

**Influence Of Gender On Students' Mathematics Performance In Public Secondary Schools
In Voi Sub-County, Kenya**

By

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Abstract

The purpose of this study was to examine the influence of gender on students' Mathematics performance in public secondary schools in the Sub-County. The study was based on the specific objective; to establish gender-related factors in public secondary schools in Voi Sub-County. The assumption of this study is that gender differentials occur in diverse areas of education; for instance, from attitudes through performance to classroom activities and course enrolments to career perception. However, there has been a long-observed gender phenomenon and distribution regardless of gender factors in Kenya, more specifically in Voi Sub-County. This study adopted a Mixed Methods research design as a procedure for collecting and analyzing data by mixing both quantitative and qualitative techniques in a single study. The target population included 69 Mathematics teachers and 23 principals in all the public schools both boys and girls of Mathematics in Voi Sub - County in Taita Taveta County. The teachers were selected for the study because they have been with the students for relatively a long time to understand their performance, attitudes and perceptions of Mathematics. The research captured the data using questionnaire for the principals' and Mathematics teachers. The findings revealed that gender-related factors had a statistically significant direct effect on the students' performance in Mathematics. The results also show that mediation was established in the study since there was increase in both R Square and Adjusted R Squared significantly changed. The ANOVA results for the study variable were observed that the ANOVA value was statistically significant. The conclusion was that gender-related variable was statistically significant and relevant to the research.

Key words: Kenya, Gender, Students' Performance, Mathematics, Public Secondary Schools, Voi Sub-County

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Introduction

Education is highly valued in Kenya with many of the students pursuing strategies such as shadow education (after school and weekend tutoring) and remaining in a grade more than one year in order to succeed in their educational exams. Influence of gender on students' Mathematics academic performance has been a topic of interest and research for many years. Multiple studies have been conducted to understand if there is a significant difference in performance between boys and girls in Mathematics.

There is increasing evidence that girls are outperforming boys in secondary education across a variety of subjects except in Mathematics and Sciences (Jabbari & Johnson, 2023). Numerous studies have been assumed to examine the influence of gender on undergraduate student engineering performance from early-year performance to that of later years, with inconsistent outcomes. Some of the literature recommends that gender differences are reliant on the kind of evaluation employed, reporting that females tend to achieve better results than males in the coursework. Jabbari et.al. (2023) have authored in their research that there was difference in the admission and attainments of gender in engineering courses, they further stated that only 28% of women making up the STEM workforce. In the industrialized world, a significant body of scholarly research has grown in recent years to address gender inequalities and recommendations for closing the gender gap are well-documented in this literature. Why there are gender variations in Mathematics teaching in African schools, however, has not yet been thoroughly investigated (Forgasz & Rivera, 2021).

The 21st century ICT advancement is promoted through integration of the STEM discipline in schools' levels. The integration of the STEM education knowledge is very vital as it enhances the country economic growth. Is also important in technology development towards country's industrial revolution. Anaya et al. (2022) indicated that despite the better employment opportunities related to the STEM fields the female gender remains under presented in certain STEM fields. Many women are not interested to work in the STEM related occupations even if they have attained degrees in these subjects unlike males (Siregar et al. 2023). Study by Ganley et al. (2018) supported this by stating that STEM subjects are male dominated and this explains as to why females are under presented in the STEM related fields.

Gender-related factors can have an impact on student academic performance. Research have shown that girls tend to outperform boys in certain subjects, such as reading and writing, while boys may excel in Mathematics and sciences. However, these differences are not due to inherent abilities, but rather to a combination of social, cultural, educational factors, stereotypes and gender expectations. Girls may be socialized to be more focused on academics and may receive more encouragement and support from parents and teachers. On the other hand, boys

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may face pressures to conform to traditional masculine roles, which may discourage them from investing time and effort into their studies.

Research have shown that girls often respond well to collaborative and nurturing learning environments whereas boys may benefit from more hands-on and competitive approaches. If classrooms are not accommodating to different learning styles, it can result in lower academic performance for students of both gender differences in self-confidence and Self-esteem. Girls may be more likely to doubt their abilities or downplay their achievements, while boys may be more confident and assertive in their academic pursuits.

Gender differences were found in both personality traits and academic motivation scales. Intrinsic motivation may predict high academic performance as it was argued by (Avcı, 2022). Gender was discovered to be a moderator in the association between conscientiousness and academic success. Conscientiousness and intellect appeared as mediators of the relationship between intrinsic motivation and academic performance. In terms of academic accomplishment, women are more driven than men. Additionally, one of the most crucial elements for academic performance is intrinsic motivation. Some personality characteristics, gender dynamics, and cultural distinctions also influence on students' academic achievements. Openness and conscientiousness in men are mediators between intrinsic motivation and academic performance. Differences in the ways that boys and girls are socialized and encouraged to pursue Mathematics influence on the performance. In some cases, boys may be encouraged and supported in their interest and pursuit of Math's, while girls may be discouraged or face barriers due to societal norms and expectations.

Societal and cultural expectations and stereotypes affect how students perceive their own abilities in Mathematics. In many cases, there is a stereotype that boys are naturally better at Math's than girls. This stereotype can create a self-fulfilling prophecy, where girls may internalize the belief that they are not as capable in Math's and therefore may not put in as much effort or have as much confidence in their abilities. This can ultimately impact their academic performance (Shah et al. 2023).

Thomson et al. (2023) states it seems that both gender gaps in academic achievement and the potential causes of such differences continue to be incongruous. In other words, the gender of the student may influence the association between test anxiety, muscle endurance and cardiorespiratory fitness and academic achievement. Adams et al. (2019) examined mean differences in developmental assets between nations and academic achievement using an Analysis of Variance. Mathematics is one of the cores and compulsory subject in the Kenya education system both in primary and secondary school and is examinable in all the levels. According to education for all Global Monitoring Report (2022), which states that, although girls are now catching up in Mathematics by the end of primary school, boys are still overrepresented among the top performers in this subject in primary and secondary education worldwide.

A study by Vilmala (2022) on the journal "A literature review of education for sustainable Development (ESD) in sciences learning" argued that more efforts are needed to introduce STEM education at the implementation level in science instruction in the classroom, especially when it is integrated with the ESD concept.

The study by Eddy & Brownell (2016) examined an introductory engineering course, there were gender inequalities in the academic performance and attitudes of the students about

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their education and themselves. By comparing coursework results between the two genders utilizing assignments, projects, tests and class participation, student academic achievement was assessed. The survey was also designed to establish whether or not the course objectives had been met and to see if students' abilities in the aforementioned areas had improved.

Despite the spirited gender enrichment awareness efforts, gender disparity in students' Mathematics performance continues to persist. Hence there is a need to explore more on influence of selected gender differences in students' achievements in Mathematics in basic secondary schools with a view of suggesting possible intervention strategies. Therefore, the need for such a study. Academic performance in Mathematics refers to how well a student performs in their Math's courses and assessments. It is a measure of their understanding, application and mastery of Mathematical concepts and skills. Strong academic performance in Mathematics is important for several reasons. First, Mathematics is a fundamental subject that is used in various disciplines and professions. It provides a foundation for critical thinking, problem-solving and logical reasoning, which are essential skills in many fields. A good understanding of Mathematics opens up opportunities for students in fields such as engineering, finance, computer science and even in everyday life tasks like managing personal finances or making informed decisions.

Mathematics also helps develop important cognitive abilities, such as analytical thinking and pattern recognition. It enhances logical and abstract reasoning skills, which can be useful in a wide range of intellectual pursuits. Moreover, a strong performance in Mathematics can boost a student's confidence and self-esteem, as they gain a sense of accomplishment and mastery over a complex subject. Gender-related factors can have an impact on academic performance in Mathematics. Research has shown that there is misalignment in the performance of boys and girls in this subject.

According to education cabinet secretary Ezekiel Machogu report as he released the Kenya certificate of secondary examination (KCSE) exam 2022 he stated that 17 subjects recorded a significant improvement. According to the report Mathematics was among the dropped and poorly performed subject. 50% of the candidates score grade D and E in Mathematics. Males outperformed the females in the subject.

Relevantly, since the academic year 2014-2022, there has been a deteriorating performance for the Mathematics subject in public Secondary Schools in Voi sub-county, Taita Taveta County. It has a long-observed phenomenon and distribution regardless the student's gender. The problem of poor performance in the subject might have been influenced by gender-related factors. Therefore, the purpose of this study was to explore on the possible gender challenges and outshine reasonable measures to curb the deteriorating performance of Mathematics in public secondary schools of Voi Sub-County.

Statement of the Problem

Since the academic year 2014-2022, there has been a deteriorating performance for the Mathematics subject in public secondary schools such as; Mbololo Secondary, Miasenyi Secondary, Sita Secondary, Mbele Secondary and both Voi Boys & Girls Secondary Schools in Voi Sub-County, Taita Taveta County. It has a long-observed phenomenon and distribution regardless the student's gender. The problem of poor performance in the subject might have been

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influenced by gender related factors. Therefore, the purpose of this study was to explore on the possible gender challenges and outshine reasonable measures to curb the deteriorating performance of Mathematics in public secondary schools of Voi Sub-County, Taita Taveta county.

Academic performance refers to the extent to which a student is achieving and excelling in their academic endeavors. It is a measure of their knowledge, skills and abilities related to their studies and is usually reflected through grades, test scores and overall academic achievements, that can determine a student's academic performance. These include their level of motivation, study habits, time management skills, intelligence, cognitive ability and the quality of their learning environment. Additionally, external factors such as family support, socioeconomic status and school resources can also impact academic performance.

High academic performance is often associated with receiving good grades and scoring well on tests and exams. It indicates that a student is mastering the material being taught and is able to apply their knowledge to solve problems and answer questions. Students who consistently perform well academically often have a strong work ethic, engage in effective studying techniques and have a high level of self-discipline. Poor academic performance can be indicative of several factors. It may suggest that a student is struggling to grasp the material or is not motivated to succeed. Poor study habits, procrastination, lack of organization and ineffective time management can also contribute to lower academic performance. Additionally, external factors such as personal issues, stress contribute to low academic performance.

Literature Review

Several studies have examined the relationship between gender and Mathematics performance. Mathematics has been a gender-marked subject with males seen to do better than girls in many countries such as Kenya (McCoy et al. 2022). This perception of gender differences is reflected in the student's actual Mathematics performance. Teachers' beliefs had a positive significance to students' academic achievement and future career choices. According to Hyde et al. (2018), a meta-analysis of international studies revealed no significant gender differences in Mathematics performance overall. However, this meta-analysis did highlight small gender differences favoring males in some sub-domains, such as complex problem-solving tasks. Similarly, PISA (Program for International Student Assessment) reports by the OECD (Organization for Economic Co-operation and Development) have consistently found negligible gender differences in Mathematics performance among 15-year-old students across various countries, including Kenya (OECD, 2020).

According to Copur- Gencturk et al. (2020) authored that teacher of Mathematics shows gender-based implicit biases even in decontextualized experimental settings. Teachers and students must have a positive relationship to have an attachment. When Mathematics teachers have a negative stereotype against girls this will contribute to negative effects on girls thus low grades in Mathematics but no effects on boys. Teachers encourage and help boys to work on more challenging Mathematics work but for girls let them stick to the easy tasks. In such a way, boys tend to improve faster due to much training as compared to girls.

Kaplan et al. (2023) state that student's self-concept, attitudes and behavior are important factors contributing to students' performance. Intrinsic motivation, students' expectations and

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students' Mathematics self-concept significantly predict the student's Mathematics performance. The study showed that teachers' treatments contribute to Mathematics self-concept which in turn predicts the students' expectations. Female students are more extrinsically motivated than their male counterparts. Therefore, their expectation is higher and thus their self-concept in Mathematics is less than that of male students. Franz-Odendaal et al. (2020) indicated that most female students lacked confidence when working on Mathematics problems as compared to male students, this may lead to the leaking of the exams to female students.

In one study by developmental psychologist Eleanor (2019), On the question of whether there are gender differences in Math ability among the general population in the United States, it was determined that there are, in fact, scientifically proven gender disparities, with men performing better in Math's. Beginning around the age of 12 or 13, boys' Math skills grew more quickly than girls', resulting in a considerable gender disparity in performance by high school. (Richardson et al. 2017). Results have revealed consistent gender differences in favor of boys in Mathematics performance in most countries. However, according to Fennema et al. (2019) the gender gap in Mathematics has been decreasing in recent decades and is quite small. The problem of the "gender gap" has reinvented itself as researchers have studied it and found partial explanations and solutions as to why the achievement of girls and boys was not at the same level. Benbow & Stanely, (2020) favored the theories that claim that men have a Mathematical advantage over women in terms of achievement and attitude.

Many gender research and studies in Mathematics education have focused on trying to understand the reasons behind gender inequalities in Math and science education (Shauman et al. 2019). Research shows significant differences in girls' and boys' performance in school Mathematics, which has been a subject of much debate in the educational field (Sprigler & Alsup, 2017). While early studies (Fennema & Sherman, 2017) suggested that males outpaced females in Mathematics achievement at the junior high and high school levels, more recent studies have revealed that the male advantage in Math achievement is a universal occurrence.

Hernández Serrano et al. (2020) have demonstrated that gender inequalities in Mathematics accomplishment start to emerge at the secondary level when female students start to display a lack of confidence in their Mathematical skills and score worse than male students on problem-solving and higher-level Mathematics activities. Evidence also suggests that, despite their aptitude, women occasionally perform less well than they ought to on significant Math achievement tests. Consequently, due to a phenomenon known as stereotype threat, their test results do not accurately represent their genuine abilities (Forgasz & Rivera, 2021).

A study by Kaino (2018) addressed the problem of gender differentials in Mathematics in Botswana Junior Secondary schools by identifying three themes forming the major areas of concern for investigation; these are "students' interest in learning Mathematics, feelings in Mathematics class and interactions in a Mathematics class" (Kaino, 2018). Despite the focus placed on Mathematics, including its inclusion as a required subject in the secondary school curriculum, there are still disparities in students' performance on Mathematics exams. According to Mondah's (2021) theory, people learn differently depending on how they take in and interpret the world. Girls typically perform worse than boys in the Kenya Certificate of Secondary Education (K.C.S.E.) in terms of overall performance, according to research findings. Gender

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inequalities in Mathematics performance have been present for a long time in Kenya, according to K.C.S.E Math's performance results.

This study has consulted several sources of knowledge authorities regarding the subject matter at hand. Indeed, the sources are rich with information, thereby indicating their diverse findings which have similar relations to this research. Despite this, no researcher made headway into studying the topic at hand, in this specific geographical area- Voi Sub-County, Taita Taveta County, Kenya. As a consequence, this research focused on the knowledge gap that exists in the aforementioned area to fill the knowledge gap. The findings of this study in the texts ahead exemplify this point.

Theoretical Aspects

Feminist theory according to Budhai et al. (2023) helps us to understand gender differences in education, gender socialization and how education systems may be easier for boys to navigate than girls. Education according to feminists transmits patriarchal norms and values and gender scripts. Patriarchal is the main cause of gender inequality.

Liberal feminists have tried to eradicate sexism from the students' books and media. It emphasizes gender equality. They further asserted that females and males are equal biologically but gender differences arise from society which directly influence students' performance. According to radical feminists' men and boys are naturally inclined to exploit and oppress women and girls. The feminism theory seeks to free women from the oppression of gender roles (gender inequality and sexuality). Science and Mathematics were not compulsory subjects until the introduction of the National Curriculum by the Education Reform Act of 1988. Not many girls studied Mathematics and sciences. Research consistently demonstrates the gender pay gap, where women earn less than men for the same work. According to the World Economic Forum's Global Gender Gap Report 2021, women around the world earn approximately 63% of what men earn. This evidence highlights the need for feminist theory to address and rectify wage inequalities.

Feminism theory also sheds light on the prevalence of gender-based violence. Numerous empirical studies have found that women experience higher rates of intimate partner violence, sexual assault and harassment compared to men. The World Health Organization estimates that one in three women worldwide experience physical and/or sexual violence in their lifetime, making this a significant issue that feminism seeks to address study conducted by the Institute for Women's Policy Research in the United States. The study found that in 2019, women earned only 82 cents for every dollar earned by men. This empirical evidence highlights the systemic discrimination and unequal treatment of women in the workforce, supporting feminist arguments for equal pay and employment opportunities.

Another empirical evidence supporting feminist theory is the prevalence of gender-based violence. Research consistently shows that women are disproportionately affected by various forms of violence, including domestic violence, sexual assault, and harassment. For instance, the World Health Organization estimates that one in three women worldwide has experienced physical and/or sexual violence in their lifetime. These statistics provide empirical evidence of the pervasive gender-based violence that women face, reinforcing feminist arguments for the need to address and eliminate violence against females.

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Girls are perceived to perform better in languages and art subjects while boys are believed to perform better in science and Mathematics (Pilotti, 2021). Also, boys are improving and dominating STEM-related career fields. Boys and girls may perform differently based on their cultural beliefs. Although liberal feminists recognize the work and achievements of women and girls but yet they underestimate the influence teachers have on the formation of gender identity. Teachers would reprimand boys for behaving like girls and also teasing them if they underperform.

Siltanen et al. (2023) in their article "Women and the Public Sphere "argued that gender bias still exists. Teachers have higher expectations for boys than girls and also encourage and motivate boys to further their education more than girls on the same level. This theory is connected to the study as it will encourage male students to study the so-called feminine subjects and also female students to study masculine subjects to help them enhance their careers in the future. In the realm of education, studies have also found gender disparities. Research has shown that girls and women are often discouraged from pursuing academic fields traditionally dominated by men, such as science, technology, engineering and Mathematics (STEM). This perpetuates stereotypes about gender roles and limits the opportunities available to women. Feminist theory argues for the need to challenge these stereotypes and provide equal opportunities for girls and women in all fields of education.

Methodology

This study adopted a Mixed-Method research design as a procedure for collecting and analyzing data by mixing both quantitative and qualitative methods in a single study (Creswell, 2019). The researcher used this approach since it helped the researcher to attain an in-depth explanation of a specific insight about a particular situation (Bloomfield & Fisher, 2019). The views obtained were used to infer the whole population. These designs were considered suitable for the study since both qualitative and quantitative data were used to define the current state of the effect of gender differences on Mathematics performance in schools.

The target population of the research comprised of 24 public secondary schools in Voi sub-county. The target population also included 24 Principals in all the public schools both boys and girls and all teachers of Mathematics in Voi Sub-County in Taita Taveta County. The teachers were selected for the study because they have been with the students for relatively a long time to understand their performance, attitudes and perceptions of Mathematics.

Simple Random Sampling (SRS) was employed to issue questionnaires to achieve a truly representative sample size from the target population. The researcher used a simple random sampling technique to minimize bias and give equal opportunity as cited by (Dahabreh & Hernán, 2019). The researcher subjected the selections of schools to randomization from the list of public mixed, boys and girls in Voi Sub-County to provide an equal chance of participation for all the potential participants in the schools.

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To determine the sample size of the schools to include in the study the researcher used Slovin’s formula:

$$n = \frac{N}{1 + Ne^2}$$

In the equation,

n is the sample size

N is the total population

e is the margin of error/ Error tolerance (level).

According to the formula, the researcher selected a sample of 23 schools using a 95% confidence interval. Slovin’s formula enabled the researcher to sample the research population with a high level of accuracy.

$$n = \frac{24}{1+24 \times (0.05^2)} = 23$$

Table 1.1 Sample Size

Target Group	Number of Schools	Respondents Per School	Sample Size
Mathematics Teachers	23	3	69
Principals	23	1	23
Total	23	4	92

Source: Research, 2023

The researcher captured the data using questionnaire for data collection. Questionnaires were used to collect data from the principals and teachers. The researcher used questionnaires because they are easy to administer and have the potential to collect a large amount of information within a short period (Grierson, 2023).

Findings

Gender- Related Factors

Table 1.2: Gender-Related Factors

Gender Factors	1	2
Boys are better than girls in Mathematics	3.0667	1.31861
Boys are more gifted in Mathematics than girls	3.3600	0.95351
Difficult subjects (STEM) are for boys and Easy for girls (non-STEMS)	3.5333	0.94916
The gender of my students affects their ability to learn Mathematics concepts	3.3867	1.01200
Boys have better strategies for Mathematics than girls	3.2933	1.01040

Source: Research, 2023

Table 1.2 above, presents the responses inform when the Mathematics teachers were asked to rate the extent to which they agreed or disagreed with the statements concerning Students’ Gender factor. The study had used a Likert-scale with five points of 1 to 5; (Scale: 1= Strongly Disagree (SD), 2=Disagree (D), 3=Moderate Agree (MA), 4=Agree (A) and 5= Strongly Agree (SA)). From results of the mean values responses with range 3.0667 - 3.5333 were above the

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expected mean value of 2.5 on the Likert-scale with five points one to five (1 to 5). Boys are better than girls in Mathematics 3.0667, Boys are more gifted in Mathematics than girls 3.3600, Difficult subjects (STEM) are for boys and Easy for girls (non-STEMS) 3.5333, The gender of my students affect their ability to learn Mathematics concepts 3.3867 and Boys have better strategies for Mathematics than girls 3.2933. All the items standard deviations were within range of 0.94916 - 1.31861 meaning that the responses were not much dispersed from each other. This implied that there were no huge discrepancies in response to questions among all the respondents.

Table 1.3: Correlation Matrix

		Performances in Mathematics	Gender-Related Factors	Attitude toward Learning	Perception	Teachers Influence	Government Policy
Performances in Mathematics	Correlation	1					
	P-value						
Gender-Related Factors	Correlation	0.501**	1				
	P-value	.000					
Attitude toward learning Mathematics	Correlation	0.490**	0.561**	1			
	P-value	.000	.000				
Teacher perception	Correlation	0.438**	0.529**	0.430**	1		
	P-value	.000	.000	.000			
Teachers Influence	Correlation	0.512**	0.660**	0.518**	0.624**	1	
	P-value	.000	.000	.000	.000		
Government policy	Correlation	0.412**	0.599**	0.616**	0.654**	0.452**	1
	P-value	.000	.000	.000	.000	.000	
	N	75	75	75	75	75	75

Source: Research, 2023

From Table 1.3 above, it can be observed that the correlation between the causes variables and the dependent variable was high and positive at 0.501**, 0.490**, 0.438**, 0.512** and 0.412** for Gender Factor, Perspective, Perception Influence and Government policy respectively. The implication was that the high correlation between gender factors and Performances in Mathematics. The implication was that the high correlation between performance and its determinants was good for regression analysis. The interpretation was that the level of multicollinearity between the independent variable was not very high which meant that the influence of each variable in the regression model could be isolated individually.

Table 1.4: Table for Regression Coefficient

Variables	B	Std. Error	T-statistic	P-value
1 (Constant)	0.413501	0.060517	6.832847	0.0000
Gender-Related Factors	0.162646	0.019830	8.201884	0.0000
Attitude toward learning Mathematics	0.298373	0.018548	16.08617	0.0000
Teacher perception	0.119699	0.018232	6.565436	0.0000
Teachers Influence	0.284814	0.017347	16.41862	0.0000
2 (Constant)	0.470194	0.066510	7.069573	0.0000
Gender-Related Factors	0.158266	0.021561	7.340364	0.0000
Attitude toward learning Mathematics	0.356445	0.021514	16.56821	0.0000
Teacher perception	0.183827	0.020901	8.795251	0.0000
Teachers Influence	0.390906	0.021220	18.42139	0.0000
Government policy	0.242162	0.028244	8.574040	0.0000

Source: Research, 2023

$$Y = 0.470194 + 0.158266 \text{ Gender related factors} + 0.356445 \text{ Attitude} + 0.183827 \text{ Teacher perception} + 0.360 \text{ Teacher Influence} + 0.242162 \text{ Government policy} + \epsilon$$

From Table 1.4 above, the regression coefficient of Gender-Related Factors was found to be 0.158266. This value shows that holding other variables in the model constant, an increase in Gender-Related Factors by one unit causes the performance in Mathematics to increase by 0.158266 units. The value of the coefficient is also positive. The positive effect shows that there is a positive relationship between Gender-Related Factors and performance in Mathematics. The variable was also found to be an influential variable on the performance in Mathematics. The study agrees with feminism theory which states that gender inequality exists and the Liberal feminists try to eliminate it in books. The findings of this study also give reliable information that teachers' stereotypes and biased thoughts had a positive relationship with students' self-confidence which directly influenced on students' Mathematics achievements.

Discussions

The regression coefficient of Gender-Related Factors was found to be 0.158266. This value shows that holding other variables in the model constant, an increase in Gender-Related Factors by one unit causes the performance in Mathematics to increase by 0.158266 units. The value of the coefficient is also positive. The positive effect shows that there is a positive relationship between Gender-Related Factors and performance in Mathematics. The variable was found to be an influential variable on the performance in Mathematics. The study agrees with feminism theory which states that gender inequality exists and the Liberal feminists try to eliminate it in books. The findings of this study also give reliable information that teachers' stereotypes and biased thoughts had a positive relationship with students' self-confidence which directly influenced on students' Mathematics achievements as stated by Al Umairi et al. (2023). The findings of this study also support the study by Mc Coy et al. (2022) by proving that Mathematics is a gender-marked subject with males performing better than females. However, the study contradicts Hyde et al. (2018) who stated that no significance between gender differences and Mathematics performance.

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The study concluded that gender-related factors influence performance in Mathematics among secondary schools in Voi Sub-County, Taita Taveta County, Kenya. The findings that learners' attitudes had a positive influence on performance was a supportive indication that an increase in gender-related factors increases high school students' performance in Mathematics, which in turn enhances the performance of students on the overall grades among high school students. This study therefore concluded that a gender-related factor was an influential variable. The Gender-Related Factors variable was revealed to be an important determinant of performance in Mathematics. Secondary schools should therefore come up with means to ensure that the student's Gender-Related Factors are looked into. The government should encourage positive Gender-Related Factors in students by making sure there are programs to make sure that students take an interest in Mathematics. The key stakeholders should do something to enhance the Gender-Related Factors to reduce the existing problem of poor performance in Mathematics.

Conclusion

The study concluded that gender-related factors influence performance in Mathematics among secondary schools in Voi Sub-County, Taita Taveta county, Kenya. The findings that learners' attitudes had a positive influence on performance was a supportive indication that an increase in gender-related factors increases high school students' performance in Mathematics, which in turn enhances the performance of students on the overall grades among high school students. This study therefore concluded that a gender-related factor was an influential variable.

Recommendations

The Gender-Related Factors variable was revealed to be an important determinant of performance in Mathematics. Secondary schools should therefore come up with means to ensure that the student's Gender-Related Factors are looked into. The government should encourage positive Gender-Related Factors in students by making sure there are programs to make sure that students take an interest in Mathematics. The key stakeholders should do something to enhance the Gender-Related Factors to reduce the existing problem of poor performance in Mathematics.

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References

- Adams, B. G., Wium, N., & Abubakar, A. (2019, April). Developmental Assets and Academic performance of adolescents in Ghana, Kenya, and South Africa. *In Child & Youth Care Forum*, Springer US.
- Al Umairi, K. S. S., Salleh, U. K. M., & Zulnaidi, H. (2023). Adaptation of the sources of the Mathematics self-efficacy scale for Oman: A validation study. *Eurasia Journal of Mathematics, Science and Technology Education*, Eurasia.
- Anaya, L., Stafford, F., & Zamarro, G. (2022). Gender gaps in Math's performance, perceived Mathematical ability and college STEM education: *The role of parental occupation*. *Education Economics*, America.
- Avcı, Ü. (2022). A Predictive Analysis of Learning Motivation and Reflective Thinking Skills on Computer Programming Achievement. *Computer Applications in Engineering Education*, Turkey.
- Benbow, C. P., & Stanley, J. C. (2020). Inequity in equity: How "equity" can lead to inequity for high-potential students. *Psychology, Public Policy, and Law*, 2(2), 249.
- Budhai, S. S., & Grant, K. (2023). Casting a Wider Net: Incorporating Black Feminist Theory to Support EdD Students' Epistemological Stance Development in Research Methods Courses. *Impacting Education: Journal on Transforming Professional Practice*, 8(3), 10-14.
- Copur-Gencturk, Y., Cimpian, J. R., Lubienski, S. T., & Thacker, I. (2020). Teachers' bias against the mathematical ability of female, Black, and Hispanic students. *Educational Researcher*, 49(1), 30-43.
- Creswell, J. W., (2019). Mixed methods and survey research in family medicine and community health. *Family medicine and community health*, 7(2).
- Dahabreh, I. J., Hernán, M. A., Robertson, S. E., Buchanan, A., & Steingrimsson, J. A. (2019). Generalizing trial findings using nested trial designs with sub-sampling of non-randomized individuals. *arXiv preprint arXiv:1902.06080*.
- Eddy, S. L., & Brownell, S. E. (2016). Beneath the Numbers: A review of Gender Disparities in Undergraduate Education Across Science, Technology, Engineering, and Math's Disciplines. *Physical Review Physics Education Research*, Oakland.
- Eleanor Maccoby. (2019). Gender and geographical disparity in editorial boards of journals in psychology and neuroscience. *Nature Neuroscience*, 25(3), 272-279.
- Fennema, E. & Sherman, J. (2017). Sex related differences in mathematics achievement: Where and why. *PUB DATE 78 NOTE 166p. AVAILABLE FROM Information Reference Center (ERIC/IRC), The Ohio State University, 1200 Chambers Rd., 3rd Floor, Columbus, Ohio 43212*.
- Fennema, Hyde & Burley. (2019). Gender Differences in General Achievement in Mathematics: An International Study. *New Waves-Educational Research and Development Journal*, 22(1), 27-54.
- Fisher, M. J., & Bloomfield, J. (2019). Understanding the research process. *Journal of the Australasian Rehabilitation Nurses Association*, 22(1), 22-27.
- Forgasz, H., & Rivera, F. (2021). Towards equity in Mathematics education. *Gender, Culture, and Diversity*. The Netherlands: Springer.

Citation: Musango, S. W; Marwa, Z/ M & Ahmed, I. (2023). Influence Of Gender On Students' Mathematics Performance In Public Secondary Schools In Voi Sub-County, Kenya. *Journal of Popular Education in Africa*. 7(11), 32 - 46.

- Franz-Odendaal, T. A., Blotnicky, K. A., & Joy, P. (2020). Math self-efficacy and the likelihood of pursuing a STEM-based career: a gender-based analysis. *Canadian Journal of Science, Mathematics and Technology Education*, 20, 538-556.
- Ganley, C. M., Barroso, C., & Conlon, R. A., (2023). Young children's career aspirations: Gender differences, STEM ambitions, and expected skill use. *The Career Development Quarterly*, 71(1), 15-29.
- Global Monitoring Report, (2022). Policies and interventions to remove gender-related barriers to girls' school participation and learning in low-and middle-income countries: A systematic review of the evidence. *Campbell Systematic Reviews*, 18(1), e1207.
- Grierson, J. (2023). *Community, Attachment, Structures and the Epidemic, CASE: A study of the Importance of Gay Community in the Lives of Gay Men* (Doctoral dissertation, La Trobe), Bangkok Rainbow Organisation, Thailand.
- Hernandez Serrano, M. J., & Munoz Rodriguez, J. M. (2020). Interest in STEM disciplines and teaching methodologies: perception of secondary school students and preservice teachers. *Educar*, 56(2), 0369-386.
- Hyde, A. J., Feng, M., May, B. H., Hügel, H., Chang, S. Y., Dong, L., ... & Xue, C. C. (2018). Comparisons between traditional medicines and pharmacotherapies for Alzheimer disease: A systematic review and meta-analysis of cognitive outcomes. *International journal of geriatric psychiatry*, 33(3), 449-458.
- Jabbari, J., Huang, W., & Johnson Jr, O. (2023). Broadening Participation in STEM through Alternative Preparation Programs: *An Exploration of Race, Gender, and Admissions Policies in a Coding and Apprenticeship Program*. *Journal of Women and Minorities in Science and Engineering*, Washington .
- Kaino (2018). Learning Mathematics with Intelligent Tutors: Gender Wise Similarity and Differences. *International Journal of Information and Education Technology*, 8(3).
- Kaplan, O., & Adams, T. L. (2023). How social expectations affect eighth-grade students' math achievement: An investigation of motivational drivers. *Journal of Innovative Research in Teacher Education*.
- Maccoby, E. (2019). Eleanor Maccoby: An abridged memoir. *Annual Review of Developmental Psychology*, 1, 1-20.
- McCoy, S., Byrne, D., & O'Connor, P. (2022). Gender Stereotyping in Mothers' and Teachers' Perceptions of Boys' and Girls' Mathematics Performance in Ireland. *Oxford Review of Education*, Ireland.
- Mondah, O. R., Cheng, Q., Yang, J., & Koua, K. A. D. (2021). Porphyry molybdenum prospectivity in the Zhongdian Arc, SW China: Use of singularity and factor analyses for resource assessment. *Natural Resources Research*, 30, 3881-3903.
- OECD, (2020). Is the math gender gap associated with gender equality? Only in low-income countries. *Economics of Education Review*, 79, 102064.
- Pilotti, M. A. (2021). What Lies Beneath Sustainable Education? Predicting and Tackling Gender Differences in STEM Academic Success. *Sustainability*, Saudi Arabia.
- Richardson, S., Gilmore, C., Keeble, S., & Cragg, L. (2017). The interaction of procedural skill, conceptual understanding and working memory in early mathematics achievement. *Journal of Numerical Cognition*, 3(2).

Citation: Musango, S. W; Marwa, Z/ M & Ahmed, I. (2023). Influence Of Gender On Students' Mathematics Performance In Public Secondary Schools In Voi Sub-County, Kenya. *Journal of Popular Education in Africa*. 7(11), 32 - 46.

Shah, D. B., Bhattarai, P. C., & Wagle, M. P. (2023). Construction and Validation of Nepali Teachers' Self-Efficacy and Classroom Management Practices Instruments through the E-Delphi Technique. *Journal of Higher Education Theory and Practice*, 23(9), 280-298.

Shauman, K. A., & Huynh, J. (2023). Gender, race-ethnicity and postdoctoral hiring in STEM fields. *Social Science Research*, 113, 102854.

Siltanen, K., & Väliniemi, L. Addressing the Gender and Diversity Paradoxes in Innovation—Towards More Inclusive Policy Design.

Siregar, N. C., Rosli, R., & Nite, S. (2023). Students' interest in Science, Technology, Engineering, and Mathematics (STEM) based on parental education and gender factors. *International Electronic Journal of Mathematics Education*, 18(2), em0736.

Sprigler, D. M., & Alsup, J. K. (2017). An Analysis of Gender and the Mathematical Reasoning Ability Sub-Skill of Analysis-Synthesis. *Education*, 123(4).

Thomas, D. P., Hopwood, B., Hatisaru, V., & Hicks, D. (2022). Gender differences in reading and numeracy achievement across the school years. *The Australian Educational Researcher*, 1-26.

Vilmala, B. K., Karniawati, I., Suhandi, A., Permanasari, A., & Khumalo, M. (2022). A Literature Review of Education for Sustainable Development (ESD) in Science Learning: What, why, and how. *Journal of Natural Science and Integration*, Indonesia.