



## EFFECT OF CAREER ADVANCEMENT ON RETENTION OF SCIENCE TEACHERS IN PUBLIC SECONDARY SCHOOLS IN KISUMU COUNTY, KENYA: A MIXED METHOD APPROACH

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### Abstract:

The aim of the study was to determine the effect of career advancement on retention of science teachers in public secondary schools in Kisumu County, Kenya. Embedded research design was adopted for the study. Target population included 905 respondents which comprised 221 principals and 684 science teachers from 221 public secondary schools in Kisumu County. Stratified, simple random and purposive sampling techniques were employed to sample 277 respondents who included 68 principals and 209 science teachers from 68 public secondary schools. Questionnaires and interview schedule were used to collect data. Validity of the data collection instruments was determined through expert judgment whereas reliability was ascertained through internal consistency method using Cronbach's Alpha coefficient formula. Statistical Package for Social Sciences version 22.0 facilitated analysis of quantitative data. Descriptive statistics, namely; frequencies, percentages, means and standard deviation were used to analyze quantitative data while thematic approach was used to analyze qualitative data. Regression analysis was used to analyze the relationship between career advancement and retention as well as to test the hypotheses. The study revealed that career advancement had a statistically significant effect on retention; training ( $\beta = .134$ ,  $p = .060 > .05$ ); career path ( $\beta = .062$ ,  $p = .382 > .05$ ) and promotion ( $\beta = .257$ ,  $p = .000 < .05$ ). Specifically, promotion had statistically significant effect on retention of science teachers. The study concludes that career advancement especially promotion has statistically

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significant effect on retention of science teachers in public secondary schools in Kisumu County.

**Keywords:** career advancement, retention, science teachers, public secondary school

## 1. Introduction

Retaining science teachers has numerous benefits. It leads to a stable school environment, higher academic achievement among students and also saves direct and indirect costs related to recruitment and replacement (Patte, Naomi, Jim & Braenna, 2016). It implies that retention is good for both school and students' achievements. Despite the significant role science is expected to play in relation to the foregoing, there are challenges connected with the achievement of the necessary knowledge. One of the challenges is that of retention of science teachers. Schools all over the world have been experiencing difficulties in relation to their retention (Kavanuke, 2013). Retention refers to the continued commitment of an employee to the institution or organization (Ouma, 2017). In the context of this study, indicators of retention were continuance commitment and turnover.

In Western countries, where adequate science teachers are trained, many newly trained science teachers either choose not to teach at all or quit teaching within a few years. In the United States, for example, a study conducted by Ingersoll (2014) revealed that only 60 per cent of teachers who are trained for teaching actually choose to go into teaching after graduation while more than 50 per cent quit teaching within the first five years. The study further reported that 45 per cent of teachers who quit teaching at the end of 2013 cited reasons related to dissatisfaction with working conditions such as large class sizes and long working hours, meagre salaries, inadequate classroom resources, students' indiscipline, rare development opportunities, lack of involvement in decision making and poor school leadership.

In a related study, Kavanuke (2013) investigated what keeps good teachers in the teaching profession in Tanzania and identified sufficient salaries, working environment, mentoring programmes and career growth opportunities as some of the motivating factors leading to teachers' retention in public secondary schools. The study revealed that 72% of the respondents expressed the view that insufficient salary was the major source of dissatisfaction. The researcher further reported that teaching profession may become a profession at risk if no quick measures are taken to address teacher retention in public secondary schools.

In Kenya, higher teacher turnover is not any different from the global and regional trends. There is a shortage of qualified science teachers in public secondary schools and at the same time, science teachers are quitting the profession to take up non-teaching jobs (Oketch & Ngware, 2012; Orodho, 2013). Apart from teaching, science teachers such as chemistry teachers can work in chemical engineering companies as quality controllers while mathematics and physics teachers can work in Information and Communication

companies thereby causing mass exodus of science teachers. The result is that science teachers who lack motivation continue to leave the classrooms leading to large workload among science teachers left and poor quality of teaching and learning of science (Ingersoll, 2014).

In a national survey conducted in 2015 by the Kenya National Union of Teachers (KNUT) on the trends of teachers' needs in public schools revealed that there was a high rate of turnover especially among science teachers. The main reasons cited by participants were poor salaries, workload and lack of career progression. The exit of qualified science teachers from the profession for any reason affects Kenya's economic development, particularly in the scientific, technological and professional sectors (Republic of Kenya, 2012).

Statistics at Kisumu County office TSC (2018) indicate that the rate of science teachers' turnover rose from 12% in 2012 to 21% in 2015. In 2017, the turnover rate was 27% thereby portraying a worrying trend. These figures are high and above the national average of 11%. Despite the government's effort to solve the problem of teachers' shortage through recruitment, science teachers' shortage still persists (Orodho, 2013). These statistics portray a negative picture in terms of science teachers' retention for a country which professes to provide free and compulsory basic quality education to its children

## 2. Objective

To determine the effect of career advancement on retention of science teachers in public secondary schools in Kisumu County, Kenya

### 2.1 Hypothesis

**H<sub>0</sub>:** There is no statistically significant relationship between career advancement and retention of science teachers in public secondary schools in Kisumu County, Kenya.

## 3. Literature Review

Career advancement is used to align employees' goals with the needs of an institution through an organized approach. Kow, Kwah and Lee (2012) define career advancement as an individual influence and behavioural process which lead to the aspect including occupations choice, role integration, career pattern and identity, work values and decision-making styles. Various studies have indicated that a limited career advancement opportunity is a major reason for the high turnover of teachers worldwide (Ingersoll, 2003; McCreight, 2000). Conversely, retention of motivated and highly capable teachers is linked to the provision of opportunities for career advancement such as professional development and promotion (Natale, Basset, Gaddis & McKnight, 2013).

A study conducted by Natale, Gaddis, Basset and McKnight (2016) employed a qualitative case study approach to investigate the effect of teacher career advancement

initiatives on retention in North Carolina, USA. The study examined components of successful career advancement initiatives which had a positive impact on teacher retention. The key findings of the study were that all districts that had career advancement initiatives reported an increase in applicants to teach in the district and increased teacher retention rates. In particular, the study found that provision of leadership, mentoring and training opportunities had a positive impact on retention of effective experienced teachers. While the reviewed study employed a qualitative case study approach, there were no results with quantitative aspects on the effect of career advancement initiatives on teacher retention. The fact is that much of the data consisted of self-reporting by individuals nominated by the district to participate in the focus group discussions cannot absolutely judge how representative the groups were of the school population as a whole to allow generalization of findings. Furthermore, the study was conducted in USA, a developed country and therefore the findings may not be applied in Kenya, a developing country. The current study used a mixed method approach with a representative sample to the population and determined the effect of career advancement on retention of science teachers in Kenya.

Allen and Sims (2017) conducted a study on improving science teachers' retention in England. The aim of the quantitative study was to evaluate the impact of National STEM Learning Network (NSLN) on science teachers' retention. Data were collected through questionnaires and interviews whereas descriptive statistics mainly percentages were used for data analysis. The findings of the study revealed that majority (83%) of secondary schools in England had at least one teacher who attended STEM learning course. Further, the study found that participation in NLSN courses was associated with improved retention of science teachers in the profession. In particular, the study revealed that teachers who participated in the course were more likely to stay in the same school than similar non-participants. Even though the reviewed study collected data using interview schedules, there were no findings regarding qualitative aspects on the impact of career advancement on retention of science teachers. Moreover, the study was conducted in a different context from Kenya and hence generalization of findings may not be plausible in Kenya. The present study analyzed both quantitative and qualitative data and established the effect of career advancement on retention of science teachers in Kenya.

In a related study, Jacob (2015) employed a quantitative approach to investigate the effects of cluster school-based teacher professional development on performance of social studies teachers in primary schools in Plateau State, Nigeria. The target population for the study included a total of 250 social studies teachers in the State. Out of this population, a sample of 25 teachers was selected through simple random sampling technique. The study revealed that teacher professional development had a positive impact on the performance of social studies teachers. A study sample of 25 teachers representing 10% of the population was representative enough for such a descriptive study. However, the reviewed study only investigated the effect of professional development on performance of teachers in primary schools. The study failed to

investigate the effect of professional development on retention of teachers. The current study adopted a mixed method approach and established the effect of career advancement on retention of science teachers in secondary schools in Kisumu County, Kenya.

In Tanzania, Kavanuke (2013) deployed a documentary analysis approach to explore what kept good teachers in the teaching profession. The purpose of the study was to explore the inherent nature and characteristics of teachers who left teaching and identify strategies of retaining teachers in the profession. The study findings revealed that mathematics and science teachers were more likely to leave the profession than teachers in other fields. Further, the study revealed that comprehensive induction, mentoring, in-service training and continuous professional development affected retention of teachers. Even though the reviewed study indicated that induction, mentoring and training affected retention of teachers in Tanzania, the study failed to indicate the magnitude of the effect of these aspects of career advancement on retention of teachers. Further, the study was conducted through documentary analysis and therefore the findings may not be generalized to the science teachers in Kenya. The current study used inferential statistics to indicate the magnitude of the effect of career advancement on retention of science teachers and produce a Kenyan perspective.

In a related study, Nyambura and Kamara (2017) employed a descriptive research design to determine the influence of career development practices on employee retention in public universities in Kenya. The study found that training and development of employees in the university had a significant positive effect on retention while mentoring had an insignificant effect on retention. The study recommended that organizational leaders needed to organize more mentoring, training and development activities for the employees. While the reviewed study reported a significant relationship between career advancement and retention of employees, it was conducted in a university located in an urban setup and therefore the findings may not apply to science teachers in secondary schools in rural areas. The study only used questionnaires as the main instrument for data collection and this limited generalization of the findings. Second, the study did not have the qualitative aspects regarding the effect of career advancement on employee retention. The current study used both questionnaires and interview schedules to collect both quantitative and qualitative data in an effort to establish the effect of career advancement on retention of science teachers in public secondary schools in Kisumu County, Kenya.

In another study, Mapelu and Juma (2013) investigated the effect of training and development on turnover among employees in hotels in Kisumu County. Findings of the study indicated that there was a negative relationship between employees' development and turnover. The study concluded that employees training and development significantly affected turnover. It was recommended that hotel managers needed to organize training and development activities for their employees. Even though the reviewed study found a negative relationship between training and turnover of employees, the study was conducted among employees in the hotel sector and therefore,

the findings may not be generalized to the science teachers in Kisumu County. Further, the study mainly focused on training and development as a component of career advancement leaving out other aspects such as promotion and leadership opportunities. The present study included other components of career advancement and established their effect on retention of science teachers to fill the gap.

#### **4. Research Design and Methodology**

Embedded research design was adopted for this study. The study targeted a total of 905 respondents comprising 221 principals and 684 science teachers in Kisumu County. Stratified sampling technique was used to categorize the 221 public secondary schools into 3 strata, namely; boys, girls and mixed schools. Simple random and purposive sampling techniques were used to select 277 respondents for the study. This sample size represented 30.6% of the target population of the study. According to Mugenda and Mugenda (2018), a sample size of between 10% and 30% when the study population is less than 10,000 is a good representation of the target population and is adequate for analysis. Questionnaires and interview schedules were used collect quantitative and qualitative data respectively. The instruments were pretested through a pilot study in seven schools that were excluded from the actual study. The items in the questionnaire were based on a 5 point likert scale with scores ranging from Strongly Disagree with a score of 1; Disagree, with a score of 2; Neutral with a score of 3; Agree with a score of 4 and Strongly Agree with a score of 5. A likert scale was used in the questionnaire to enable the researcher to code and convert the data into numerical values for the Statistical Package for Social Sciences (Creswell, 2014). Content validity of the instrument was ensured through expert judgment whereas Cronbach's alpha coefficient was used to measure the internal consistency. The Cronbach's Alpha coefficient obtained was 0.809 which was considered high enough for reliability. According to Gay, Mills and Alrasian (2009), for research purposes, a useful rule of thumb is that reliability coefficient should be at least 0.70 and preferably higher.

During data collection, the instruments were administered to the respondents with the help of research assistants. The questionnaires were picked after two days to allow respondents adequate time to give well-informed opinions regarding the variables under study. On the day of picking the questionnaires, the researcher had an interview session with the principals to obtain qualitative data using the interview schedule.

Quantitative data were entered, cleaned and analyzed using the Statistical Package for Social Sciences (SPSS) version 22.0 software. The descriptive statistics mainly frequencies, percentages, means and standard deviations were used to analyze the likert scale data. The responses to the five point likert scale were summarized into three responses including agree, undecided and disagree whereas the standard multiple Regression analysis was used to test the hypothesis to find out the effect of career advancement on retention. According to Keller (2014), the multiple regression formula is  $y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + e$ . where y represents the expected value of the dependent variable,

$\alpha$  represents the expected value of the dependent variable if  $x_1, x_2$  and  $x_3$  are all zero. Where  $x_1, x_2$  and  $x_3$  are first, second and third predictor variables respectively.  $\beta_1$  refers to the change in  $y$  for each unit change in  $x_1$  while holding  $x_2$  and  $x_3$  constant.  $\beta_2$  refers to the change in  $y$  for each unit change in  $x_2$  while holding  $x_1$  and  $x_3$  constant and  $\beta_3$  refers to change in  $y$  for each unit change in  $x_3$  while holding  $x_1$  and  $x_2$  constant. The “ $e$ ” refers to the error term, which stands for other variables that affect retention of science teachers but not considered in the present study. Qualitative data were summarized into themes. Techniques including interpretive and coding were used to summarize the datasets.

## 5. Results and discussions

The study sought to determine the effect of career advancement on retention of science teachers in Kisumu County. Subsequently, science teachers were requested to respond to items related to career advancement in the questionnaire on a 5 point scale. The responses were in five Likert Scale ranging from Strongly Disagree (SD) [1] to Strongly Agree (SA) [5]. The analysis was done using weighted average of the responses and their standard deviations. Weighted average of 3.50-5.00 indicates agreement to a statement while a range of 1.00-1.49 indicates disagreement to a statement. Specifically, weighted average of 1.00-1.49 represents strongly disagree; 1.50-2.49 represents disagree; 2.50-3.49 represents neutral; 3.50-4.49 represents agree and 4.50-5.00 represents strongly agree (Joshi, Kale, Chandel, & Pal 2015). The findings are displayed in Table 1.

Table 1 presents responses to twelve aspects of career advancement as evaluated by science teachers. Accordingly, about half (45.2%) of the science teachers agreed that they had stayed in the same job group more than expected while 43.7 per cent disagreed. The mean rating for this item was 3.09 with a standard deviation of 1.50 which indicates low agreement with the statement. This implies that majority of the science teachers are not satisfied with staying in the same job group more than expected and therefore might quit the profession in case of an opportunity that promises career advancement arises. The findings also reveal that majority (62.8%) of the respondents agreed that they were discouraged with the opportunities for growth in TSC whereas a sizeable number (28.7%) disagreed. The item had a mean rating and a standard deviation of 3.55 and 1.45 respectively. This implies that most science teachers in public secondary schools in Kisumu County are not satisfied with the growth opportunities in TSC and might quit the profession to pursue other jobs that promise growth opportunities.

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**Table 1:** Science teachers' responses on career advancement

	SD		D		U		A		SA		Mean	Std. Dev.
	N	%	N	%	N	%	N	%	N	%		
Training and dev't plan	49	24.6	85	42.7	12	6	45	22.6	8	4	2.39	1.20
Career progression policies	83	41.7	65	32.7	21	10.6	25	12.6	5	2.5	2.02	1.12
Mentoring program	60	30.2	98	49.2	14	7	22	11.1	5	2.5	2.07	1.02
Equity in promotion	53	26.6	58	29.1	31	15.6	43	21.6	14	7	2.53	1.28
Same job group	38	19.1	49	24.6	22	11.1	38	19.1	52	26.1	3.09	1.50
Be a principal retirement	31	15.6	24	12.1	41	20.6	58	29.1	45	22.6	3.31	1.36
High chance for promotion	30	15.1	34	17.1	29	14.6	75	37.7	31	15.6	3.22	1.32
In-service programs	49	24.6	31	15.6	18	9	73	36.7	28	14.1	3.00	1.44
Highest job group	44	22.1	40	20.1	55	27.6	32	16.1	28	14.1	2.80	1.33
Career prog' initiatives	74	37.2	76	38.2	23	11.6	16	8	10	5	2.06	1.12
Opportunities for growth	28	14.1	29	14.6	17	8.5	55	27.6	70	35.2	3.55	1.45

The findings further reveal that more than half (50.8%) of the respondents agreed that TSC sponsors them to attend in-service programmes whereas a significant number (40.2%) disagreed. The item had a mean rating of 3.00 and a standard deviation of 1.44 which denotes majority of the science teachers are in agreement with the statement. However, a significant number (40.2%) of the respondents were not comfortable with TSC sponsorship to attend in-service programs meaning that sponsorship for in-service programmes is still an issue to a sizeable number of science teachers in the county leading to low retention. The results also indicate that majority (51.7%) of the science teachers agreed that they planned to be principals before retirement while only 27.7% disagreed with the statement. The statement had a mean rating of 3.31 and a standard deviation of 1.36 which denotes respondents' high agreement with the statement. This means that the vision of rising to the position of a principal is a way through which retention of science teachers can be enhanced.

On the issue of surety of reaching the highest job group before retirement, majority (42.2%) of the respondents responded in the negative with slightly more than one-third (30.2%) affirming the statement. The item generated a mean score of 3.22 and a standard deviation of 1.33. The findings imply that most science teachers in the county are not sure whether they will be promoted to the highest job groups in the profession which leads to de-motivation with the profession thus low retention.



The results also show that more than half (53.3%) of the respondents agreed that they had a high chance of being promoted to the next job group while a significant number (32.2%) disagreed. The item generated a mean rating and standard deviation of 3.22 and 1.32 respectively. This implies that majority of science teachers in Kisumu County are satisfied with their chances of being promoted to the next job group. However, a significant number (32.2%) are not comfortable with their chances of being promoted to the next job group meaning that chances of being promoted to the next job group is still a major concern to a significant number of science teachers in the county leading to low retention.

The findings also indicate that majority (55.7%) of the science teachers disagreed that they had an equal chance of being promoted as compared to non- science teachers while a sizeable number (28.6%) agreed with the statement. The item generated a mean rating of 2.53 with a standard deviation of 1.28 which connotes respondents' low agreement with the item. This implies that equal chance of promotion is still a major issue to most science teachers in public secondary schools in Kisumu County leading to their low retention. Further, the findings reveal that more than two-thirds (67.3%) of the respondents disagreed that their schools had a training and development plan for science teachers while a sizeable number (26.6%) agreed with the statement. The mean rating of this statement was 2.39 and a standard deviation of 1.20. This implies that most science teachers in Kisumu County are dissatisfied that their schools do not have training and development plans in place leading to low motivation and retention.

The findings illustrate that about three quarters (74.4%) of the science teachers disagreed that TSC career progression policies encouraged them to stay in the profession whereas only (15.1%) agreed with the statement. The item generated a mean rating of 2.02 and a standard deviation of 1.12 indicating that the respondents highly disagreed with the statement. This implies that most science teachers in public secondary schools in Kisumu County are not happy with the TSC career progression policy hence low motivation and retention. Similarly, more than three quarters (75.4%) of the respondents disagreed that the career progression initiatives TSC motivate while only (13.0%) agreed with the statement. The item generated a mean score of 2.06 and a standard deviation of 1.12 which denotes that most respondents disagreed with the statement. The findings imply that most science teachers are dissatisfied with the career progression initiatives by TSC leading to low motivation and retention.

Lastly, the findings reveal that more than three quarters (79.4%) of the respondents disagreed that their schools had initiated a strong mentoring programme for science teachers while only (13.6%) agreed. The mean rating for this statement was 2.07 and a standard deviation of 1.02 meaning that most science teachers disagreed with the statement. This implies that most science teachers are not happy that their schools have not initiated strong mentoring programs leading to low motivation and retention.

Qualitative findings generated through interviews with the principals confirmed the results contained in Table 1. Most of the principals reported that science teachers were not happy with their career progression because of staying in the same job group more

than expected and this affected their retention. Reasons given by majority of the principals for dissatisfaction with career advancement among science teachers included limited promotion opportunities and discouraging career progression initiatives leading to low retention. This is in agreement with the findings of Natale, Basset, Gaddis and McKnight (2013) who revealed that retention of motivated and highly capable teachers is linked to the provision of opportunities for career advancement such as professional development and promotion. One of the principals had this to say:

*“The teachers are not happy with their progression. Most of them complain about stagnation in the same job group for several years. Now the science teachers that we have, all of them are in job group L, the rest are still young and they have not reached the three years to proceed to the next job group. The ones in job group L qualify to be promoted to job group M, however, not even one managed to succeed when they attended the interview for promotion last year.”*

This revelation was a confirmation of the frustration such as limited promotion opportunities science teachers face in the teaching profession hence low retention. The findings are in tandem with results of Ekabu, Nyagah and Kalai (2018) who revealed that promotion of teachers was a serious issue as many teachers including principals themselves stagnated in the same job group for long with some having to retire without being promoted for a single grade apart from the general grade “K” and “L”. Some of the principals confirmed that the training and development initiatives by TSC do not enhance retention of science teachers. One principal had this to say:

*“Usually, it does not, it only improves on their delivery, helps them to feel like they belong to the school. So, the initiatives are not effective in matters retaining them but matters in delivery in class, it is good.”*

The finding implies that training and development initiatives in schools do not promote retention of science teachers; however, they enhance delivery of content by teachers. The findings are in agreement with Jacob (2015) who found that teacher professional development had a positive impact on their performance. However, the findings are in disagreement with Nyambura and Kamara (2017) who found that training and development of employees in the university had a significant positive effect on retention. Further, the findings contradict Allen and Sims (2017) findings which revealed that participation in National STEM Learning Network was associated with improved retention of science teachers in the profession.

Further discussions with the principals confirmed that schools had put in place certain initiatives to ensure career advancement among science teachers. These initiatives include issuing letters of recommendations, certificates of good performance and organizing workshops. One principal observed:

*“Correct, that is right science teachers are also given other duties and when you are given a duty, you are given a letter and even a certificate of good performance if your area has performed well. Also, in the school we help the science teachers to go for any workshop and even right now my three science teachers are going to go for a workshop on Thursday this week.”*

It is evident from the principals’ responses that various career advancement initiatives are put in place to ensure science teachers’ progress in the profession. These findings concur with Kavanuke (2013) who reported that in-service training and continuous professional development affected retention of teachers. The next stage of data analysis encompassed generation of inferential statistics to determine the effect of career advancement on retention of science teachers.

### 5.1 Test of hypothesis

The null hypothesis was that there is no statistically significant relationship between career advancement and retention of science teachers in public secondary schools in Kisumu County, Kenya. Multiple regression analysis was used to test the null hypothesis. Predictor variables (Independent variables) were uploaded in the model at the same time to determine the coefficient of determination (R-Square). Tables 2 to 4 present data from regression analysis on career advancement and retention of science teachers in public secondary schools in Kisumu County.

**Table 2:** Model summary of regression statistics  
 on career advancement and retention of Science teachers

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.300 <sup>a</sup>	.090	.076	.62766

a. Predictors: (Constant), Promotion, Training, Career Path

Table 2 presents Model Summary of Regression Statistics on career advancement, namely; Promotion (P), Training (T) and Career Path (CP) as predictor variables and retention of science teachers. The findings in Table 2 indicate a correlation coefficient of ( $r = .300$  for the regression analysis. This represents a weak relationship between career advancement and retention of science teachers in public secondary schools in Kisumu County. Further, Table 2 presents the coefficient of determination which is given by R-square of .090 that showed how much the variation in retention of science teachers in Kisumu County was explained by career advancement.

R- Square of .090 implies that 9.0% of variation in retention of science teachers in Kisumu County is explained by career advancement (Promotion, Training and Career Path). These findings imply that 91.0% of variation in retention of science teachers in Kisumu County can be attributed to other factors. However, the coefficient of determination gives the overall measure of the strength of association between career advancement (Promotion, Training and Career Path) and retention (R) of science teachers

which does not indicate the extent to which each independent variable, namely; (Promotion, Training and Career Path) contributes to the dependent variable (Retention). It is vital to determine the regression weight (Beta) of each of the independents predictors. The results are contained in Table 3.

**Table 3:** Regression coefficient table

<b>Coefficients<sup>a</sup></b>						
<b>Model</b>		<b>Unstandardized</b>		<b>Standardized</b>	<b>t</b>	<b>Sig.</b>
		<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
<b>1</b>	(Constant)	2.532	.197		12.835	.000
	Training (T)	.078	.041	.134	1.893	.060
	Career Path (CP)	.028	.032	.062	.877	.382
	Promotion (P)	.123	.034	.257	3.672	.000

a. Dependent Variable: Retention

Table 3 presents the regression coefficients of career advancement (Training, Career Path and Promotion) and retention (R). From the findings contained in Table 3, it is clear that the “Constant” is 2.532. This means that the predicted value of retention if career advancement is zero is 2.532. The beta estimates in Table 3 show the amount of increase in retention of science teachers that can be predicted from a unit increase in Training, Career Path and Promotion. Thus, for, Training, the Beta is .134 implying that for each unit increase in Training, a .134 unit increase in retention of science teachers (R) is predicted. In addition, for every unit increase in Career Path, a .062 unit increase in retention is predicted (Beta= .062). Finally, Table 3 indicates that for every unit increase in Promotion, a .257 increase in R is predicted (Beta = .257).

The findings in Table 3 further indicate whether each predictor variable is making a statistically significant contribution to the model at a significance level of  $p < .05$ . It is evident from Table 4.17 that the p- value for promotion (P) only is less than the significance level of .05 whereas the p-values for Career Path and Training are higher than the significance level. These findings imply that it is only promotion that made a significant contribution to the model whereas career path made the least contribution. Thus, T (B =.134,  $p = .060 > .05$ ); CR (B = .062,  $p = .382 > .05$ ) and P (B = .257,  $p = .000 < .05$ ). To refine the regression model, the Beta values were replaced with the coefficients from the regression analysis as follows:

$$R = 2.532 + 0.134(T) + 0.062(CP) + 0.257(P) + e.$$

Where

R = retention,

T = training,

CP = career path,

P = promotion, and

e = error term.

In an attempt to test the null hypothesis which states that there is no statistically significant relationship between career advancement and retention of science teachers in public secondary schools in Kisumu County, Kenya, F test that requires an analysis of the variance identified in the ANOVA Table 4 was used.

**Table 4:** ANOVA table

ANOVA <sup>a</sup>					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	7.589	3	2.530	6.421	.000 <sup>b</sup>
Residual	76.821	195	.394		
Total	84.410	198			

a. Dependent Variable: RETENTION  
 b. Predictors: (Constant), Promotion, Training, Career Path

The findings presented in Table 4 depict that the value of the calculated  $F$  is 6.421 with 3 and 195 degrees of freedom and  $F$  being significant at less than 0.05 level. These findings indicate that the regression analysis appears to be appropriate since the significant value of  $p = 0.000$  was statistically significant ( $p < 0.05$ ). Therefore, the significant regression equation from the output could be stated as;  $F(3, 195) = 6.421, p < 0.05$ . Since the significant value of  $p = 0.000$  is less than  $p$ -value (0.05), the null hypothesis is rejected. This implies that the alternative hypothesis which states that there is a statistically significant relationship between career advancement and retention of science teachers in public secondary schools in Kisumu County, Kenya is accepted. This is in line with Natale, Gaddis, Basset and Mcknight (2016) who found that career advancement initiatives had a positive impact on retention of effective experienced teachers.

The findings concur with the findings of other reviewed studies such as Kavanuke (2013); Natale, Gaddis, Basset and Mcknight (2016) ; Nyambura and Kamara (2017). For example, a study by Nyambura and Kamara (2017) revealed that training and development of employees in the university had a significant positive effect on retention. Similarly, Natale, Gaddis, Basset and Mcknight (2016) revealed that provision of mentoring and training opportunities had a positive impact on retention of effective experienced teachers.

In addition, Natale, Gaddis, Basset and Mcknight (2013) reported that retention of highly capable teachers is linked to the provision of opportunities for career advancement such as professional development and promotion. The findings further support the findings of Allen and Sims (2017) that majority (83%) of secondary schools in England had at least one teacher who attended STEM learning course.

## 6. Summary

The findings revealed that opportunities for growth in TSC discouraged science teachers from remaining in the teaching profession. Regarding the effect of career advancement on retention of science teachers, the study indicated that promotion had statistically significant effect on retention of science teachers whereas training and career path did not have significant effect on retention of science teachers in public secondary schools in Kisumu County. Subsequently, the null hypothesis was rejected and the alternative hypothesis which states that there is a statistically significant relationship between career advancement and retention of science teachers in public secondary schools in Kisumu County, Kenya, was accepted.

### 6.1 Conclusion

The findings were that opportunities for growth such as promotion in TSC discouraged science teachers from remaining in the teaching profession. It is important to conclude that career advancement especially promotion has statistically significant effect on retention of science teachers in public secondary schools in Kisumu County.

### 6.2 Recommendation

TSC should develop different career advancement criteria for science teachers. In the new criteria, science teachers should be promptly promoted to the next job group or grade when the promotion is due without any delay.

### Conflict of Interest Statement

The authors declare no conflicts of interests.

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