ISSN: 2714-2965 (Print)
ISSN: 2714-3449 (Online)
University of the Gambia supported edition
The African Journal of Behavioural and Scale Development Research
AJB-SDR Vol. 7, No 2, 2025

Impact of Parental Involvement on Students' Mathematics Achievement in Senior Schools, West Coast Region, The Gambia.

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Abstract

This study investigated the impact of parental involvement on Mathematics achievement among senior secondary school students in the West Coast Region of The Gambia. The research focused on assessing the extent of parents' participation in their children's Mathematics education, identifying gender differences in achievement and perceptions of parental involvement, and determining whether a relationship exists between parental involvement and students' Mathematics performance.

This study adopted descriptive survey design. Using a multistage sampling technique, 300 students were selected from five senior secondary schools. Data were gathered through two instruments: the Students' Mathematics Achievement Test (SMAT) and the Students' Questionnaire (SQ), which demonstrated reliability coefficients of 0.61 and 0.76, respectively. Mean scores, t-tests, and Pearson Product Moment Correlation were used for data analysis.

The results indicated that parental involvement in students' mathematics learning was generally low. Although significant gender differences were observed in Mathematics achievement, male and female students did not differ significantly in their perceptions of parental involvement. Furthermore, the study found no significant relationship between parental involvement and Mathematics achievement. The findings suggest the need for greater parental awareness of the importance of education and improved communication between schools and parents through regular feedback on students' academic progress in Mathematics.

Keywords: Mathematics achievement; Parental involvement, Students' performance, Mathematics

Introduction

The significance of Mathematics in both individual learning and societal development is undeniable, as it remains a core component of academic curricula at all levels of education. Mathematics is not solely included to produce mathematicians but to equip learners with essential problem-solving skills applicable to daily life. It is a fundamental discipline that fosters logical reasoning, creativity, and analytical thinking.

Khan (2015) emphasizes that mathematics is deeply embedded in everyday challenges, enabling individuals to use imagination and critical thinking to explore and discover new concepts. Similarly, Decker (2018) asserts that mathematics is integral to all scientific fields, highlighting its role in intellectual development and global scientific advancement.

As a globally recognized core subject, Mathematics forms the base for scientific and technical acquaintance, which is essential for nation's socioeconomic progress (Yusuf & Araba, 2019). Beyond its academic scope, Mathematics cultivates a growth mind-set, enhances logical reasoning, and supports STEM education. It strengthens learners' problem-solving and decision-making abilities by aiding in complex analysis, pattern recognition, and practical applications (Christina et al., 2017).

Additionally, Mathematics offers a framework for comprehending and solving current issues in a variety of disciplines, including engineering, economics, medical, and environmental sciences. This implies that Mathematics serves as the foundation for Science, Technology, Engineering and Mathematics (STEM) -related graduate degrees and careers (Christina et al., 2017). For efficient communication and concept articulation, learning mathematical language and communication is crucial (Wilkinson, Bailey & Maher, 2018). Also, Mathematics fosters resilience and perseverance, helping

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ISSN: 2714-3449 (Online)
University of the Gambia supported edition
The African Journal of Behavioural and Scale Development Research
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students to approach challenges adequately. Ernest (2010) asserts that Mathematics is a complex system which in itself is vague. The vagueness or abstract nature of Mathematics affects the student's ability in the subject. This amongst other reasons is why many people believe that Mathematics is just for bright people and men.

PISA, Programme for International Student Assessment (2022) indicates that in numerous education systems, a considerable proportion of learners fail to achieve the minimum required level of competence in Mathematics. Stakeholders with such education systems are quite concerned about low Mathematics achievement. One of the nations in West Africa experiencing the same trends, pressures, and worries is The Gambia, as the unassertive success of students in Mathematics is becoming more worrisome, serving as warning of an endangerment indication in our education system. The poor outcomes in Mathematics have repeatedly been a hindrance to the fulfilment of the learning and employment desires of numerous candidates as it serves as perquisite condition for most careers. This proclamation is justified by the examination accomplishments of entire Gambian candidates in Mathematics for the years 2021 to 2023 as shown in Table 1 below.

Table1: WASSCE performance rate of Mathematics for The Gambia by West African Examination Council (WAEC) from 2021 to 2023

Year	Candidates	% Credit (A1 – C6)	% Pass (D7 & E8)	% Fail F9
2021	15146	12% (1817)	17% (2575)	71% (10754)
2022	13725	8% (1098)	16% (2196)	76% (10431)
2023	15848	8% (1268)	13% (2060)	79% (12520)

Source: WAEC Research Unit, Banjul, The Gambia

From table 1 above, students' performance in Mathematics in 2021 was low. Out of 15146 candidates that sat for to WASSCE Mathematics paper in The Gambia, only 12% (1817) of the candidates passed at credit level, 17% (2575) of the candidates obtained ordinary pass, while 71% (10754) of candidate failed Mathematics. students' performance in Mathematics in 2022 was also low, out of 13725 candidates that sat for the WASSCE Mathematics paper in The Gambia, only 8% (1098) of the candidates passed at credit level credit, 16% (2196) of the candidates obtained ordinary pass, while 76% (10431) of the candidates failed Mathematics. Furthermore, students' performance in Mathematics in 2023 was very low. Out of 15848 students who sat for the WASSCE Mathematics examination paper in The Gambia, only 8% (1268) of the candidates passed at credit level, 13% (2060) of the candidates obtained ordinary pass, while 79% (12520) of the candidates failed Mathematics.

Moreover, from Table 1, the achievement proportion for candidates (credit level i.e. A1-C6) in the Senior School Certificate Examination (SSCE) between 2021 to 2023 ranges between 12% and 8% while the pass rate (pass, i.e. D7-E8) ranges between 17% and 13%. The total failure percentage (i.e. F9) ranges between 71% and 79%. The Table also reveals that over a three-year period, not more than 12% of the candidates registered for Mathematics in SSCE accomplished credit passes in Mathematics. This validates the findings of other studies: Mazana, Montero, and Casmir (2020); Letsoalo (2017); and Njigwum & Oye (2020), that students' performance in Mathematics is below predicted standards.

Researchers have made numerous efforts to ascertain influences associated with students' academic achievement in Mathematics. Abreh, Owusu and Amedahe (2018), studied the achievement of students in Mathematics over a

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ISSN: 2714-3449 (Online)
University of the Gambia supported edition
The African Journal of Behavioural and Scale Development Research
AJB-SDR Vol. 7, No 2, 2025

decade in Ghana and concluded that the teachers' failure to cover 50% to 75% of the academic curricula, time constraints in implementing and completing the curriculum, a shortage of competent teachers, and the practise of ineffective teaching approaches are some contributing factors. According to Hofman & Guldemond (2002), uniformity among teachers, school administrators, governors, and parents fosters a feeling of community inside the school, which in turn helps to create conducive learning environments ideal to student success. School governance features of public and privately owned schools moderate the differential benefits of schooling, the variations in the school community's influence over school board guiding principle.

Parents have the ability to impact their children's success in Mathematics by lowering their anxiety about the subject, especially when it comes to more challenging types of Mathematics (Vukovic, Roberts Green & Wright 2013). They affirmed that lowering students' Mathematics anxiety, parental expectations and support at home affected students' performance on word problems and algebraic thinking. The association between whole number arithmetic and expectations and home support was not mediated by Mathematics anxiety.

Collaboration among teachers, school administrators and parents fosters a feeling of community within the school thereby creating learning environments that are conducive to students' progress. Poor parental support for students on homework and assignments on Mathematics vividly hampered students' achievement in Mathematics. From an educational viewpoint, it is vital that parents vigorously participate and reliably engage themselves in their children's learning. It is believed that the more parents are devoted to assisting their children's academic undertakings, the greater their children's success will be (Oranga, Matere & Nyakundi, 2023).

Hen and Gregory's (2009) study finds that Students who recognized that their parents held ambitious goals for their academic success achieved higher GPAs and exhibited greater classroom engagement. These expectations served as a powerful mechanism of academic socialization, proving more effective in promoting positive outcomes than established forms of parental participation such as supporting with homework or participating in conferences of parent-teacher.

Drawing on Connell and Wellborn's (1991) theoretical model, Ratelle et al. (2005) demonstrated that parental involvement and support foster students' motivation by enhancing their sense of competence, autonomy, and relatedness. Their findings showed that perceived parental autonomy support significantly predicted students' persistence in science, with this relationship being partly explained by increased autonomy. Although perceived parental involvement did not directly predict persistence in science, it had an indirect effect by strengthening students' feelings of autonomy and relatedness. These findings underscore the important role of supportive parenting in promoting students' sustained engagement and persistence in science education.

The study underscores the distinct functions of parental contribution and care in determining students' self-conceptualisations and academic results. Parental support for autonomy remains an important influence during late adolescence and throughout the college years, as it encompasses corroborating students' sensations and boosting autonomous decision-making, especially in the course of this interim phase. Furthermore, observed parental participation, revealed through interest and time devoted on students, reinforces their understanding of independence, competency, and connectedness as vital elements for upholding determination in challenging areas like Science, as well as Mathematics-related fields.

Chen and Mok (2023) investigated the association between students' observed parental participation and their educational success. They found that higher degree of perceived parental participation positively correlated with increased academic buoyancy and adaptability. This suggests that students who perceive higher levels of parental support are more prepared to navigate learning challenges, manage uncertainty, and adapt to new situations in Mathematics classrooms.

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Gender partialities in education and societal anticipations can influence both Mathematics success and professional choices. Eccles (2014) suggested that stereotype threats, like the notion that schoolboys are inherently ameliorate at Mathematics, can erode girls' confidence in addition to performance, particularly in competitive environments. Gender disparity in Mathematics achievement differs from country to country, fashioned by traditional approaches and education practices. Guiso, Monte, Sapienza and Zingales (2008) noticed that in societies that exhibit higher levels of gender parity, girls achieve similar results to boys in Mathematics, indicating that societal norms contribute significantly to shaping academic success.

Boys and girls may perhaps approach Mathematics differently due to societal norms and expectations. According to Wang and Degol (2017), cultural stereotypes and self-perception play essential part in influencing girls' participation and attention in Mathematics, which can affect their long-term academic success and career ambitions. This effect is especially pronounced in more complex Mathematics subjects and STEM-related fields, where girls tend to be underrepresented, even though their performance in earlier grades is often comparable to boys.

Ghasemi, Burley and Safadel (2019) identified implicit and explicit cultural partialities in policymaking as a key factor contributing to the poor representation of women in Mathematics-associated occupations. They emphasized that this issue remains a significant concern for policymakers, economists, and educators.

Despite Mathematics' crucial function in the country's general development and prosperity, students in The Gambia regularly exhibit poor achievement in the subject, as supported by their performance rates in WAEC exams for senior schools over the past decade. This continuing failure or underachievement in Mathematics raises trepidations among education stakeholders, this continuing failure or underachievement in Mathematics raises serious trepidations among education stakeholders, as it may impede the nation's ability to nurture a sufficient number of scientists, given Mathematics' crucial role in science-related professions. Empirical studies have identified several factors contributing to poor achievement in Mathematics, including ineffective teaching methods, inadequate curriculum coverage, limited parental support for students and schools and ineffective school leadership styles. Although these factors have been examined in various places, there is no substantial study on the influence of parental participation on students' Mathematics success in senior schools within West Coast Region, The Gambia.

In order to fill this void, this investigation targets to survey the impact of parental involvement in students' Mathematics achievement in senior schools. Specifically, it seeks to establish the extent of parental participation in their children's Mathematics learning; assess gender disparities in academic achievement and students' perceptions of parental involvement and examine the association between parental involvement and students' academic performance in Mathematics at the senior school.

Research Questions

i. To what extent does parental involvement influence children's Mathematics learning in senior schools in West Coast region, The Gambia?

ii. Is there any significant difference in academic achievement and perception of male and female students on parents' involvement in their academic achievement in Mathematics in senior schools in the West Coast region, The Gambia?

iii. What relationship exists between parental involvement and students' academic success in Mathematics in senior schools in West Coast region, The Gambia?

Method

The investigation implemented descriptive research methodology of the survey style as variables of this study were not manipulated but were studied as they already existed. This design involved administering appropriate research instruments to the respondents to describe their opinions and views regarding the subject of investigation.

A multistage sampling procedure was

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ISSN: 2714-3449 (Online)
University of the Gambia supported edition
The African Journal of Behavioural and Scale Development Research
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implemented in this study. This technique is cost-effective compare to other techniques; reduces bias and it allows the use of diverse sampling techniques.

In the main stage, stratified sampling method was utilized to group schools into public schools, grant-aided schools and private schools.

In the second stage, simple random sampling method was employed to choose five (5) senior secondary schools from schools in West Coast Region of The Gambia. The five schools selected comprised Mingndaw Senior Secondary Schools School, a grant-aided school; Sibanor and Kabafita Senior Secondary Schools, the two public schools; and Sheikh Hamdan and Yunus Senior Secondary Schools, the two private schools.

In the third stage, a proportional allocation technique was used to select 300 students. This guaranteed that the sample was illustrative of the population and that all participants of the population had the same probability of being carefully chosen.

Inclusion standards for students included being in the selected senior secondary schools and studying Mathematics as a subject in grade twelve.

Two instruments, Students' Mathematics Achievement Test (SMAT) and Students' Questionnaire (SQ), were self-developed and administered by the researcher to the respondents. SMAT contained twenty-five (25) multiple-choice items with four options to test students' level of achievement in mathematics whereas; SQ encompassed ten (10) items on Students Parental Involvement Scale (SPIS) to examine the extent of students' parents support to their Mathematics learning.

Face and contented legitimacy of the instruments were both certified. To safeguard the face authenticity of the instruments, the first preliminary version of the instruments were reviewed by experts in item construction and two experts in Mathematics. Their constructive criticisms and recommendations were integrated into the ultimate draft of the instruments. Content validly was established with the use of table of specification.

Copies of the instruments were administered to forty students in senior secondary schools that were parallel to the sample to ensure the reliability of the instruments. The reliability and internal consistency of SPIS were established using Cronbach's Alpha with coefficients r = 0.76 obtained. Reliability of Students' Mathematics Achievements Test (SMAT) was also ascertained using Kuder-Richardson formula 20 (KR-20) with KR-20 = 0.61 obtained.

Frequency counts, percentages, mean and standard deviation were obtained descriptively to analyse the demographic information and research question 1; question 2 was subjected to t-test statistical tool and the third question was tested using Pearson Product Moment Correlation (PPMC).

Results

The analysis of gender among the 300 respondents (students), as shown in Table 2, revealed that 135 students (45%) were boys, while 165 students (55%) were girls. This confirms that there were more female respondents than males.

Students	Frequency	Percentage (%)
Male	135	45
Female	165	55
Total	300	100

Source: Fieldwork, 2024.

Table 3: Shows frequency counts, percentages, mean and standard deviation of students' responses on their parents participation in their students' responses mathematics learning

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Table 4: show T-test outcome on significant difference in academic success of male and female students in Mathematics

Gender	N	Mean	Std	df	t	sig
Male	135	10.32	5.129	266.913	3.885	0.000
Female	165	8.14	4.445			

Since the t – value **(3.885)** is significant at 0.05 as t = 3.885, P (0.00) < 0.05. This implies that there is substantial difference in academic success of gender of students in Mathematics.

Table 5: show T-test outcome on significant disparity in the perception of male and female students on parents' involvement in their academic success in Mathematics

Gender	N	Mean	Std	df	T	sig
Male	135	27.70	5.341	298	0.869	0.386
Female	165	27.12	6.087			

Since the t – value **(0.869)** is not significant at 0.05 as t = 0.869, P (0.386) > 0.05. This implies that there exists no significant difference in the perception of male and female students on parents' involvement in their academic achievement in Mathematics.

Table 6: Shows the association between parental participation and students' academic success in Mathematics

	N	mean	Std. Deviation	r	Sig.
Mathematics achievement	300	9.11	4.880	0.032	0.584
Parental involvement	300	27.38	5.761		

The R-value **(0.032)** in the above Table 6 indicates that **3.2%** of the variance in the dependent variable (Students' Mathematics Achievement) is explicated by explanatory variable (Parental involvement). The Sig. value **(0.584)** is greater than **0.05** indicating that the connection between parental engagement and students' academic achievement in Mathematics is not significant. **Discussion of findings**The outcomes of this investigation uncovered that parental involvement in students' academic success in Mathematics is minimal at the senior school level. These results align with the research of Epstein and Steven (2002) and Xitao and Michael (2001), who identified an affirmative relationship between parental participation and enhanced academic performance, particularly in \Mathematics. In contrast, Lankard (2015) emphasized that low parental encouragement significantly reduces the likelihood of students, despite their acumen or socio-economic level, aspiring to attend college. In contrast, high parental encouragement increases the likelihood of students pursuing education, even when socio-economic and intelligence levels are relatively low. Lankard concluded that the structure and approach of family support contribute a fundamental role in inducing children's academic performance, as the organization and direction of the family system directly influence their educational outcomes.

The end result of the research question two revealed that there is no substantial difference between male and female students' perceptions on parental involvement in their mathematics academic achievement, as the p-value (0.584) surpasses the 0.05 threshold. This discovery is in contrast with the findings of Ing (2014) and Hong et al. (2010) who also found on\ the significant disparity between male and female students' perceptions on parental involvement in their academic achievement. However, result also revealed that there is significant difference in academic achievement on gender of students in Mathematics as the as the p-value (0.00) is less than the 0.05 threshold. These results align

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Item no.	SD	D	A	SA	Mean	S.D
1. My parents regularly support me with my Mathematics homework or assignments.	96 32%	124 41.3%	52 17.4%	28 9.3%	2.04	0.93
2. My parents communicate with my Mathematics teacher to discuss myprogress and challenges.	103 34.3%	117 39%	43 14.4%	37 12.3%	2.05	0.99
3. My parents regularly show up at parent - teacher meetings or conferences to discuss my Mathematics progress.	50 16.7%	51 17%	101 33.6%	98 32.7%	2.82	1.07
4. My parents engage me in mathematical discussions or activities outside of school hours.	72 24%	121 40.3%	61 20.4%	46 15.3%	2.27	0.99
5. My parents actively search for educational resources and materials to support my Mathematics learning at home.	48 16%	60 20%	104 34.7%	88 29.3%	2.77	1.04
6. My parents always make sure that I complete my homework in Mathematics.	66 22%	106 35.3%	82 27.4%	46 15.3%	2.36	0.99
7. My parents are aware of the Mathematics curriculum and learning objectives that I am expected to achieve.	59 19.7%	102 34%	95 31.6%	44 14.7%	2.41	0.96
8. My parents teach me some aspects of Mathematics at home.	92 30.7%	143 47.6%	42 14%	23 7.7%	1.99	0.87
9. My parents offer me the chance to attend evening classes after school hours	36 12%	40 13.3%	96 32%	128 42.7%	3.05	1.02
10. My parents support and reinforce the importance of Mathematics education as a key to my future success.	58 19.3%	63 21%	93 31%	86 28.7%	2.69	1.09
Average Mean					**2.445**	**1.00**

The table above indicates four options, with a mean score of 2.5 or higher representing a great level of parental participation in students' academic achievement in Mathematics. The results in the table show that the mean scores for item 3 (2.82), item 5 (2.77), item 9 (3.05), and item 10 (2.69) are all above 2.5, suggesting a high degree of parental contribution in these areas. However, the overall average mean scores of 2.445 suggest that parental participation in students' academic achievement in Mathematics is of a low extent in senior schools.

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University of the Gambia supported edition
The African Journal of Behavioural and Scale Development Research
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with the findings of Penner & Paret (2008) and Asante (2010). Notwithstanding, the outcome is in contrast to the results of Hyde et al. (2010), Fennema et al. (1998), Ghasemi et al. (2019), Hong et al. (2010).

This study further has exhibited that there exist no significant association between parental involvement and students' academic success in mathematics at senior secondary schools in the West Coast Region of The Gambia as Significant value of 0.584, being greater than 0.05. This outcome also agrees with the discoveries of Sing, Keith, Keith, Trivette & Anderson (1995), who made similar studies on correlation between parental involvement and students' academic achievement in Mathematics.

However, investigation's outcome is in contrast to the discoveries of Fan and Chen (2001); Yiran, Zhang & Leung (2021); Purnomo, Ainun, Nina, Utami, Wijayanti & Ismail (2022); Tambari and Danner (2012) and Aligbe (2014) on the same subject matters.

Conclusion

This research offers insightful information about the relationship between parental involvement and students' accomplishment in Mathematics in senior secondary schools in the West Coast Region of The Gambia. The outcomes show no statistically significant correlation concerning parental participation and pupils' Mathematics ability, with parental involvement accounting for only 3.2% of the accomplishment variance. Additionally, the study ascertained no significant gender disparities in the perception of parental involvement in academic achievement, but there is significant difference in academic success of male and female students in Mathematics as the as the p-value (0.00) less than the 0.05 threshold. Moreover, this study ascertained that most parents do not engage their children in mathematical discussions or activities outside of school hours and are not aware of the Mathematics curriculum and learning objectives their children expected to achieve, etc.

Recommendations

· From the investigation, the study has proposed the following recommendations for improvement of students' achievement in mathematics at senior schools:

- School authorities should develop initiatives that encourage greater parental participation in students' education. Parents need to be sensitized on the importance of providing academic support, guidance, and encouragement to their children, particularly in Mathematics-related activities.
- Effective communication systems should be strengthened between schools and parents to ensure that parents are regularly informed about their children's academic progress. Providing frequent updates on students' performance can help parents identify areas where additional support may be needed.
- Results of Continuous Assessment (C.A) which stands as feedback mechanism should be given to the students to take home for their parents to see and know exactly how their children are doing in school in order to encourage them more on Mathematics.
- Classroom activities should be designed to provide equal opportunities for participation and academic success regardless of gender.
- Guidance and counselling units should organize programmes that motivate students to develop positive attitudes toward Mathematics and adopt effective learning strategies that can improve their academic performance.
- Continuous orientation and advice should be given to parents on the value of education to the lives of their children.

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ISSN: 2714-2965 (Print)
ISSN: 2714-3449 (Online)
University of the Gambia supported edition
The African Journal of Behavioural and Scale Development Research
AJB-SDR Vol. 7, No 2, 2025

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