Postgraduate Education as Human Capital Investment: An Empirical Estimation of the Private Rate of Return to a Master's Degree among Secondary School Teachers in Kenya

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DOI: https://doi.org/10.47772/IJRISS.2026.101100059

Received: 08 November 2026; Accepted: 13 November 2026; Published: 23 November 2026

ABSTRACT

The theory of human capital postulates an increase in earnings at different levels of educational qualifications. There have been mixed findings and interpretations on return to investment in education around the world due to differences in methodology used and data analyzed. Employing the Mincerian regression equation this paper sought to establish the private rate of return to investment in higher education for teachers who are holders of Master's degree. The study employed a comparative research design where primary data was collected by the use of a questionnaire. Stratified sampling technique was used to draw the sample. Multivariate regression and correlation analysis was utilized to analyze the data. Hypothesis was tested at 5% significance level. It is established from the findings that teachers who hold master's degree earn on average Ksh 91,725.95 with the least earning of Kshs 49,765 and highest earner of Kshs 168,000. Rate of return for master's degree was 6.23%. From the Mincerian regression equation, years of schooling, experience and experience squared were significant factors that affected the private rate of return to investment in education. Since it is profitable for individuals to invest in higher education, this study suggests that individuals intending to invest in higher education do so at a younger age so as to maximize their future earnings.

Keywords: Private Rate of Returns, Mincer Regression, Master's Degree, Secondary School Teachers, Higher Education, Investment, Earnings, Experience,

INTRODUCTION

There is a general understanding between various economists and researchers in the field of economics of education that formal education is a viable investment that produces a high rate of returns. Educational benefits can be either to an individual or to society (Psacharopolous &Woodhall, 1985). Education according to Cohn and Geske (1990) is best categorized as both investment and consumption, because it satisfies the student and increases productivity and earnings. According to Cohn and Geske (1990), educational benefits are futuristic in that the said benefits will be realized after the successful completion of formal education and training. Additionally, many researchers and economists have established a positive and statistically significant relationship between the wages of individual workers and the level of formal education. Workers with a higher level of education are expected to earn more salaries than those with less education (Olakulehin & Panda, 2011).

According to Mincer (1958, 1966); Schultz (1962), the theory of human capital assumes an increase in wage earnings with the rise in years of schooling. The theory of human capital assumes that most educated workers earn more wages as compared to their colleagues with less or no formal education. Several

empirical research studies on the rate of return to investments in education have established that there exists a positive relationship between education and earnings. It is postulated that earnings rise as the level of educational attainment improves. The concept of human capital identifies education as an investment of time and resources. Education enhances the productivity of workers by imparting necessary skills and training in form of formal Schooling. Increased productivity enhances earnings for individual employees (Mulongo, 2012).

Krueger (1972) conducted a research study on the private rate of return to investment in University education in Turkey in 1963 using the 1965Turkish census the study revealed a 20-25 percent return for secondary school and University education. Borland (2002) carried out a study on private rates of returns to University education in Australia. The study findings established that returns to a bachelor's degree were 14.5 percent. Lifetime monetary returns were estimated to be $380,958 (Borland, 2002). The study concluded that the return rates showed a wide disparity across the field of qualification. That notwithstanding, relatively high returns were estimated for engineering graduates and business and administration courses. Rates of return were observed for society, culture, and science fields (Borland, 2002). The current study evaluated the private rate of return to investment in higher education among public Secondary school teachers in UasinGishu County using primary data.

Research studies by Rugar, Ayodo, and Agak (2010) on the financial profitability of higher education among academic staff members in two public Universities established that as the level of education rises the earnings of the staff members also increase. The study concluded that the University Level of education provided a more private rate of return as compared to other levels of education at 47.8 percent. The study further revealed that the Doctorate program was the most profitable followed by the master's degree. The finding of this study has motivated many students to pursue a higher level of education in anticipation of enhanced earnings.

In Mumias Sub-County, Kakamega County, Kenya, Chenane (2018) did empirical research on the private rate of returns to investments in the education of public primary school teachers. According to the study's findings, a master's degree is the most expensive educational option, while a P1 certificate is the least expensive. P1 certificates were found to cost between Kshs. 2,000 and Kshs. 181,325 while diploma certificates cost between Kshs. 180,000 and Kshs. 329,300. A bachelor's degree costs between Kshs. 400, 000 and Kshs. 645,000, while a master's degree costs between Kshs. 800, 000.

The Kenyan government has continued to expand access to tertiary and University education due to the perceived payback ensuing from advanced education (Engebe, 2015). According to Knight and Sabot, (1987) earnings inequality in Kenya has been very high which has necessitated many teachers in public secondary schools to enroll for higher education in anticipation of higher returns in the long run.

Statistics from the Department of education in Uasin Gishu County Kenya revealed that the number of students who have enrolled for advanced education has grown significantly over the last few years. Available statistics indicate that majority of public secondary school teachers in Uasin Gishu County have enrolled for advanced education in anticipation of higher returns. This is because earnings vary significantly based on the level of educational qualifications. This paper therefore sought to determine empirically the private rate of return to investments in tertiary education among public secondary school teachers in Uasin Gishu County Kenya who are holders of Master's degree.

In calculating private rate of return to investments in education many scholars and researchers have used different methods and data in arriving at different conclusions. While employing the USA census data for 1960 Mincer established that the rate of return to investment in education was 10 percent and experience was 8 percent.

Many scholars and researchers have acknowledged the Mincerian earning function in estimating returns to schooling due to its simplicity (Psacharopuolus, 1994).This study used primary data derived from questionnaire of teachers in public secondary schools in Uasin Gishu County. Unlike the study by Mincer

that evaluated general education this study evaluated the private rate of return to education by levels among teachers in Uasin Gishu County.

Utilizing the Mincerian earning function where years of schooling is used as a proxy to analyze returns to schooling this paper sought to establish the private rate of return to investment in higher education for teachers who are holders of master's degree in public secondary schools in Uasin Gishu County Kenya.

Research Design and Methodology

The study employed a comparative research design. Primary data was collected by use of a questionnaire and was further piloted to establish reliability. This paper utilized stratified and simple random sampling technique to draw the sample. The sample size for each stratum was calculated using the stratified sample formula by Mark (2010) where a generic sample of 175 teachers drawn from six constituencies in Uasin Gishu County with a 5% Margin of error was generated. The unit of analysis was the secondary school teacher.

The reliability of the research instrument was determined using Cronbach alpha. The results presented showed an average of 0.0945 and the total reliability coefficient was 0.7285 which is above the threshold of 0.70 according to Cronbach (1951), suggesting that the items have relatively high internal consistency.

Pearson correlation (ρ) was utilized to test the association between level of education and earnings. Inferential statistics such as regression analysis were used to determine the effect of education on earnings. Multivariate regression analysis was used to analyze data for the study.R^2, the coefficient of determination provided a measure of the predictive ability of the model. Data were analyzed using SPSS software. The following variables were controlled age, union membership, gender, and cost.

Data Screening was done to establish whether there was extremely high or low correlation or uncorrelated items. Additionally, data was screened for regression assumptions. Data analysis was guided by the objective of the study which was to test the null hypothesis that $\mathbf{H_0 1}$ There are no statistically significant private returns to investments in education for a Master's degree for teachers in public secondary schools in Uasin Gishu County at 95% confidence level using Jacob Mincer's regression model.

$$\text{Ln } Y = \alpha + \beta 1X + \beta 2\text{Exp} + \beta 3\text{Exp}^2 + \varepsilon$$ ……..Equation 1

Ln Y is the natural logarithm of earnings

α= the constant

$\beta 1, \beta 2, \beta 3$, are model estimates or coefficients

X is the yeas of schooling

Expis the teaching experience

$\text{Exp}^2$the teaching experience squared

$\varepsilon$is the error term assumed to have zero mean and independent.

FINDINGS AND DISCUSSION

This paper sought to establish the private rate of return to investment in education for holders of Master's Degree for public secondary school teachers in Uasin Gishu County Kenya. The outcome variable was the private rate of returns to investments in education (earnings). This section presents univariate and bivariate statistics for teachers with master's degree; correlation analysis for teacher with master's degree, multivariate modelling for teachers with master's degree, model diagnostic's tests for the assumptions of a

multivariate linear regression for master's degree teacher, the hypothesis test, and discussion for private rate of return for master's degree.

Table 1: Descriptive statistics

Variable	Category	Frequency	Percentages
Gender	Male	89	50.86
	Female	86	49.14
Age	20-29	11	6.29
	30-39	61	34.86
	40-49	73	41.71
	50-59	30	17.14
Promotion	No	50	28.57
	Yes	125	71.43

Results showed that 175 teachers interviewed had master's degree; Gender disparity between male and female teachers with master's degree was minimal. From the findings male teachers were 50.86 percent and females at 49.14 percent. From the results, majority of teachers with this certificate aged between 40-49 years (41.71%). Majority of the teachers 71.43%, with masters and above degree were promoted while only 28.57% had not been promoted.

Table 2: Descriptive statistics for Continuous Variables

Variable	Obs.	Mean	Std. dev.	Min	Maximum
Years of schooling	175	18.22	1.06	17	21
Costs	175	198828.60	145937	30000	800000
Starting salary	175	30614.90	9433.77	40000	56000
Earnings	175	91725.95	27271.36	49765	168000

Source: Research Data (2022)

Table 2 present results for continuous variables. A teacher with master's degree took a mean of 18.22 years to attain it. The cost for these certificates was averaged at Kshs 198,828.6 with highest cost of Kshs 800,000. Their average starting salary was Kshs 30,614.9 and ranged from Kshs 40,000 and Kshs 46,000. The average pay for master's degree was 91,725.95 with the least earning of Kshs 49,765 and highest earner of Kshs 168,000

Correlation Analysis

Table 3: Correlation Analysis for Teacher with master's degree

	Age	Gender	Years in Schooling	Experience	Promotion	Cost	Starting salary	Gross pay
Age	1.000							
Gender	-.013	1.000						
Years in Schooling	.450*	.035	1.000					
Experience	.790*	.077	.277	1.000				
Promotion	.129	.204	.346*	.338*	1.00			
Cost	-.217*	-.020	.147	-.114	.225	1.000		

Starting salary	-.604*	-.148	-.130	-.660	-.073	.361	1.000	
Gross pay	.700*	.015	.284	.845	.458	-.285	-.482	1.000

Note: * indicate significance at 5 percent level

Table 3 presents correlation analysis for a teacher with master's degree. There was high correlation between age and experience($\rho = .790$), age and gross pay($\rho = .700$), experience and gross pay($\rho = 845$). Age and years in schooling($\rho = .450$), promotion and gross pay($\rho = .458$), were moderately correlated. However, there was a weak correlation between age and gender ($\rho = -.013.$), gender and years in schooling($\rho = .035$), gender and experience($\rho = .077$), promotion and starting salary($\rho = -.073$). Costs negatively correlate with return to investment$\rho = -.285$.

Multivariate Modeling for Teachers with Master's Degree

The study used the Jacob Mincer's regression model to calculate the private rate of return to investment in education for teachers holding master's degree or doctorate in public secondary schools in Uasin Gishu County, Kenya given by:

$$\text{Ln } Y = \alpha + \beta 1X + \beta 2\text{Exp} + \beta 3\text{Exp}^2 + \varepsilon \quad \text{..... Equation 1}$$

Where; Ln Y is the natural logarithm of earnings, α= the constant, $\beta 1, \beta 2, \beta 3,$ are model estimates or coefficients, X is the years of schooling, Exp is the teaching experience, Exp^2 the teaching experience squared, and ε is the error term assumed to have zero mean and independent

Table 4. Regression Analysis for Teachers with Master's Degree

	Model 1	**Model 2**
	B (Std. Error)	**B (Std. Error)**
Control Variables		
(Constant)	4.48 (.08)**	4.75(.15)**
Gender	-0.02(.01)*	-0.03(.01)
Age	0.01(.00)	-0.01(.00)**
Costs	0.00(.00)	0.00(.00)***
Predictors		
Years of schooling		0.01(.04)**
Experience		0.04(.01)*
Experience squared		0.001(.00)**
Mode Summary Statistics		
R	0.667	0.793
R Square	0.445	0.628
Adjusted R Square	0.43	0.61
Std. Error of the Estimate	0.08	0.07
Change Statistics		
R Square Change	0.45	0.18
F Change	34.51	20.71
df1	3	3
df2	129	126
Sig. F Change	0.00	0.00
a Dependent Variable: Earnings		

Results in table 4, showed that 44.5% % variation of private rate of return to schooling for holders of a Masters degree can be predicted using years of schooling and experience while being controlled by gender, age and cost. The F-statistic = 95.502 with a significance (Prob>F = .000) for the model indicates that the

Jacob Mincer equation was fit to estimate parameters. Further the R square of the model indicates that the variables (experience, years of schooling and experience squared) explained 45% of the variations in private rate of return to schooling for holders of a Masters degree. The estimated rate of return to education is obtained as the coefficient to education variable in the regression equation that controls for work experience and other individual characteristics. Hence, from the equation, experience affects the private rate of return to education by$\beta = 0.075, \mathrm{p} - \text{value of } 0.000 < 0.01$, At 5% level of significance and 95% level of confidence, teaching experience and experience squared showed a <0.01 level of significance. From the above results, the following Jacob Mincer's regression model was generated in estimating private rate of return to schooling for teachers having Masters Degree: given by the following equation.

$$\mathrm{Ln\,Y} = \alpha + \beta 1\mathrm{X} + \beta 2\mathrm{Exp} + \beta 3\mathrm{Exp}^2 + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots \text{ Equation 1}$$

Where; Ln Y is the natural logarithm of earnings, α, X is the years of schooling, Exp is the teaching experience, Exp^2 the teaching experience squared, and εis the error term assumed to have zero mean and independent.

$$\mathrm{Ln\,Y} = 4.75 + .01\mathrm{X} + .04\mathrm{Exp} + .001\mathrm{Exp}^2 + \varepsilon$$

When the above equation is substituted and based on the model above private rate of return to Investment in education for teachers in public secondary school who are holders of master's degree was 6.23%

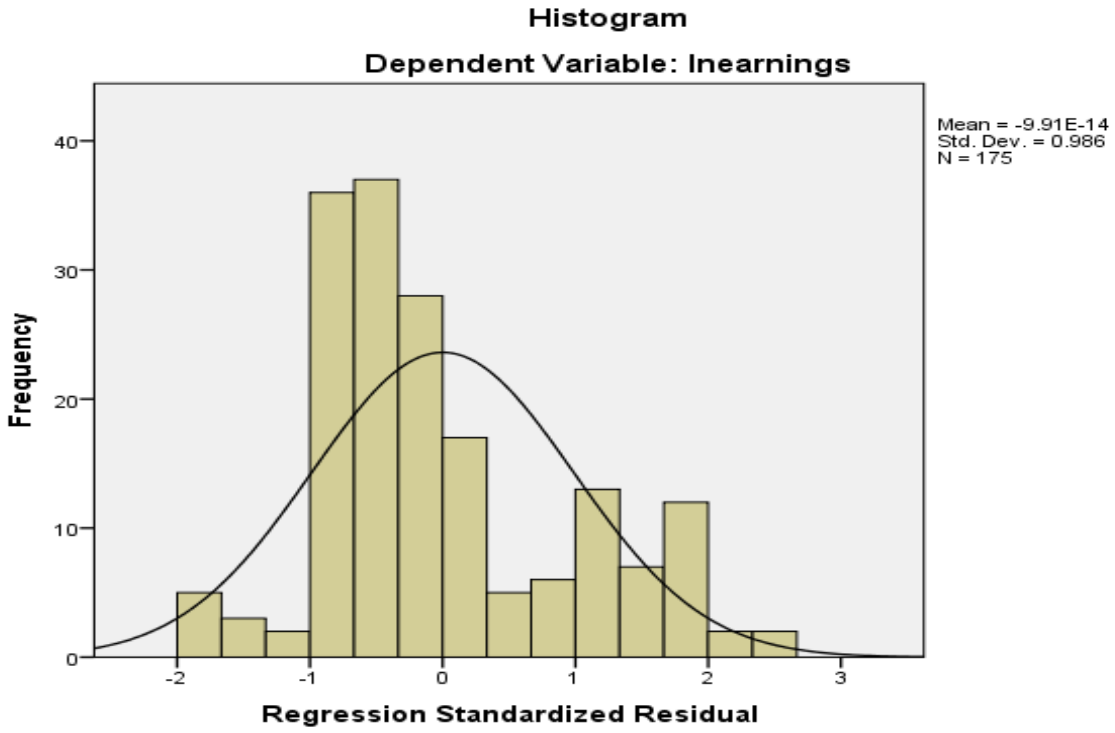
Model Diagnostic's Tests for the Assumptions of a Multivariate Linear regression.

The study tested each of the following assumptions to assess whether normality, multicollinearity, linearity, and homoscedasticity were met.

Normality Results for Teachers with master's degree.

Figure 1 indicates a normal distribution of residuals. The normality of the residuals was tested using histogram of the standardized residuals. From the figure, it can be observed that residuals were normally distributed, and the study confirmed that normality assumptions were met.

Figure 1: Normality Test Results for Teachers with master's degree and above



Multicollinearity Results for Teachers with Master's Degree

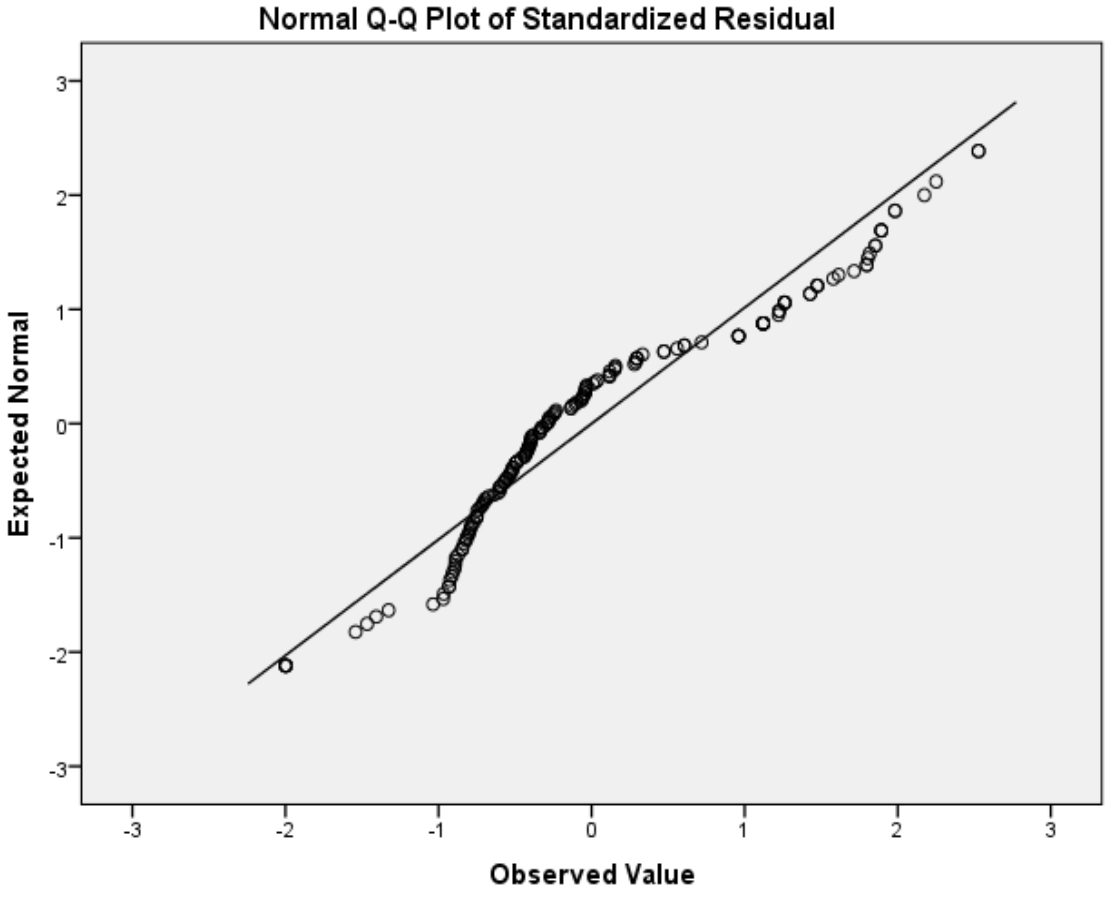
Table 4.14 presents VIF estimates for explanatory variables describing a master's degree. The calculated VIF values are all below 5, then it was concluded that there was no multicollinearity.

Table 6: VIF Test Result for Multicollinearity for Teachers with master's degree.

	Collinearity Statistics	
Variables	**VIF**	**Tolerance (1/VIF)**
Gender	1.007	.993
Age	4.605	.217
Years of schooling	4.821	.207
Experience	2.265	.442
Costs	1.345	.774

Linearity Results for Teachers with master's degree.

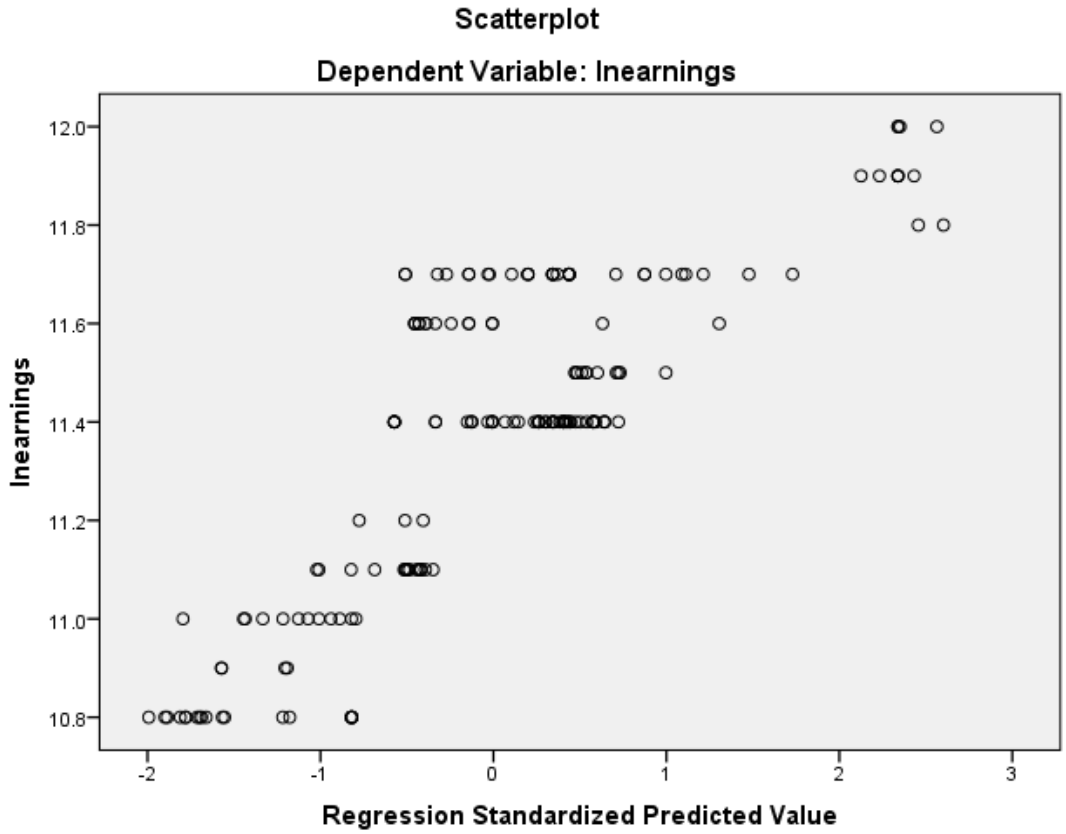
The figure 4.8 indicates a linear relationship between the expected normal values against the observed standardized residuals of the independent variables. Therefore, the study confirmed presence of linear relationships between the independent variables and the dependent.



Homoscedasticity Test for Teachers with Master's Degree and Above

Figure 2 show a homoscedastic value since the distribution of data values where values were not over dispersed implying data points were close to each and that pattern of a constant the variation of the data points when the residuals are plotted against the fitted (predicted) values. This indicating that there was presence of homoscedasticity

Figure 3 Test for Homoscedasticity for Teachers with master's degree.



Source: Research Data (2022)

Discussion for Private Rate of Return for Master's Degree

Results showed out of a total of 749 teachers interviewed, 175 had master's degree Gender disparity between male and female teachers with master's degree was minimal. From the results, majority of teachers with this certificate aged between 40-49 years (41.71%). Majority of the teachers 71.43%, with master's degree were promoted while only 28.57% had not been promoted. The cost for these certificates was averaged at Kshs 198,828.6 with highest cost of Kshs 800,000. Their average starting salary was Kshs 30,614.9 and ranged from Kshs 40,000 and Kshs 46,000. The average pay for master's degree was 91,725.95 with the least earning of Kshs 49,765 and highest earner of Kshs 168,000.

For a teacher with master's degree and above, there was high correlation between age and experience($\rho = .790$), age and gross pay($\rho = .700$), experience and gross pay($\rho = 845$). Age and years in schooling($\rho = .450$), promotion and gross pay($\rho = .458$), were moderately correlated. However, there was a weak correlation between age and gender ($\rho = -.013.$), gender and years in schooling($\rho = .035$), gender and experience($\rho = .077$), promotion and starting salary($\rho = -.073$).

This resonates with previous findings by Rugar, Ayodo and Agak on financial profitability of higher education among academic staff members in two public Universities established that as the level of education rise the earnings of the staff members also increase. The study concluded that the University Level of education provided more private rate of return as compared to other levels of education at 47.8 percent. The study further revealed that the Doctorate programme was the most profitable followed by the master's degree.

Faridi, Hussain& Bashir (2010) investigated the effect of different level of education on student's earnings. Applying OLS method on data collected from ground inspection about different levels of education of students, they concluded that years of completed education and experience are positively related to income

of students. Comi& Brunello (2000) explored the relationship between education and the effects of education on growth of earnings. They collected the cohort data from eleven European countries and found differences in growth of earnings at different levels of education. In Europe Psacharopoulos

Deolaliker (1993) estimated the rate of return to investment in education in Indonesia using the National social economic survey from 1987.The study findings establishes that the rate of return for primary education was about 10 percent while the rate of return for secondary and tertiary education was around 20 percent. However, another empirical study on return to schooling in Indonesia was conducted by Duflo (2001) his research findings established that returns to investment in education were about 6.8 to 10.6 percent. Using data from National social economic survey Comolo and Metto (2010) also evaluated the returns to schooling in Indonesia and established that the returns to schooling ranged from 9 to 10.8 percent on average.

Kifle (2007) while establishing the rate of return to schooling in Eritrea using the ordinary least square method established that workers with higher level of educational qualifications earned more wages as compared with workers with little or lower educational qualifications. The study further established a positive impact of experience on earnings. Shah (2007) and Jared et al (2010) estimated the impact of higher education and experience on earnings of women workers in Islamabad. The findings established that higher education has a positive role in enhancing earnings of women workers in Islamabad.

CONCLUSIONS

The purpose of this paper was to establish the private rate of return to investment in education for teachers who are holders of master's degree in Uasin Gishu County Kenya. From the findings the rate of return for a bachelor's degree holder was 6.23% and the marginal rate of return was 3.83%. From the Mincerian regression equation, years of schooling, experience and experience squared were significant factors that affected the private rate of return to investment in education. Since it is profitable for individuals to invest in higher education, this study suggests that individuals intending to invest in higher education do so at a younger age so as to maximize their future earnings.

Policy Recommendations

Since the study established that lifetime earnings increase with an increase in level of higher education, individuals wishing to maximize returns should opt for higher educational qualifications like Masters and PhD.

ACKNOWLEDGEMENT

The author would like to thank the teachers in public secondary schools in Uasin Gishu County Kenya, the National Council of Science and Technology for the Issuance of the Research authorization permit and the County government of Uasin Gishu for allowing us to conduct the research.

Declaration of Conflict Of Interest

The authors declare no potential conflict of interest with respect to authorship of this Article

Funding

The author used personal funds in supporting the authorship of this article.

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