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GENDER INFLUENCE ON LEARNERS' ACADEMIC ACHIEVEMENT IN PHYSICS IN PUBLIC SECONDARY SCHOOLS IN ELGEYO MARAKWET COUNTY

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ABSTRACT

Gender issues in education are geared towards gender equity which accords equal opportunities to boys and girls. Gender equity has positive impact on educational goals as well as economic, social and cultural development. Researchers, policymakers, and practitioners have observed and appear to agree upon socially constructed differences between male and female and their significant effects in their lives. Studies conducted across the world among students studying in different levels of education found a significant gender difference in academic performance between boys and girls. In Elgeyo Marakwet County in Kenya, it was observed that girls performed better than boys in summative assessment in physics; this difference is phenomenon that required investigation to examine the cause of the disparity. The study examines the gender influence on learners' academic achievement in physics in public secondary schools in Elgeyo Marakwet County.

The research objectives werefind out if there is any gender difference in academic achievement in physics in Marakwet County based on school classification, find out learners' perspective of who is more talented in studying physics between boys and girls and to find out learners' perspective of who is more likely to undertake a career related to physics between boys and girls. Explanatory sequential design was adopted. Stratified and purposive sampling was used to select a sample of 28 secondary schools, 30 teachers, 28 principals and 1005 learners. The data was collected using questionnaires, documentary analysis, interviews and observation guide. The findings of the study showed that girls perform better than boys, both expect to take careers related to physics and that both genders expect to perform equally well in physics. in physics because they are more disciplined in their schoolwork than boys. The study recommends that the government should address differences in physics performances to ensure gender equity in physics education. The findings serve as a starting point for other researchers to look into the shifting features of gender in education to help policymakers improve gender parity in access to physics education.

Key words: Gender, gender equity, gender parity, physics, academic achievement.

INTRODUCTION

The term "gender" refers to the socially manufactured distinctions between men and women. In all facets of the social context, gender is a factor that affects the obligations, duties, opportunities, restraints, and demands of men and women (Filgona & Sababa, 2017). Scholars, decision-makers, and practitioners have noted socially created disparities between men and women and their considerable effects on their lives, and they appear to concur on this. Studies carried out worldwide among students enrolled in various levels of study revealed a large gender gap in academic achievement. Because gender equality is a priority in all spheres of life, gender is a crucial problem that has caught the attention of teachers in particular.

Due to this, the current study placed a high priority on determining how much gender has an impact on learners' academic achievement.

In light of the complicated circumstances of our time, traditional and stereotyped approaches to problem solving are woefully insufficient. We must be able to plan our course of action and think of creative, alternate solutions to life's sometimes naughty problems.

Unfortunately, design is not taken into account by our society's thinking practices or educational traditions; rather, we believe that design solely applies to objects like buildings and furniture (Hassan & Ogunyemi, 2008). In our society, girls have always been urged to fit in, while boys are anticipated to be assertive, energetic risk-takers. Hassan and Ogunyemi (2008) agree that almost all boys are given toys that improve their visual-spatial skills, such as trucks, Legos (toys made of plastic building blocks and other components), and models, which support this viewpoint. Spencer (2004) further confirms that girls' games frequently have strict rules and are quite organized. Thus, cultural barriers for girls may be created by social expectations and demands to conform.

In a research, Fabunmi (2004) found that gender mix had a considerable impact on secondary school students' academic performance and just a significant association with students' academic performance. According to numerous studies, female students perform better than their male counterparts (Orabi, 2007; Dayioglu & Turut, 2007; Khwaileh & Zaza, 2010).

According to Ghazvini and Khajehpour (2011), gender differences in academic settings even occur at the level of cognitive functioning. Girls adjust fast in a new learning situation compared to boys.

However, Wangu (2014) found that boys outperformed girls more frequently in a research done among secondary school students in Kenya.

Many research on gender disparities concentrated on inequalities in performance related to various science topics(Kahle 2004; Chang 2008; Lai 2010; Abubakar, Bada 2012; Eze, Ezenwafor, Obi 2015). There are numerous opposing viewpoints, making it a hotly debated topic (Kahle 2004; Penner 2008; Guo, Tsang, Ding 2010). According to several of these studies, there are noticeable achievement discrepancies between boys and girls (O'Reilly, McNamara 2007; Penner 2008; Else-Quest, Hyde, Linn 2010), with girls generally performing better in literacy-based topics. Others observed that these variations were inconsistent. Ajai and Imoko (2015) conducted a study to examine gender disparities in math retention & achievement. The study demonstrated that accomplishment and retention scores between male and female students did not differ considerably, demonstrating that both genders are competitive in mathematics.

Likewise, Voyer and Voyer (2014) conducted a research from 1914 through 2011 using a meta-analytic model and found out a tiny but substantial female merit that was highest for language courses & smallest for math and science.

In a similar line, Voyer and Voyer (2014) noted that while gender differences on achievement tests largely follow traditional patterns, females typically have an advantage on school grades regardless of the subject. This suggests that despite the common misconception that boys do better on logical reasoning examinations than girls, there is a tendency on the side of females to flourish in scientific disciplines that call for logic and reasoning. The gender achievement gap has been widely researched in Western nations, but due to the scarcity of secondary education data in developing nations, very few thorough studies of the gender accomplishment gap have been carried out there. The current study therefore aims to demonstrate gender inequalities in academic attainment.

Equality among the sexes is one of the topics that comes under discussion among educators due to the crucial roles played by both genders in the development of the nation, especially in the Area of science, technology, engineering, and mathematics (STEM). In Kenya, statistically speaking, there are still gender differences in physics education. It has been established that girls are underrepresented in physics in secondary schools where enrolment in the number of girls chosing the subject has been dwindling (2012-2019 KCSE KNEC report).

In the county of Elgeyo Marakwet, this is not the case. From 2012 to 2020, more girls than boys in the county sat for physics in KCSE and ended performing better than boys; this difference is a phenomenon that required investigation to examine the cause of the disparity. The study therefore aimed to examine the gender influence on learners' academic achievement in physics in public secondary schools in Elgeyo Marakwet County.

PURPOSE AND OBJECTIVES OF THE STUDY

The purpose of the study was to examine the influence of gender on learners' academic achievement in physics in public secondary schools in Elgeyo Marakwet County, Kenya. The research aimed to achieve the following research objectives

1) To find out if there is any gender difference in academic achievement in physics in Marakwet County based on school classification
2) To find out learners' perspective of who is more talented in studying physics between boys and girls
3) To find out learners' perspective of who is more likely to undertake a career related to physics between boys and girls

METHODOLOGY

The study employed explanatory sequential design where both qualitative and quantitative data was collected. Thetargeted populationwas 10,421 which included 250 physics teachers, 123 principals, and 10,048 form four students in the four sub counties of Elgeyo Marakwet County whose distribution is shown in Table 1.

Table 1: Category of public secondary schools in Elgeyo Marakwet County

Sub County	Category				Total
	National	Extra County	County	Sub County	
Keiyo North	1	6	8	20	34
Keiyo South	0	5	10	19	35
Marakwet East	0	3	9	17	29
Marakwet West	1	3	6	15	25
Total	**2**	**17**	**33**	**71**	**123**

Source: office of the county director of education

Stratified and purposive sampling was used to select a sample of 28 secondary schools, 30 teachers, 28 principals and 1005 learners. Boys', Girls', and Mixed schools were distributed among the Extra County, County, and Sub County categories in each sub county using purposeful sampling. 28 schools were included in the sample, representing 23percent of the populace as shown in Table 2.

Table 2: Number of sampled schools per category

	CATEGORY				TOTAL
	National	**Extra County**	**County**	**Sub County**	
No. of schools	2	17	33	71	123
Sample	2	4	7	15	28

A minimum of one physics teacher was present in each sampled school, for a total of 30 teachers (from two schools, both sexes were represented), 28 principals as well as deputy principals were drawn from the sample, as well as a max of 50 students per school, for a total of 1005 students from sample schools, were examined.

According to Mugenda & Mugenda (2009), 10percent of the accessible population is sufficient for a descriptive survey. Due to their big population, a minimum of 10% was picked for students, followed by 12percent of physics teachers and 25.76percent of principals due to their tiny populations.

Table 3: The distribution of sample size for this study

Target category	**Target population**	**Selected sample size**	**%**
Learners	**10,048**	**1,005**	**10.00**
Physics teachers	**250**	**30**	**12.00**
Principals	**123**	**28**	**25.76**
Total	**10,421**	**1,063**	**10.20**

Questionnaires for teachers and students, principal interview schedules, a document sheet for gathering data on learners' scores, and an observation checklist served as the study's research tools. The statistical software for social sciences (SPSS) version 21.0 was used to evaluate quantitative data that was taken from questionnaires and observation schedules. The results were presented as percentages, means, pie charts, bar graphs, and frequency tables. In accordance with the study's objectives, qualitative data collected from the interviews was transcribed, coded, and organized into themes.

The learner's questionnaire items 4 and 5 and the teacher's questionnaire section C items 1 and 2 were used to get feedback from students. Item number 5 was utilized for the interview. The researcher compared the student responses to their physics grade at the end of the term for analysis. To draw findings, the researcher utilized the SPSS program to calculate the coefficients of correlation for each response.

RESULTS AND DISCUSSION

The goal of the study was to determine the relationship between students' gender and their academic achievement in physics. The researchersutilized test scores from KCSE for a period of four and the results of the end-of-term three physics examination for boys and girls in order to ascertain whether learners' gender influences their academic achievement in physics. Two schools at equivalent levels for boys and girls—two national schools, two additional county schools, and two county schools—were used for the comparison. All of the schools used for comparison were boarding schools and had comparable physical teaching and learning resources. This data is shown in Tables 4, 5and 6.

Table 4: Comparison between boys' and girls' academic performances in physics in selected national schools

National school

Year/ KCSE mean score	2017	2018	Deviation	2019	Deviation	2020	Deviation
Boys school	9.1313	5.8683	-3.263	6.5481	+0.6798	7.5985	+1.0504
Girls school	4.3000	4.9000	+0.600	5.5020	+0.602	6.5700	+1.068

Table 4 shows that throughout the previous four years, boys performed better than girls in a certain national school.

In the same vein, girls' academic performance in physics was steadily improving with a bigger positive deviation than that of boys. As a result of this upward trend, the Ministry of Education upgraded the County's girls' school to A National school status (2011).

Table 5: Comparison between boys' and girls' academic performances in physics in selected extra county schools

Year/KCSE mean	2017	2018	2019	2020	Average mean
Boys school	5.0000	5.0100	4.9910	4.7613	4.9406
Girls school	4.9000	5.1000	5.7000	5.1000	5.2000

Table 6: Comparison between boys' and girls' academic performances in physics in selected county schools

Year/KCSE mean score	2017	2018	2019	2020	Average mean
Boys school mean score	4.2000	4.5120	5.2000	4.600	4.6280
Girls school mean score	4.7485	5.1425	5.7831	6.1321	5.4516

Table 5 compared KCSE physics mean score in two extra county schools. It also shows a trend of girls performing well than boys in the last four years. The average means for the four years also shows that girls perform better than boys in extra county secondary schools in the county. From Table6 which compared the physics performances in two county schools showed that in county schools girls outshines boys in physics.

The descriptive statistics was done to compare the mean scores for boys and girls from Extra County and county schools for more analysis. Analysis of variance (ANOVA) was conducted on two sets of mean scores for boys and girls in both Extra County and county schools to find out if their differences are statistical. Table 7 shows mean and standard deviation of the scores whereas Tables 8 shows the results of ANOVA.

Table 7: KCSE physics means cores for boys and girls for year 2017-2020

Nature of the school	Mean	N	Std. Deviation
Boys' school	4.784288	8	.3301618
Girls' school	5.325775	8	.4854188
Total	5.055031	16	.4888969

Table 8: ANOVA analysis for KCSE physics for year 2017-2020

Relationship			Sum of Squares	df	Mean Square	F	Sig.
Physics Mean Score * Nature of the school	Between Groups	(Combined)	1.173	1	1.173	6.806	.021
	Within Groups		2.412	14	.172		
	Total		3.585	15			

From Table 7, boys had a mean score of 4.784288 while girls had a mean score of 5.325775 in physics from the year 2017 to 2020.

This makes girls academic performance in physics higher than boys by a mean of 0.541487 and concludes that girls are doing better than boys in physics in Elgeyo Marakwet County. Table 8 shows that the p value obtained, 0.021 is smaller than the alpha value of 0.05 and this signifies that there is statistical significant different between boys and girls mean scores in physics. Girls performed better than boys in physics in Elgeyo Marakwet County.

End of term 3 form three physics performance between girls and boys were then compared.. The test score document was used to collect the data from six girls' boarding schools; analyzed their average means and compare to the average means of six boys' boarding schools. The KCSE 2020 average means in physics of the schools were also tabulated as shown in Table 9.

Table 9: Students performance in physics in End of term 3 2020/21 and KCSE 2020 examinations

Nature of the school	**No. of sampled schools**	**End of term 3 2020/21 Average mean in physics**	**KCSE 2020 Average mean in physics**
Boys boarding	6	4.1488	5.0222
Girls boarding	6	4.6632	6.0620

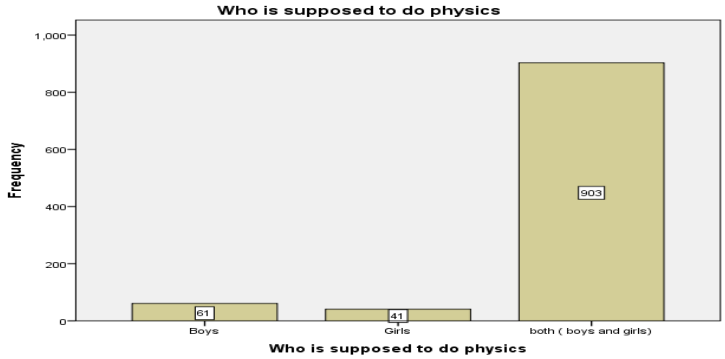
From Table 9, the average mean score for six sampled boys' schools was 4.1488 and 5.022 in end of term 3 2020/21 and KCSE 2020 in physics and the results is lower than sampled girls' schools which had an average of 4.6632 and 6.0620 in the respective examinations. The study furthermore showed that girls' schools were doing better than boys' schools.

From the principals' interviews, majority of the principals (26) stated that both girls and boy's students had equal intellectual ability to perform well in physics. The principals (26) stated that the trend in girls' better performance than boys has been attributed to effort of various education stake holders to boost girl's child education in the region. Only two principals believed that boys were smarter than girls in physics.

The researcher went ahead and asked the learners and teachers what they felt about students' gender and academic achievement in physics. The researcher wants to get opinion from the learners on which students' gender is smart in physics. The Figure 1 shows the students responses on who were supposed to enroll for Physics.

About 61(6.1%) of students believed that boys were supposed to do physics. These students believed that boys performed better in Physics than girls. Only 41(4.1%) of the students believe that girls were supposed to do physics. However, the majority of students 903 (89.9%) believed that physics was supposed to be done by both boys and girls. The study finds that 66.67% of teachers believed that both girls and boys are equaled talented for physics. No one indicated that only girls are talented for physics but 33.33% of teachers have the view that boys are more talented for physics.Figure 3 shows the responses of teachers on which gender is more talented for occupational in the domain for technical sciences.

Data showed that 63.33% of teachers have the view that men and women are equally talented in the domain for technical sciences while 36.67% of the teachers' state that men are more talented for the occupation in the domain for technical sciences. Figure 5, 6&7 shows clearly that both students and teachers state that physics can be done by both boys and girls.



This means that physics subject has not be stereotyped as any students' gender domain in Elgeyo Marakwet County.

The study demonstrates that there are gender differences in Elgeyo Marakwet County students' academic performance in physics. In physics, girls are performing better than boys. This study's findings are consistent with those of Orabi (2007), Dayioglu & Turut (2007), and Khwaileh &Zaza (2010) studies, which found that female students do better than their male counterparts in the sciences. According to Ghazvini and Khajehpour (2011), gender differences in academic settings even occur at the level of cognitive functioning. Girls are probably more able to adjust to learning in a new situation.

Ajai and Imoko (2015) and Voyer and Voyer (2014) conducted research to examine the disparity between genders in academic achievement. The results of their investigation indicate that there was no discernible difference between the academic performance of boys and girls. Their findings conflict with those of this study. In a similar vein, Kahle (2004), Penner (2008), Else-Quest (2010), Hyde (2010), and Linn (2010) concluded that there was a large discrepancy between the academic performance of boys and girls, with boys typically outperforming girls in the sciences. The results of their study conflict with those of this study.

The researcher found that girls in Elgeyo Marakwet County are purposefully equipped with the knowledge and skills to overcome social and cultural gender biases and actively break the stereotypical norm that defines girls and women in society after conducting additional analysis on the data to address the question of why girls are performing better than boys in school. Compared to boys, girls are more disciplined when it comes to their schoolwork; they work more and achieve higher grades. When it comes to schoolwork, girls are especially diligent.

In a seminal study published in 2006, Martin Seligman and Angela Lee Duckworth discovered that middle school girls outperform boys in terms of total self-discipline. They receive superior grades in all disciplines as a result of this. They discovered that ladies are better at paying attention in class than boys are, reading test instructions before moving on to the questions, selecting homework over TV, and persevering through boredom and irritation with lengthy assignments. These findings demonstrate that girls are more likely than boys to begin their schoolwork earlier in the day and spend nearly twice as long finishing it.

Boys work just enough to keep adults off their backs, whereas girls work nonstop until every assignment is flawless and they have meticulously rewritten their notes using color-coded notes. The survey also revealed that girls are complimented and encouraged to be neat, cooperative, and perfectionist. Boys gain confidence at school, but girls gain competence.

Elgeyo Marakwet County, the region is classified as a gazetteer hardship area because it receives little rainfall, is dry, and is frequently victimized by livestock rustling. The government opens more girls' boarding schools, including 21 boys' and 22 girls' schools from the national to county level. More girls enroll in secondary schools as a result of more schools catering to them, which boost physics performance.

CONCLUSION AND RECOMMENDATIONS

The study also comes to the conclusion that there is a significant link between physics students' academic success and their gender. Academically speaking, girls from the same category of schools in the county perform better than boys. In mixed-gender schools, boys perform better than females do. The study's findings also demonstrate that both boys and girls are equally capable of learning physics; the social environment is the only factor that can disadvantage one gender.

The following recommendations for action were made based on the findings of this study:

i) The parents, teachers and school administration should ensure teaching and learning environment is gender sensitive and increase the level of equal opportunity in education by addressing the learning gap between boys and girls.

ii) Capacity development scheme should be put in place through teachers' professional development (TPD) by the government forteachers with the aim of enhancing their efficiency and improving learners' academic achievement.

iii) To better understanding for the differential academic performance between the boys and the girls, a study on other factors that determine the differences in academic achievement beside gender should be conducted.

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