary for the influence of Students' Entry Behavior on Academic Achievement in Mechanical Engineering course

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	.471	.221	.211	.02316	.221	21.338	1	75	.000

Predictor: (Constant), Entry behaviour

Table 16. ANOVA for the influence of Students Entry Behavior on Students Academic Achievement in Mechanical Engineering course

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

Dependent Variable: Students' Academic Achievement in Mechanical Engineering Courses
Predictor: (Constant), Entry behavior

Table 17. Regression analysis for the influence of Students' Entry Behavior on Academic Achievement of Students in Mechanical Engineering Course

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

Dependent Variable: Students' Academic Achievement in Mechanical Engineering Courses
Regression Equation:$Y = \beta_0 + \beta_1 X_1 +$ ----------ε

Regression equation: Students academic achievement in electrical and electronics engineering $=.152+0.009X_1$.

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 14. From Table 14, 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. From Table 15 it is indicated that students' entry behavior had a statistically significant influence on academic achievement of students in mechanical engineering ($r = .471$, $N = 77$, $P<.05$). That is, students' entry behavior enhanced academic achievement. The entry behavior accounted for 21.1% of the variation in achievement as indicated by the coefficient .211.

The other 78.9% were due to other factors that were not the subject of this study. 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 16. From Table 16, 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 17. From Table 17, it can be observed that an increase of one unit in students' entry behavior will increase students' academic achievement by .010 units. Regression equation: students academic achievement in electrical and electronics engineering courses $=.129+0.010X_1$.

DISCUSSION

One of the main issues that polytechnics contend with is retention of Engineering students who are initially attracted to engineering. Attrition is common place in engineering,

particularly in the first year of study. This means that the students pursue engineering education, depend on their perception across courses offered in the polytechnics. Engineering students have been observed, often to develop little identity as Engineers in their first year of study because they take majorly Mathematics and Science courses and have little exposure to engineering practice. Students have expressed dissatisfaction with the teaching and advising in initial years, citing unfriendliness, unaffordability and requiring of extra preparation. This is critical given their low admission grades. The findings of this study agree 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 Pearson's correlation coefficient of. 365 at p value of .05. 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 Kenya Certificate of Secondary Education examination 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 Education examination which is the entry requirement for engineering courses in National polytechnic. 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. 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. Cole and Espinoza (2008) agree 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 Science Technology and Mathematics majors. A sample size of 146 Latino college students in first year majoring in Science Technology and Mathematics was used. Notably high school performance had a significant and positive influence on students' performance in the university. The current study used both descriptive and correlational research designs with a sample of 241 students from automotive, electrical and mechanical engineering courses in the polytechnic. Students' final performance in the Kenya National Examination council examination was used as a reference for performance. Adewale and Adhuze (2013) and Loo and Choy (2013) findings indicated that student's entry behavior positively influences their academic achievement in engineering courses. Peter and Olasunmbo (2013) used an ex post facto research design to establish the relationship between entry qualification and students' performance in electrical engineering in Nigerian polytechnics. One hundred and twenty eight 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 correlational research 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. 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.

This finding that entry behavior moderately influences students' academic achievement agrees with Thomas, Hunderson and Goldfinch (2013) 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 research designs among 241 engineering students in their final year of study at the polytechnic. The Kenya National Examination Council 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. 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.

Conclusion

Students' entry behavior moderately influenced academic achievement in engineering courses. It accounted for 6.3% of the variation in students' academic achievement. Automotive Engineering 12.5%; Electrical and Electronics Engineering 3.5%; Mechanical Engineering 21.1%.

Recommendations

The management of National polytechnics and departments should review admission policy on entry behaviour for engineering courses. Weak students should be identified early enough during coursework, so that they are guided and counseled to understand the course contents by doing extra research, reading, consultations and discussion in order to improve and become knowledgeable in their areas of specialization. National Polytechnic Boards of Management should re-examine the objectives of engineering education with the view of making them relevant and achievable easily. The knowledge and skills offered should have pre-requisites that are friendly and affordable to the students. These pre-requisites courses will serve as bridging courses. The polytechnics should develop themes to communicate better image of engineering level. Thus the polytechnics should work with Technical and Vocational Educational Training Institutes Authority to craft the messages they want to convey to students, parents, counsellors and lecturers or trainers, in enhancement of engineering education. Successful models for enhancing technical knowledge and skills for students with humble backgrounds should be studied. Consequently, workshops should be held for sharing best practices in engineering education, such as how to mentor engineering students or how to incorporate non-technical skills, such as ethics into technical courses. Polytechnics should develop models of helping students to transit to the next stage of their education, the transition from youth polytechnics to national polytechnics and even degree level.

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.

Adewale P. O. and Adhuze, B. O. 2013. Entry Qualification and Academic Performance of Architecture Students in Nigerian polytechnics. Are the admission requirements still relevant? *Frontiers of architectural research Vol. 3 issue 1March 2014 pp. 69-75.*

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., and 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.

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., and 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., and Trigwell, K. 2007. Factors affecting students' experiences and satisfaction about teaching quality in engineering.

Cole, D., and 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.

Eagan, M.K., Sylvia, H. and Juan, C.G. 2013. Making a difference in Science Education: The Impact of undergraduate Research programmes. *American Educational Research Journal.* https://www.ncbi.nlm.nih.gov>artciles.

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

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

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

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., and 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.*

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

Juan, C.G., Hughes, B.E., Eagan, M.K. and Sylvia, H. 2013. What influences STEM post Baccalaureate pathways. https://slide player.com>slide.

Kamila, S., and 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., and 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.

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., and Choy, J.L.F. 2013. Sources of self-efficacy influencing academic performance of engineering students. *American journal of education research vol1. No3 86-92.*

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., and Albert, J. 2005. The role of the laboratory in undergraduate engineering education. *Journal of engineering education.*

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

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

Ministry of Education. 2006. *Technical Education Programs*. Syllabi regulation Kenya Institute of Education, Kenya.

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

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

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., and 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.*

Olurunfeni, A., and 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. 1998. Ministry of education and human resource development results of 1995 primary census. 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.

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

Romanas, V.K., and 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 2019 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. and 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.

Sylvia, H., Eagan, M.K. and Hughes, B.E. 2013. Reversing underrepresentation: The impact of undergraduate research programs on enrolment in STEM graduate programmes. Retrieved from https://www.heri. ucha.edu>downloads.

Thomas, G., Henderson, A. and 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 and ILO 2002. *Technical and Vocational Education and training 21st CenturyParis.*

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

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

UNESCO. 2007. Textbook and quality learning for all; some lessons learned from international experiences. UNESCO

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/.

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.*

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., and Wanjohi, W.C. 2011. Performance Determinants ofKenya Certificate of Secondary Education examination Mathematics in secondary schools in Nyamira Division, Kenya *Asian Social Science,* 7(20): 107-11.

****