
Research Article,

Interest and Science Performance among Secondary School Students in Migori County, Kenya: Gender as a Moderator

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Abstract: The purpose of this study was to establish the moderating role of gender in the influence of interest on science performance among secondary school students in Migori county. A sample of 327 Form Four students in Migori county was used. Data was analyzed using Descriptive Statistics, Correlation analysis and Multiple Linear Regression Analysis. Overall, boys had higher levels of performance in science (Mean=39.21) than girls (Mean=30.80) and the mean difference was statistically significant ($t=3.89$, $p=.00$). Boys had higher levels of interest (Mean=2.99) than girls (Mean=2.73) and the mean difference was statistically significant ($t(173) = 2.137$, $p = .034$). Further, the overall correlation between interest and performance in science was statistically significant with $r = .253$ ($p=.001$, $n=327$). Interest predicted performance in science with $F(1,173) = 11.871$, $p < .05$. Consequently, gender significantly moderated the relationship between interest and performance in science with $b = 8.6149$, 95%CI (-1.4566, 18.6864), $t = 1.6885$, $p < .05$. The relationship was significantly higher among females at $b = 9.892$, 95%CI (2.2487, 4.8067), $t = 2.152$, $p < .05$ than males at $b = 5.989$, 95%CI (2.1526, 22.1325), $t = 2.965$, $p < .05$. It is concluded that boys outperform girls in science, boys exhibit higher levels of interest than girls and the association between interest and performance in science is stronger for girls than boys. In order to reduce the gender gap in science performance, it is recommended that interest in science should be enhanced for students but more particularly so for girls.

Keywords: Interest, Science Performance, Moderation, STEM, Gender, Kenya.

Introduction

Gender bias in Mathematics and science classrooms has been and still continues to be a problem (Diane, 2003). Despite improvements in the past two decades, girls are still less likely than boys to take physics and higher-level Mathematics and science courses in high school. As a consequence, fewer female students may study Mathematics and science at the college level. The types of courses taken in high school and how students perform in these courses can impact acceptance into college, choice of college major, and subsequent career choice (Diane, 2003).

A growing demand for professionals in Science, Technology, Mathematics and Engineering (STEM) is met with a significant labour shortage in these fields as women account for just 28 percent of global researchers but the figure masks wide variations between countries and regions (UNESCO, 2016). Women are often

underrepresented in STEM, and their low levels of participation can be traced back all the way to their school years, where a number of influences from society and culture, education and the labour market are all at play (UNESCO, 2016).

Statistics Canada (2007) reports that as of 2006 only 22% of professionals in natural sciences, Engineering, and Mathematics are women, an increase of a mere 2% from 1987; and since women continue to account for a small sector of the student population in these fields, there will probably be little change to this statistic in the near future (Fried & MacCleave, 2009; Statistics Canada, 2007). Similar situations are visible in the United States and Europe. In the United States, women comprise 50% of the workforce but only 15% of scientists are female (Weinburgh, 2000). While more women are receiving PhDs in science nowadays there still is no equity as far as their career is concerned (Burrelli, 2008; UNESCO, 2007).

At the end of the 20th century, still fewer than 6% of the highest attainable academic positions were held by women (Fox, 2001). This trend is also seen in other parts of the world. In Europe, although women represent more than half of the student population, only 11% of top academic science positions are held by women (Dewandre, 2002; European Commission, 2009). While women represent 52% of professionals and technicians, only 32% of scientists and engineers are women. Efforts in Europe to encourage more women to obtain their PhDs have been successful in life sciences and humanities, where women are 41% of PhD holders; however, in Engineering and physical science, only 25% of PhD holders are women (European Commission, 2009). Women scientists attribute this skewed representation to small discriminations along the way that finally end up creating this gender gap (Baker & Leary, 2003; Ceci & Williams, 2007).

Studies in Nigeria have however revealed mixed reports on gender difference in science performance. Many researchers have provided reports that there are no longer distinguishing differences in the cognitive, affective and psychomotor skill achievements of students in respect of gender (Abayomi & Mji, 2004; Bilesanmi- Awoderu, 2006 & Din, Ming & Ho, 2004). Girls are being encouraged and sensitized into developing positive attitudes towards science. Other researchers have reported differently on this issue. For example, in one study carried out by Eriba and Sesugh (2006), they found that boys outperformed girls in integrated science and mathematics achievements. Some other research studies reported that males are becoming the disadvantaged gender in schools, and that fewer males are interested in science (Omoniyi, 2006).

In Uganda, a study conducted by the Female Education in Mathematics and Science in Africa project, found that women's performance in science subjects (which is the gateway to computer science studies) in the Uganda Certificate Examinations is very low compared to that of men (Ochwa-Echel, 2011). He further reckons that although there has been some rhetoric from politicians and educators in Uganda about improving the teaching of mathematics and science courses to women, not much has been done and the deficiencies and inadequacies continue. The concern this raises is that women are not participating fully in the sector, meaning that their potential is not being fully realized and their capabilities to participate in the development of the country in particular, and in the human development process in general, are being curtailed.

The situation in Kenya is no better as recent literature show that there has been a big problem of poor performance in STEM subjects in the country as a whole as girls perform even worse in comparison with the boys (Forum for African Women Educationalists, 2008). The same position is held by Wambua (2007) in his study as he found that boys performed better than girls in STEM subjects. This has caused a lot of public outcry as poor performance by girls in STEM would automatically translate to fewer women enrolling for STEM courses (FAWE, 2008). Wambua (2007) reckon that as a result of the gender gaps in performance in STEM subjects, fewer girls as compared to boys qualify to join Science, Mathematics, Engineering and Technology related courses.

This skewed performance in STEM subjects eventually results to underrepresentation of women in the STEM field. This scenario is indeed captured by the UNESCO (2018) survey which established that women are grossly under-represented in Science, Technology, Engineering and Mathematics (STEM) careers. For instance, only one in three doctors is a woman: slightly more than a third (35 percent) of the 6,664 doctors and dentists registered with the Kenya Medical Practitioners and Dentists Board (KMPDB) by 2018 are women. The survey further indicate that the representation of women researchers is also low in other science fields in Kenya, including natural sciences (14 percent), and engineering and technology (11 percent). Even though women provide 80 percent of farm labour in Kenya, they make up less than a third of agricultural scientists.

The situation in the Kenyan universities is no better. The figures from the Commission for University Education indicate that a third (33 percent) of university students enrolled in STEM courses are women. The presence of women varies according to the field of study. In 2015, at the undergraduate level, the share of female students' enrolment was particularly low in the clusters of Manufacturing (16 percent), Engineering (17 percent) and Computing (22 percent). But there was near gender parity in the health and welfare cluster (49 percent) (CUE,2018).

Consequently, at the Kenya Certificate of Secondary Education (KCSE) level, boys continue to outshine girls in Science and Mathematics. In 2019 boys defeated girls in all the science subjects. In the 2018 Kenya Certificate of Secondary Education examination girls defeated boys in Metal Work only and lagged behind the boys in the other science and technology-related courses, including Biology, Chemistry, Computer Studies, Electricity, General Science, Mathematics, Physics, Power Mechanics, Agriculture, and Aviation. A similar result was evident in the 2017 KCSE results where, of the examinable subjects, boys scored better than girls in 23 subjects, defeating girls in all Sciences, whereas girls only defeated boys in 6 subjects of; English, Kiswahili, CRE, Home Science, Art, and Design and Electricity (KNEC Report, 2019).

Migori county has not done any better in terms of science performance as well. Migori county had girls scoring an average mark of 22.63% for all sciences against the boys' 26.65%, giving a gender disparity of 4.02%. Consequently, just 10.22% of girls in comparison with 20.46% of boys who sat for 2019 KCSE examination did all the 4 Science subjects (Migori County Education Office Records, 2019). This provides a very negative influence on female students as they have few peer role models to motivate them in taking this particular subjects. Migori county risks lagging behind in Scientific development, since STEM subjects contribute towards industrialization, environmental conservation, medical research, food management and improved agricultural production. As a result, Kenya risks losing out on her aspirations to achieve the Millennium Development Goals and eventually attainment of Vision 2030 (ROK, 2007). It is for this fact that the current study set to investigate the causal factors that necessitate this gender disparity in science performance to ensure an improvement in STEM subject both for male and females to ensure the attainment of Millennium Development Goals.

While some studies indicate a male advantage in mathematics and science (UNESCO, 2018; Otieno, 2019; FAWA, 2008; Wambua, 2007; Organization for Economic Co-operation and Development [OECD], 2015; Migori County Education Office Records, 2019 and CUE, 2018); other studies show that female students perform equally well or even better than male students at mathematics and science (Cotton, McIntyre, & Price, 2013; O'Grady & Houme, 2014 : Abayomi & Mji, 2004; Bilesanmi- Awoderu, 2006; Din, Ming & Ho, 2004 & Voyer & Voyer, 2014). Based on these conflicting findings, one cannot authoritatively assert that females perform poorly in sciences than males. It is for this that the current study sought to establish the gender disparity in performance of sciences by subjecting students in Migori county to a science achievement test with a view to examining how the selected factors influence the science performance.

One possible reason for this gender disparity in science performance could be differences in the level of interest in science. Research has indicated that students who are interested in the subject they are studying,

including science, focus more attention and concentration as well as persistence on the subject (Winne & Nesbit, 2010). They argued that as a result, students often learn more about the subjects in which they are interested (Winne & Nesbit, 2010). That is, being interested in a subject is a mental resource that enhances learning, which then leads to better performance and achievement. Indeed, research has demonstrated that both situational and individual interest promote attention, recall, task persistence, and effort. However, large gender difference has been identified with males showing greater interest than females (Hidi & Renninger, 2006).

Another study by Winne and Nesbit (2010) they surveyed 9,500 teenage girls in nine European countries on their interest toward STEM. It found that most lose interest by the time they turn 14. Even in Finland, the only country where girls are more likely than boys to be top performers in science, two-thirds of female teens said they see the natural sciences as important, but just slightly more than a third said they would consider a career in that area. This in the end leads to a low performance in science by women as we only dedicate our time on what we are interested in (Winne & Nesbit, 2010).

Adekunle and Femi-Adeoye (2016) quotes from Encarta Dictionary (2004) that “interest is a feeling of curiosity or concern about something that makes attention turn towards it”. They opined that personal interest develops slowly and tends to have long-lasting effects on a person’s knowledge and values, whereas situational interest is an emotional state that is evoked suddenly by something in the immediate environment and that may have only a short-term effect on an individual’s knowledge and values. Situation interest is aroused as a function of the interestingness of the content and context and partially under the regulation of teachers. In their study on relationship between interest and academic performance in Biology among senior secondary school students they found a significant relationship in the student’s interest in Biology and student’s academic performance in Biology.

Rautta (2013) in a study in Nairobi county concurs with Adekunle and Femi-Adeoye (2016) assertion that interest influences the performance in sciences. The study however went further to include the aspect of gender in this relationship. The study asserted that when a student has an interest in a particular subject, then he/she is bound to perform better as he/she places more effort in tackling the tasks in that subject. The study found that majority of the boys qualified to join the science-based courses while majority of girls qualified for enrolment in Art based courses. The interest in Science subjects was also high among the boys as compared with girls.

Having interest in a subject leads to positive performance in that subject (Winne & Nesbit, 2010 & Hidi & Renninger, 2006). These studies opined that there is a relationship between interest in science and science performance. Despite making these assertions these studies failed to do a correlation test to establish the existence of the relationships and instead relied on beliefs from students that interest would impact on their science performance. An attempt to empirically establish the relationship is found in Adekunle and Femi-Adeoye (2016) and Rautta (2013) studies. However just like the afore-cited Winne and Nesbit (2010) and Hidi and Renninger (2006) which looked at Science in general, these two studies looked at Biology and overall performance respectively. With all these studies failing to look at interest in relation with all the four science subjects, there is a knowledge gap left. Consequently, these studies failed to evaluate the moderation effect of gender on the relationship between interest and science performance. It is this gap that this study sought to bridge.

1.1 Objectives of the Study

The study was guided by the following objectives;

1. To establish the level of science performance across gender
2. To establish secondary school students’ level of interest in science across gender.
3. To determine the overall relationship between interest and performance in science among secondary school students.

To examine gender difference in the relationship between interest and performance in science among secondary school students.

1.2 Limitations of the Study

The following were the limitations of the current study:

1. Since the Science Achievement Test only tested the theoretical aspect of the science subjects and left out the practical segment, the results of the test could be inconclusive as the practical segment makes a significant part of science performance.
2. Since this study was conducted in a relatively rural environment with one predominant cultural setting, the study could lack adequacy in providing complete generalization for other regions with mixed cultural or urban setting. This could create biases in the result.

Methodology

2.1 Research Design

A mixed methods research design which includes both quantitative and qualitative paradigms was adopted in the study. More specifically, the convergent parallel mixed methods approach was used.

2.2 Study Population

The population for this study consisted of form four students of the year 2020 in Migori county. The form four students in this target population were those who took all the 4 science subjects of Mathematics, Biology, Chemistry and Physics. Their total population was approximately 2,200, i.e. 1550 boys and 650 girls spread out in the 240 public secondary schools in the county (Migori County Director of Education Office Records, 2019).

2.3 Sample Size and Sampling Technique

The study used Fisher et al. (1991) formula to arrive at a sample size of 327. The study used cluster sampling method and simple random sampling technique to sample the students for study. Cluster sampling was used to categorize the schools whereas simple random sampling was used in selecting schools and participants. To this effect schools were divided into 4 clusters of national, extra-county, county and sub-county schools. Of the 240 public secondary schools, 2 are national schools, 8 are extra-county, 14 are county and 216 are sub-county schools. To get the number of students to be sampled from each cluster, a proportion was worked out based on the following formula:

$$N = \frac{\text{Number of schools in a particular cluster}}{\text{Total number of schools}} \times \text{Sample size}$$

Where N is the number of students in each cluster.

From this formula, sub-county schools got 294 students, county schools got 19 students, extra county schools got 11 students and national schools got 3 students. To do this, the names of students were written in different sheets of papers then placed in an urn then well mixed. Names were then picked randomly with replacement noting all the names already selected to avoid repetition. The names of students from the sub-county schools were written down and 294 names picked using simple random sampling. For the remaining 3 clusters, sampling was done according to the predetermined proportion above. 19 students from the county schools, 11 from the extra-county schools and 3 from the national schools were selected using simple random sampling.

2.4 Research Instruments

The research instruments employed here are described below:

2.4.1 Science Interest Survey (SIS)

The SIS was used to measure the level of students' interest in Science. The survey is a modification of Hidi and Renninger's (2006) Science Interest Survey. The initial scale was modified to remove the content of

curriculum that is foreign to the Kenyan curriculum. The survey has 8 items scored on a 4-point Likert type scale ranging from strongly disagree (very low level) = 1, disagree (moderately low) =2, agree (moderately high) to strongly agree (very high level) = 4. Previous research has yielded reliability estimates of .85 (Hidi & Renninger's, 2006). The current scale was subjected to reliability tests to ascertain its suitability in the local environment.

2.4.2 Science Achievement Test (SAT)

The researcher used the SAT to measure the performance of sciences. The researcher developed the test from the KCSE examination of 2012 and picked questions drawn from the forms 1 and 2 syllabi. The test was made up of 4 subjects; Physics, Biology Chemistry and Mathematics with each subject having a total of 25 marks. The items in the scale fell under 4 sub-scales of Physics, Biology Chemistry and Mathematics. The scoring for the scale was keyed in as the total score attained for each sub-scale. The total score for the 4 sub-scales was 100 marks with scores below 50 marks being weak performance while scores above 50 marks being good performance. The scale was subjected to a pilot study to ascertain its reliability before being adopted for use in the main study. Experts from the department of Educational Psychology, Maseno university advised on the face and content validity of the instrument.

2.5 Procedure for Data Collection

Permission for data collection was first sought from the Maseno University School of Graduate Studies (SGS) and Maseno University Ethics Review Committee. Thereafter, the Migori County Director of Education (MCDE) was provided with information about the intended study. The Principals of the samples schools were then requested to seek permission from the Parents Association (PA) to allow students participate in the study. It was at this point that actual data were collected through administering questionnaires.

2.6 Methods of Data Analysis

Descriptive statistics, correlation analysis and simple linear regression were used to analyze quantitative data. The software used for quantitative data analysis was the Statistical Package for the Social Sciences (Version 24).

2.7 Ethical Considerations

All the protocols for conducting research in psychology were observed. The study was approved by Maseno University Ethics Review Committee prior to data collection.

Results

3.1 Reliability Analysis

A Test-re-test was conducted on the different instruments using a sample of 33 participants and yielded the following results.

Table 1: Cronbach's Alpha for Each Variable

Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items
Science Performance	0.782	0.781
Interest	0.780	0.783

Tables 1 shows the reliability measurement for each variable. Cronbach’s alpha gave a reliability index of 0.782 for Science Achievement Test and 0.78 for Science Interest Survey. Thus, both tools were reliable because their reliability exceeded the threshold of 0.70.

3.2 Students’ Performance in Science across Gender

Table 2 contains mean scores in the Science Achievement Test sub-scales across gender. The overall mean score for boys (Mean=39.21) was higher than for girls (Mean=30.80). Boys consistently outperformed girls in all the four science subjects. The best done subject was Mathematics followed by Biology and then Physics. The worst performance was in Chemistry.

Table 2: Level of Performance in Science across gender

	Mean Score by Gender	
	Boys	Girls
Physics	9.90	7.02
Chemistry	7.39	5.78
Mathematics	11.25	9.08
Biology	10.66	8.92
Overall Mean	39.21	30.80
Valid (listwise)	N ₂₀₀	127

In order to establish if the mean difference in science performance between the mean for boys and that for girls is statistically significant or not, the independent samples t-test was used at $\alpha=.05$ (two-tailed). Table 3 shows the outcome of the analysis which indicates that the fundamental assumption for t-test regarding the equality of variances was satisfied at $\alpha=.05$ ($F=.83, p=.37$). With equal variances, the difference in science performance between boys and girls was statistically significant at $\alpha=.05$ ($t=3.89, p=.000$). Therefore, the mean difference in science performance between boys and girls was a true difference in the population from which the sample was drawn and not a result of chance or sampling error.

Table 3: Test of Significance for Gender Difference in Science Performance

		Levene's Testt-test for Equality of Means				
		Variance		for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Performance in Science	Equal variances assumed	.83	.37	3.89	173	.000
	Equal variances not assumed			4.08	100.60	.000

3.3 Level of Interest across Gender

Table 4 presents mean scores for interest across gender derived from an independent-samples t-test. The overall mean score for boys is 2.99 and the overall mean for girls is 2.73. This implies that the level of self-efficacy for boys was higher than that for girls.

Table 4: Level of Interest

	G	N	Mean	Std. Deviation	Std. Error Mean
Interest	MALE	200	2.9872	.83656	.07482
	FEMALE	127	2.7280	.29070	.04111

In order to establish if the mean difference in interest between the mean for boys and that for girls is statistically significant or not, results from the independent samples t-test was used at $\alpha < .05$ (two-tailed). Table 5 shows the outcome of the analysis which indicates that the fundamental assumption for t-test regarding the equality of variances was satisfied. There was a significant difference in the scores for Males ($M=2.99$, $SD=.84$) and Females ($M=2.72$, $SD=.29$); at $\alpha = .05$ $t(173) = 2.137$, $p = .034$.

Table 5: Test of Significance for Gender Difference in Level of Interest

		Levene's Test for Equality of Means								
		Equality of Variances		t-test for Equality of Means						
Interest		F	Sig.	t	df	Sig. (2-tailed)	Std. Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Interest	Equal variances assumed	1.446	.231	2.137	173	.034	.25920	.12131	.01977	.49863
	Equal variances not assumed			3.036	170.781	.003	.25920	.08537	.09067	.42773

The results above suggest that there is a significant difference in the level of interest across gender. Specifically, male students have a higher level of interest in science than female students.

3.4 Relationship between Interest and Science Performance

The overall correlation between interest and performance in science was found to be statistically significant at $\alpha=.05$ with $r =.253$ ($p=.001$, $n=327$). Thus, an increase in interest is associated with an increase in science performance. When data were disaggregated by gender, the correlation between interest and performance in science for boys was statistically significant at $\alpha=.05$ with $r =.221$ ($p=.013$, $n=200$). The correlation between interest and performance in science for girls was also statistically significant at $\alpha=.05$ with $r=.297$ ($p=.036$, $n=127$). Thus, an increase in interest is associated with a significant increase in science performance for both the gender.

Consequently, regression estimate for the relationship between interest and performance in science for both males and females was worked out. Interest explained 4.9% of the variance in science performance for boys and 8.8% for girls. Put differently, the correlation between the two variables was positive, significant and stronger for boys and girls. This outcome suggests that it is accurate to predict performance in science from interest for both the gender. Considering that the correlation between science interest and performance in science was statistically significant for both gender, Table 6 is a linear regression output for predicting performance in science from interest for both the gender.

Table 6: Regression Model Summary for Both the Gender

Model	R	R Square	Adjusted Square	RStd. Error of the Estimate
1	.253 ^a	.064	.059	13.04698

a. Predictors: (Constant), Interest

Based on the value of R, the results above indicate that there is a .253 correlation between the observed and predicted values of the dependent variable while the value of R Square indicates that 6.4% of the variance in science performance can be predicted by interest.

To test the significance of the model, ANOVA statistics was used at $\alpha=.05$. If Sig. is $< \alpha$ (.05), then the relationship is significant and vice versa. Table 7 illustrates ANOVA test for the relationship between interest and science performance.

Table 7: ANOVA Test

Model		Sum Squares	ofdf	Mean Square	F	Sig.
1	Regression	2020.690	1	2020.690	11.871	.001 ^b
	Residual	29448.704	173	170.224		
	Total	31469.394	174			

a. Dependent Variable: SCIENCE

b. Predictors: (Constant), Interest

As evident in Table 7, the results indicate that the model is a significant predictor of science performance, $F(1,173) = 11.871, p < .05$.

To test the null hypothesis, the regression coefficients was used. The criterion for acceptance or rejection of the hypothesis is based on the level of the p-value in relation to the α (.05). If the p-value is $> .05$ then we accept the null hypothesis while if the p-value is $< .05$ then we reject the null hypothesis. Table 8 presents the results of the regression coefficient for the influence of interest on science performance.

Table 8: Prediction of Performance in Science from Interest

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	23.250	4.056		5.732	.000
	Interest	4.653	1.351	.253	3.445	.001

a. Dependent Variable: SCIENCE

Table 8 shows that interest has a B weight of 4.653, a Beta weight of .253 and a t-value of 3.445. From the B-value interpretation, for every 1 unit increase in the level of interest, there is a positive 4.653 unit increase in predicted science performance. With a p-value of .001, this relationship is significant at a p-value $< .05$. The null hypothesis is therefore rejected.

To get the statistical model that allows for prediction of the outcome variable based on the predictor variable, the following statistical equation was used:

$$Y = \beta_0 + \beta_1 X$$

- Where Y represents the outcome variable
- And X represents the predictor variable

In substitution:

$$\text{Science Performance} = 23.250 + (4.653 * \text{Interest})$$

Therefore, by inserting the level of interest into this equation, we can predict the level of science performance.

The current study therefore affirms that interest influences science performance among secondary school students in Migori county. This implies that an increase in the level of interest leads to significant increase in the level of science performance and therefore the more one is interested in science the higher the level of science performance.

3.5 Gender as Moderator in the Relationship between Interest and Performance in Science

To test the moderating role of gender on the relationship between interest and science performance, interest was keyed in as the independent variable (X), science performance was keyed in as the dependent variable (Y) while Gender was keyed in as the moderating variable (M) in SPSS’s PROCESS by Andrew F., Hayes and then run. The table below shows the B-value which is the unstandardized coefficient and is compared to zero using a t-test which is computed from the Beta divided by its Standard Error. The level of significance is set at a p-value < α (.05).

Table 9: Interaction of Gender in the Prediction of Performance in Science from Interest

Regression Model Summary						
Model	b	SE	t	p	LLCI	ULCI
Constant	37.2614	1.0270	36.2819	.0000	35.2342	39.2887
Interest	5.9891	1.5182	3.9448	.0001	2.9922	8.9860
Gender	-5.8986	2.4244	-2.4330	.0160	-10.6842	-1.1131
Interest x Gender	8.6149	5.1022	1.6885	.0331	-1.4566	18.6864

Table 9 indicates the results for moderation analysis. To determine the effect of moderation, we use the results for the interaction variable (Interest x Gender). This result shows that there is a significant interaction of gender, $b = 8.6149$, $95\%CI (-1.4566, 18.6864)$, $t = 1.6885$, $p < .05$, indicating that the relationship between interest and science performance is moderated by gender.

3.6 Simple Slope Analysis of the Effect of the Moderator

To interpret the moderation effect, this study used the simple slopes analysis to determine moderation among the different gender. The simple slopes table below shows the results for two different regressions: the regression for interest as a predictor of science performance (1) when the value of gender is 0.5 (i.e., low). Because females were coded as 1, this represents the value for girls; and (2) when the value of gender is 1.5 (i.e., high). Because males were coded as 2, this represents the value of boys’ end of the gender spectrum. B represents the effect of the predictor on the outcome (science performance) whereas p shows the significance pegged at <.05.

Table 10 Conditional Effect of X on Y at Values of the Moderator

Gender	Effect	SE	t	p	LLCI	ULCI
Female	9.892	4.597	2.152	.033	2.2487	4.8067
Male	5.989	2.020	2.965	.003	2.1526	22.1325

From Table 10, it is evident that when the gender is low (Female), there is a significant positive relationship between interest and performance in science, $b = 9.892$, $95\%CI (2.2487, 4.8067)$, $t = 2.152$, $p < .05$. Consequently, when the Gender is high (Males), there is also a significant positive relationship between

interest and performance in science, $b = 5.989$, $95\%CI (2.1526, 22.1325)$, $t = 2.965$, $p < .05$. The results show that the relationship between interest and performance in science is different for boys and girls. To indicate the difference in the levels of relationships between boys and girls, a simple slope graph was used.

3.7 Simple Slope Graph of the Effect of the Moderator

The graph below shows the different levels of relationships between interest and performance in science for males and females.

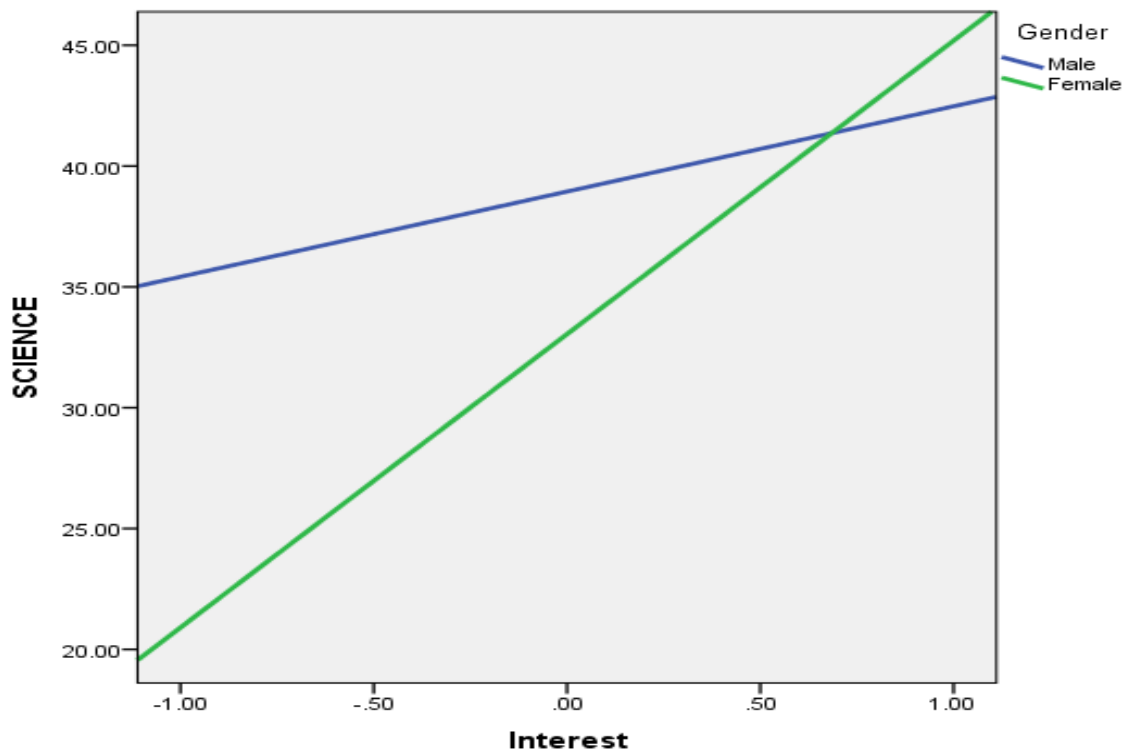


Figure 1 Simple Slope Graph

From Figure 1, male gender is represented by a blue line while female gender is represented by a green line. From the figure, it is evident that the effect is both on the same direction, which is positive indicating that for both males and females' interest positively influences the level of science performance. However, the relationship is so steep for females than males indicating that the effect is stronger for females than males. Additionally, the fact that lines cross indicates a significant interaction effect (moderation). Therefore, the study concludes that the influence of interest on performance in science is higher among females than males.

Discussion

The fact that boys did better than girls is consistent with the findings of Eriba and Sesugh (2006) and KNEC (2019). Eriba and Sesugh (2006) found that boys outperformed girls in integrated science and mathematics achievement. KNEC (2019) also found that boys scored better than girls in all Sciences in the 2017 KCSE examination. Similarly, the finding corresponds with that of Ochwa-Echel (2011) in Uganda in a project, dubbed Female Education in Mathematics and Science in Africa. The study found that girls' performance in science subjects (which is the gateway to computer science studies) in the Uganda Certificate Examinations is very low compared to that of boys.

Likewise, the finding is a true reflection of the situation in Kenya as recent literature shows that there has been poor performance in STEM subjects as a whole with girls performing even worse compared to boys (Forum for African Women Educationalists, 2008). The same position is held by Wambua (2007) who found that boys performed better than girls in STEM subjects.

With the Science Achievement Test being developed from science questions in the KCSE examination, the study finding mirrors the true performance scenario on the ground as recent national KCSE examination results of 2017, 2018 and 2019 have shown that boys continue to perform better than girls in all the science subjects. For instance, in the 2017 KCSE results, of all the examinable subjects, boys scored better than girls in 23 subjects, defeating girls in all sciences, whereas girls only defeated boys in 6 subjects; English, Kiswahili, CRE, Home Science, Art, and Design and Electricity (KNEC Report, 2018). Similarly, in the 2018 KCSE examination, girls lagged behind the boys in all the science and technology-related courses, including Biology, Chemistry, Computer Studies, Electricity, General Science, Mathematics, Physics, Power Mechanics, Agriculture, and Aviation.

The current finding also corroborates other studies done in the local environment. According to the records at the Migori County Office, boys have continued to perform better than girls in the sciences. For instance, in the 2018 KCSE results, Migori County had girls scoring an average of 22.63% in all the sciences against the boys' 26.65%, giving a gender disparity of 4.02% (Migori County Education Office Records, 2019).

These outcomes are congruent with other reports that have found that among the other science subjects, Physics is normally the worst performed subject by girls. As observed by Carlone (2003), the gender gaps in Physics are among the most pronounced.

The above notwithstanding, the current findings contradict that of Omoniyi (2006) who found that males are becoming the disadvantaged gender in schools, and that fewer males are interested in science. However, the result of his study was based on qualitative reports from respondents and not on actual performance of students. Therefore it is difficult to authenticate Omoniyi's findings because students tend to exalt themselves before an interviewer thereby masking their true ability.

The present study found that male students had higher levels of interest in science than their female counterparts. The relationship between interest and performance in science was found to be statistically significant in the present study. This is in agreement Trumper (2006), Elster (2007), Logan and Skamp (2008) and Adekunle and Femi-Adeoye (2016) who indicated that there is a positive influence of student's interest on science performance. They posit that students who are interested in the subject they are studying, including science, focus more attention and concentrate well on the subjects. As a result, students often learn more about the subjects in which they are interested. Those who are not interested in science subjects keep off these subjects and therefore fail to study them, this eventually leads to them getting low performance in science.

Zuckerman, Gagne, and Nafshi (2001) study which also affirm the findings of the current study also adds that those students who are interested in their science majors do well in their science majors and are least likely to change their majors. The same position is held by Rautta (2013) who posits that the better performance by male students in science subjects in the KCSE was as a result of gender disparity in interest. Boys have interest in the subjects of sciences as they are associated with masculinity and therefore, they dedicate a lot of their time to the subjects.

However, studies by Winne and Nesbit (2010) and Miller, Blessing and Schwartz (2006) Schwartz (2006) contradicts the current finding by finding no significant relationship between interest in science and science performance. However, these studies were carried out among college going students who had already chosen their science majors. Therefore, since these students had earlier indicated interest in science at the college entry level, they can all be assumed to be having a high level of science interest and hence no variations would be evident in their level of science interests. As such performance would cease to be a factor of interest as everyone would be assumed to be having a high level of interest and therefore the level of performance would be subject to personal effort and other factors.

The findings of the current study showed that there is a gender difference in the relationship between interest and performance in science. This affirms the findings of previous studies by Venkatesh and Morris (2000),

Hidi and Renninger (2006) and Terzis and Economides (2011) studies who indicated a significant gender difference in the relationship between interest and science performance. The studies note that the gender factor has the ability to influence the level of the association between interest and science performance. The studies noted that girls were performing poorly in science since they lacked interest in science. Hence their level of performance in science would rise steadily if they developed interest. The studies were therefore able to draw a link between the high levels of interest and performance. They alluded that, high interest leads to dedication of much time and effort and hence translating to a better performance.

Conclusions and Recommendations

In light of the findings of the study, it is concluded that male students perform better than female students in science subjects in Migori County, Kenya. In addition, interest in science influences performance in science, and an increase in the level of interest in science translates to a corresponding increase in the level of science performance. Consequently, interest is likely to increase the level of performance in science at a higher level among the girls than the boys. It is recommended that teachers and counselors should work towards building the students' level of science interest by providing extrinsic motivation. This should apply more particularly to the female students. It is through such an approach that gender disparity in science performance may be minimized.

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