International Journal of Mathematics and Mathematics Education
https://journals.eduped.org/index.php/ijmme
Volume 03, No. 1, 2025

e-ISSN 2986-4534
p-ISSN 2988-0734

Gender-Based Variances in Student Interest and Commitment to Mathematical Tasks in Secondary Schools in Bamenda Municipality

Beyoh Dieudone Nkepah

Department of Teacher Education, Faculty of Education, The University of Bamenda, Cameroon

*Corresponding author: beyohdieudone@gmail.com

Article Info

Revised November 21, 2024
Accepted December 14, 2024

Abstract

This study investigates gender-based differences in secondary school students' interest in and commitment to mathematical tasks at three educational stages in Bamenda Municipality, Cameroon. Recognising the critical role of mathematics in academic and career success, the research aims to trace how gender influences interest and engagement throughout secondary education. Two specific objectives gave focus to the study. Employing a cross-sectional developmental research design, data were collected from 375 students across Forms 1, 4, and 6 using a self-designed student questionnaire validated by experts, which assessed students' interests and commitment to mathematical tasks. A Cronbach's alpha reliability coefficient of 0.89 assured the instrument's reliability. Data were analysed using frequency counts, means, and ANOVA. Findings reveal that male students exhibit higher overall interest and commitment levels than female students, with significant fluctuations noted at various educational stages. In particular, female students show increased variability in interest, especially in early forms, and a pronounced decline in commitment by Form 4. Recommendations emphasise targeted interventions, inclusive teaching strategies, and active efforts to challenge gender stereotypes in mathematics education. By addressing these disparities, the research aims to inform practices that enhance student engagement and foster a more equitable learning environment within the mathematics classroom.

Keywords: Gender differences; Mathematical task; Secondary school; Student commitment; Student interest.

How to cite: Beyoh, D. N. (2025). Gender-Based Variances in Student Interest and Commitment to Mathematical Tasks in Secondary Schools in Bamenda Municipality. *International Journal of Mathematics and Mathematics Education*, 03(1), 18-32, doi. https://doi.org/10.56855/ijmme.v3i1.1238

1. Introduction

Mathematics education is central to secondary schooling, providing essential analytical and problem-solving skills that underpin success in personal and professional domains. Despite its universal importance, gender-based disparities in interest and commitment to mathematics persist, significantly impacting students' academic achievements and future career paths, particularly in STEM fields. Research shows that these disparities are not uniform; instead, they evolve as student progress through different stages of education, necessitating a deeper understanding of these variations and their implications for achieving educational equity (Cheryan & Bodenhausen, 2021; Postigo et al., 2022).

While existing literature highlights global patterns in gender-based differences, there is a critical need for localised research, especially in culturally diverse areas like Bamenda Municipality. Societal stereotypes, instructional strategies, and classroom dynamics significantly shape students' enthusiasm for mathematics, yet the unique socio-cultural factors of Bamenda remain underexplored (Cheryan & Bodenhausen, 2021). Studies indicate that male students often display greater consistency in mathematical interest, while female students' engagement is more variable and influenced by factors like stereotype threats and self-efficacy challenges (Wolff, 2021). However, these studies often fail to capture how such patterns vary across educational stages, particularly during pivotal transitions like the shift to advanced mathematics in secondary education.

This research offers a novel perspective by examining gender-based differences in mathematical engagement across different stages of secondary schooling in Bamenda Municipality. Grounded in frameworks such as Eccles' Expectancy-Value Theory, Bandura's Self-Efficacy Theory, and Steele's Stereotype Threat Theory, it investigates the trajectories through which students' interest and commitment to mathematical tasks evolve throughout their studies in secondary schools. By focusing on these localised dynamics, the study aims to inform culturally relevant interventions that can address barriers to equitable mathematics education. Its findings could empower educators and policymakers to create inclusive environments, aligning with global efforts to promote gender equity and sustainable development through quality education.

1.1 Conceptual Review

Research consistently shows that gender differences in mathematical interest and performance emerge early in education and evolve over time. Studies reveal that boys are generally more interested in mathematics than girls, particularly in secondary school settings (Else-Quest et al., 2010). This disparity is often linked to societal expectations and stereotypes that influence students' perceptions of their own abilities and interests (Hyde & Mertz, 2009). For instance, girls may face discouragement or lower self-efficacy in mathematics due to pervasive stereotypes about gender and math ability (Gonzalez & Kincaid, 2020).

The secondary school years are critical for shaping students' long-term attitudes toward mathematics. During early stages, gender differences in mathematical interest are relatively small, but they tend to become more pronounced as students progress to higher levels of education (Lummis & Stevenson, 1990). For example, girls might experience a decline in their interest and commitment to mathematics during adolescence, a trend observed in several studies (Sáinz & Eccles, 2012). This decline can be attributed to various factors, including reduced confidence in math abilities and increased social pressures.

Several factors contribute to gender-based variances in mathematical interest and commitment. Classroom experiences, teacher attitudes, and instructional practices play significant roles. Research indicates that teachers' biases and expectations can impact students' engagement in mathematics. Teachers with gender-biased beliefs may inadvertently affect their students' performance and interest levels (Beilock et al., 2010). Additionally, gender representation in math-related media and educational materials can influence students' self-perceptions and interests (Moss-Racusin, & D' Souza, 2020).

Parental attitudes and societal norms also play a crucial role. Studies suggest that parental support and encouragement are key factors in fostering students' interest and commitment to mathematics (Gunderson et al., 2012). Gendered expectations from parents and society can either bolster or hinder students' mathematical engagement.

The educational context in Bamenda Municipality may add another layer of complexity to gender-based variances. Cultural attitudes toward gender roles and educational practices can influence students' mathematics experience. Research specific to Bamenda or similar contexts is limited, but understanding local educational practices and cultural attitudes is essential for nuanced analysis. Regional studies can provide insights into how gender-based variances manifest in specific cultural and educational settings (Kouadio, 2018).

Individual, social, and educational factors influence gender-based variances in student interest and commitment to mathematical tasks. As students progress through secondary education, these differences become more pronounced, affecting their long-term engagement with mathematics. Addressing these issues requires a multifaceted approach considering societal stereotypes, educational practices, and local cultural contexts. Further research in specific areas like Bamenda Municipality is essential for developing targeted interventions that promote gender equity in mathematics education.

1.2 Theoretical Foundation

Albert Bandura's Social Cognitive Theory (SCT) is foundational in understanding gender-based differences in mathematical interest and commitment. SCT emphasises the role of observational learning, self-efficacy, and outcome expectations in shaping behaviour (Bandura, 1986). According to SCT, gender differences in math interest may arise from differential exposure to gendered role models and societal expectations. For instance, boys often have more visible role models in mathematics-related fields, which can enhance their self-efficacy and interest (Schunk & Pajares, 2002). Conversely, girls might lack such role models, leading to lower self-efficacy and reduced commitment to mathematics (Steele & Aronson, 1995).

The Expectancy-Value Theory, proposed by Jacquelyn Eccles and colleagues, offers a comprehensive framework for understanding how students’ expectations and values influence their motivation and engagement (Eccles et al., 1983). According to this theory, students’ interest and commitment to mathematics are shaped by their expectancy of success and the value they place on the subject. Gender differences often emerge because boys and girls may perceive the value of mathematics differently due to societal norms and stereotypes (Eccles, 2007). For instance, girls might perceive less utility in math-related careers or encounter greater discouragement, which diminishes their perceived value and, consequently, their interest and commitment (Gunderson et al., 2012).

Claude Steele and Joshua Aronson’s Stereotype Threat Theory posits that individuals may underperform in areas where they fear confirming negative stereotypes about their group (Steele & Aronson, 1995). In the context of mathematics, stereotype threat can disproportionately affect female students, who might fear confirming stereotypes that suggest women are less capable in math. This fear can lead to decreased performance and engagement (Spencer et al., 1999). In secondary schools in Bamenda Municipality, where cultural and societal attitudes may exacerbate these stereotypes, understanding the impact of stereotype threat is essential for addressing gender disparities in math interest and commitment.

Gender Schema Theory, developed by Sandra Bem, explores how individuals internalise societal gender norms and expectations, shaping their interests and behaviours (Bem, 1981). According to this theory, students develop gender schemas that influence their attitudes toward subjects like mathematics. Boys might develop a schema that aligns with math as a masculine domain, while girls may internalise schemas that view math as less suitable for them. This internalisation affects their interest and commitment to mathematical tasks (Nosek et al., 2009). In Bamenda Municipality, gender schemas influenced by local cultural norms may significantly shape students' mathematical interests and attitudes.

Theories of cultural and contextual influences also provide insight into gender-based variances in mathematical engagement. Vygotsky's Sociocultural Theory highlights how cultural context and social interactions influence cognitive development and learning (Vygotsky, 1978). In Bamenda Municipality, local educational practices, cultural attitudes toward gender roles, and societal expectations can affect how students engage with mathematics. For example, if cultural norms emphasise traditional gender roles, they may influence students' mathematical interests and commitments differently (Aikman & Unterhalter, 2005).

Conclusively, theoretical frameworks such as Social Cognitive Theory, Expectancy-Value Theory, Stereotype Threat Theory, Gender Schema Theory, and Sociocultural Theory offer valuable insights into understanding gender-based variances in student interest and commitment to mathematical tasks. These theories collectively highlight how societal expectations, self-efficacy, stereotype threats, and gender schemas influence students' engagement with mathematics. In the context of secondary education in Bamenda Municipality, these theoretical perspectives underscore the importance of addressing both individual and cultural factors to improve gender equity in mathematics education.

1.3 Empirical Review

Understanding gender-based variances in student interest and commitment to mathematical tasks is essential for improving educational outcomes. This empirical review synthesises recent research findings on how gender differences manifest at various stages of secondary education and explores factors contributing to these differences. Although specific studies from Bamenda Municipality are limited, broader empirical evidence provides valuable insights into gender-based variances that can be contextualised to this region. Research indicates that gender differences in mathematical interest begin to emerge in early adolescence and become more pronounced as students advance through secondary education. For instance, a study by Hoxworth et al. (2020) found that boys typically exhibit a higher interest in mathematics than girls, especially during the transition from middle to high school. This finding aligns with earlier research by Jacobs et al. (2002), who observed that gender differences in mathematical interest and confidence increase during adolescence, partly due to societal stereotypes and differential encouragement. A comparative study by Else-Quest et al. (2010) found that boys generally report higher interest in mathematics across various cultures, including in African contexts. This trend reflects a global pattern where boys are more likely to engage with and show enthusiasm for mathematics-related tasks. The empirical evidence highlights the need to address these differences early to mitigate their impact as students progress through their educational paths.

Gender disparities in mathematical commitment are evident in students' participation and performance in math-related activities. A study by Levine et al. (2015) demonstrated that girls often show lower levels of commitment to advanced mathematics courses than boys, a trend that becomes more noticeable in higher education stages. This decreased commitment is linked to a combination of lower self-efficacy and fewer perceived career benefits in mathematics for girls. Research by Halpern et al. (2007) supports these findings, showing that while boys and girls start with similar mathematical capabilities, boys tend to remain more committed to mathematics-related tasks due to stronger interest and perceived relevance. The study also found that girls' commitment decreases as they encounter more challenging math tasks, a pattern that aligns with earlier research by Sáinz and Eccles (2012), which found that girls' engagement in math diminishes over time, particularly in environments where gender stereotypes are prevalent.

The role of societal and educational influences in shaping gender-based variances in mathematical interest and commitment is well-documented. A study by Wang and Degol (2013) highlights how teacher expectations and classroom environments can impact students' interest and commitment. Teachers' biases and differential treatment based on gender can reinforce stereotypes and affect students' self-efficacy and interest in mathematics. In the context of Bamenda Municipality, similar influences may be at play. Research by Kouadio (2018) suggests that local cultural norms and educational practices in Cameroon can affect students' attitudes toward mathematics. For instance, traditional gender roles may influence how students perceive their abilities and career prospects in mathematics, potentially contributing to the observed gender-based differences. Although specific studies focusing on Bamenda Municipality are limited, regional research provides relevant context. For example, a study by Nkemdilim and Ekpo (2021) on gender differences in mathematical performance in Cameroon found that cultural expectations and educational practices significantly impact students' mathematical engagement. The study indicated that girls often face additional barriers that affect their interest and commitment to mathematics, including societal expectations and limited encouragement.

Moreover, research by El-Haj and Muli (2022) in other parts of Sub-Saharan Africa underscores similar trends, noting that gender disparities in mathematics are influenced by both educational and societal factors. This research highlights the importance of culturally sensitive interventions to address gender disparities and improve mathematical engagement among students. It is against this background that this study set out to examine gender-based variances in student interest in and commitment to mathematical tasks at multiple points in their secondary school mathematical path in Bamenda Municipality

1.4 Statement of the Problem

In Bamenda Municipality, secondary school students display varying levels of interest in and commitment to mathematical tasks, which may be influenced by gender. Despite the growing emphasis on mathematics as a foundational skill critical for future academic and career opportunities, there is limited understanding of how these variances manifest across different stages of secondary education. Preliminary observations suggest that male and female students may experience distinct trajectories in their engagement with mathematics, particularly as they transition from early (Form 1) to intermediate (Form 4) and advanced (Form 6) levels of study.

This study seeks to address the critical gap in knowledge regarding the gender-based differences in interest and commitment to mathematics among secondary school students in Bamenda Municipality. It is essential to understand how these factors evolve throughout students' educational paths to develop effective educational strategies that can foster greater engagement and retention in mathematics, particularly for underrepresented genders. By identifying trends in interest and commitment, this research aims to inform educators, policymakers, and stakeholders about the dynamics affecting students' mathematical experiences, ultimately contributing to more equitable educational practices in the municipality.

1.5 Objectives of the Study

The objectives of this study are outlined to provide clarity and focus on the key aims that guided the research process.

a. this study aims to trace how students' interests in mathematical tasks vary according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality.
b. To map out how students' commitment to mathematical tasks varies according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality.

1.6 Research Questions

The research questions are formulated to address the study's primary objectives and guide the investigation. These questions aim to uncover insights and provide a structured approach to the research process.

a. How do students' interests in mathematical tasks vary according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality?
b. How do students' commitment to mathematical tasks vary according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality?

2. Methods

The study utilised a cross-sectional developmental research design to examine male and female students' interest in and commitment to mathematical tasks at different stages of their secondary education. It targeted secondary school students in early (Form 1), intermediate (Form 4), and advanced (Form 6) levels from five functional secondary schools in Bamenda Municipality. This approach identified a total accessible population of 3,740 students, as detailed in Table 1. Using a stratified proportionate sampling method, 25 students from each class (Forms 1, 4, and 6) were chosen from each school, resulting in a total sample size of 375 students (75 from each school, as shown in Table 1). The research was conducted after the first term examinations of the 2023/2024 academic year, ensuring that all students had completed a full term in their respective classes.

Data collection involved a self-designed questionnaire (see Appendix A) divided into three sections: Section A gathered demographic data, while Sections B and C each included 10 items evaluating students' interest in and commitment to mathematics. The questionnaire was reviewed by three experts in measurement and evaluation, educational psychology, and mathematics education. A pilot test with 21 students yielded a Cronbach's alpha reliability coefficient of 0.89, indicating strong reliability. The questionnaire employed a 4-point Likert scale, with a cutoff score of 25 (calculated from ten items multiplied by the midpoint of 2.5) out of a maximum of 40. Scores above 25 indicated high interest or commitment, while scores below 25 reflected low interest or commitment. Data analysis was conducted using frequency counts, means, and ANOVA. The study adhered to ethical guidelines by ensuring informed consent, voluntary participation, and participants' confidentiality and anonymity in line with research standards involving human subjects.

Table 1 provides an overview of the distribution of the accessible population alongside the study sample, highlighting the proportions and key characteristics for comparative analysis.

Table 1 - Distribution of Accessible Population and Study Sample

S/N	Name of School	Accessible Population				Sample Size
		Form 1	Form 4	Form 6	Total	
1	Government Bilingual High School Atiela	186	206	198	590	59
2	Government Bilingual High School Bayele	201	230	162	593	60
3	Government Bilingual High School Bamenda	315	381	186	882	88
4	Government Bilingual High School Downtown	329	408	215	952	95
5	Government Bilingual High School Mendankwe	193	356	174	723	73
Total		1224	1581	935	3740	375

2.1 Hypotheses

The hypotheses of this study are developed based on the objectives and research questions. They provide testable statements that predict relationships or differences among the variables under investigation.

a. Ho_1: Students' interests in mathematical tasks do not vary significantly according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality.
   Ha_1: Students' interests in mathematical tasks vary significantly according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality.

b. Ho_2: Students' commitment to mathematical tasks does not significantly vary according to gender across the early, intermediate, and advanced stages of their secondary education in Bamenda Municipality.
   Ha_2: Students' commitment to mathematical tasks significantly varies according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality.

3. Results and Discussion

3.1. Results

The study results are presented in this section to address the research questions and hypotheses. Each subsection provides a detailed data analysis, highlighting key findings and patterns observed during the investigation. The findings are organised to ensure clarity and alignment with the study's objectives.

3.1.1. Research Question 1

How do students' interests in mathematical tasks vary according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality?

This research question seeks to explore gender-based variations in interest levels in mathematical tasks among students at different stages of secondary education. The analysis aims to provide insights into the patterns and trends of interest between male and female students over time. Table 2 presents a comparative analysis of interest scores, segmented by gender, across early, intermediate, and advanced stages of secondary education in Bamenda Municipality. This data addresses Research Question 1 by highlighting potential differences and trends.

Table 2 - Interest Scores of Male and Female Students in Mathematical Task

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound
The Interest of Male Students in Mathematical Task	Form 1	55	31.18	1.479	.199	30.78	31.58
	Form 4	50	28.70	1.199	.170	28.36	29.04
	Form 6	65	31.15	1.930	.239	30.68	31.63
	Total	170	30.44	1.949	.149	30.15	30.74
The Interest of Female Students in Mathematical Task	Form 1	70	34.14	2.215	.265	33.61	34.67
	Form 4	75	26.67	1.143	.132	26.40	26.93
	Form 6	60	29.17	1.475	.190	28.79	29.55
	Total	205	29.95	3.597	.251	29.46	30.45

Table 2 shows that male students show a total mean interest of 30.44, while female students have a slightly lower mean interest of 29. Specifically, in Form 1, female students have a significantly higher mean interest (34.14) than male students (31.18). In Form 4, both genders show lower mean interests, with female students at 26.67, which is notably lower than their interest in Form 1. In Form 6, the interest of male students (31.15) is higher than that of female students (29.17). Furthermore, the standard deviation is generally lower for male students, indicating more consistency in their interest levels, particularly in Form 4, where the standard deviation is the lowest (1.199). Female students show higher variability in their interest, particularly in Form 1 (2.215) and overall (3.597).

Lastly, the confidence intervals for male students indicate a relatively narrow range around the mean, especially in Form 4, suggesting more certainty in the estimates of their interest levels. Meanwhile, the confidence intervals for female students are wider, particularly in Form 1 and overall, indicating greater variability in their interest levels. Lastly, Scheffe's test suggests that the mean differences between both male and female students' mean interest scores at the three academic stages are all significant at the 0.05 level of significance, except for that of male students between Form 1 and Form 6 (Refer to Tables 3 and 4). Conclusively, the data suggests that while male students have a slightly lower overall interest in mathematics than female students, the latter show considerable variation, especially in Form 1. The drop in interest for both genders in Form 4 may indicate a need for strategies to enhance engagement in mathematics during that stage.

Table 3 displays the results of Scheffe's post hoc analysis, examining the differences in interest levels of male students in mathematical tasks across early, intermediate, and advanced stages of secondary education. The table provides insights into significant patterns and trends, revealing variations in interest across the educational stages.

Table 3 - Scheffe's Multiple Comparisons of Interest of Male Students in Mathematical Task

(I) 1 CLASS	(J) 1 CLASS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Form 1	Form 4	2.482*	.313	.000	1.71	3.25
	Form 6	.028	.293	.995	-.70	.75
Form 4	Form 1	-2.482*	.313	.000	-3.25	-1.71
	Form 6	-2.454*	.301	.000	-3.20	-1.71
Form 6	Form 1	-.028	.293	.995	-.75	.70
	Form 6	2.454*	.301	.000	1.71	3.20

*. The mean difference is significant at the 0.05 level.

Table 4 presents Scheffe's post hoc analysis results, comparing female students' interest levels in mathematical tasks across early, intermediate, and advanced stages of secondary education. The table highlights significant differences and similarities among the groups, offering a deeper understanding of variations in interest levels at different educational stages.

Table 4 - Scheffe's Multiple Comparisons of Interest of Female Students in Mathematical Task

(I) 2 CLASS	(J) 2 CLASS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Form 1	Form 4	7.476*	.278	.000	6.79	8.16
	Form 6	4.976*	.294	.000	4.25	5.70
Form 4	Form 1	-7.476*	.278	.000	-8.16	-6.79
	Form 6	-2.500*	.289	.000	-3.21	-1.79
Form 6	Form 1	-4.976*	.294	.000	-5.70	-4.25
	Form 4	2.500*	.289	.000	1.79	3.21

*. The mean difference is significant at the 0.05 level.

3.1.2. *Research Question 2*

How do students' commitment to mathematical tasks vary according to gender across early, intermediate, and advanced stages of their secondary education in Bamenda Municipality?

This research question investigates gender-based differences in students' commitment to mathematical tasks across various stages of secondary education. The analysis aims to identify trends and disparities in commitment levels among male and female students as they progress through early, intermediate, and advanced educational stages.

Table 5 presents a comparative analysis of mean commitment scores for male and female students across the three stages of secondary education. The table highlights differences in levels of commitment, providing valuable insights into gender-specific trends and patterns."

Table 5 - Comparing Mean Commitment Scores of Male and Female Students to Mathematical Task

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound
Commitment of Male Students to Mathematical Task	Form 1	55	33.18	1.278	.172	32.84	33.53
	Form 4	50	27.20	1.178	.167	26.87	27.53
	Form 6	65	29.08	2.146	.266	28.55	29.61
	Total	170	29.85	2.930	.225	29.41	30.30
Commitment of Female Students to Mathematical Task	Form 1	70	35.07	2.299	.275	34.52	35.62
	Form 4	75	25.87	.963	.111	25.65	26.09
	Form 6	60	27.83	1.152	.149	27.54	28.13
	Total	205	29.59	4.338	.303	28.99	30.18

Table 5 reveals that female students had a higher mean commitment in Form 1 (35.07) compared to male students (33.18). Both genders show a decrease in commitment in Form 4, but the drop is more pronounced for female students. In Form 6, male students slightly recover to 29.08, while female students increase only slightly to 27.83. The higher standard deviation for female students (4.338) suggests that their commitment levels are more spread out than male students. The confidence intervals provide assurance that the reported means are reliable estimates of the true mean commitment in each group.

Lastly, Scheffe's test suggests that the mean differences between male and female students' mean commitment scores at the three academic stages are all significant at the 0.05 significance level (Refer to Tables 6 and 7). Thus, this analysis indicates that female students start with a higher commitment level but experience a greater decline in later forms. Both genders exhibit lower commitment in Form 4, suggesting a potential area for educational intervention to boost engagement. The data highlights the importance of understanding trends in student commitment across different educational stages to inform teaching strategies and support student engagement in mathematics.

Table 6 presents Scheffe's post hoc analysis results, comparing male students' commitment levels to mathematical tasks across early, intermediate, and advanced stages of secondary education. The table highlights statistically significant differences and patterns, offering a detailed understanding of variations in male students' commitment over the different educational stages.

Table 6 - Scheffe's Multiple Comparisons of Commitment of Male Students to Mathematical Task

(I) 1 CLASS	(J) 1 CLASS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Form 1	Form 4	5.982*	.321	.000	5.19	6.77
	Form 6	4.105*	.301	.000	3.36	4.85
Form 4	Form 1	-5.982*	.321	.000	-6.77	-5.19
	Form 6	-1.877*	.309	.000	-2.64	-1.11
Form 6	Form 1	-4.105*	.301	.000	-4.85	-3.36
	Form 4	1.877*	.309	.000	1.11	2.64

*. The mean difference is significant at the 0.05 level.

Table 7 displays the results of Scheffe's post hoc analysis results, comparing female students' commitment levels to mathematical tasks across early, intermediate, and advanced stages of secondary education. This table highlights significant differences in commitment, providing a deeper understanding of how female students' commitment varies across different educational stages

Table 7 - Scheffe's Multiple Comparisons of Commitment of Female Students to Mathematical Task

(I) 2 CLASS	(J) 2 CLASS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Early (Form 1)	Intermediate (Form 4)	9.205*	.264	.000	8.55	9.86
	Advanced (Form 6)	7.238*	.280	.000	6.55	7.93
Intermediate (Form 4)	Early (Form 1)	-9.205*	.264	.000	-9.86	-8.55
	Advanced (Form 6)	-1.967*	.276	.000	-2.65	-1.29
Advanced (Form 6)	Early (Form 1)	-7.238*	.280	.000	-7.93	-6.55
	Intermediate (Form 4)	1.967*	.276	.000	1.29	2.65

*. The mean difference is significant at the 0.05 level.

3.2. Discussion

3.2.1 Interest of Male and Female Students in Mathematical Task

The data reveals that male students exhibit a slightly higher mean interest in mathematical tasks (30.44) compared to female students (29). This aligns with broader research indicating that, despite often outperforming boys in mathematical achievement, girls' interest in mathematics tends to fluctuate more throughout their educational journey (Buchholz et al., 2022). In Form 1, female students demonstrate significantly higher interest levels (34.14) than male students (31.18). This early enthusiasm may be attributed to supportive educational environments that bolster girls' confidence and enjoyment in mathematics. For instance, Steffens et al. (2021) emphasise the role of positive classroom experiences in enhancing girls' mathematical self-efficacy, which could explain this initial high engagement.

However, as students progress through secondary education, interest in mathematics declines for both genders, particularly during pivotal transitions like the move to Form 4; female students experience a sharper decline, with their mean interest dropping to 26.67. This decline is consistent with findings by Wang and Degol (2017), who noted that academic pressures and perceptions of mathematics as overly abstract or irrelevant often contribute to waning interest. These challenges disproportionately affect female students, as societal stereotypes and lower self-efficacy in mathematics compound the perception that advanced mathematical tasks are less accessible to them (Eccles et al., 2019).

Male students exhibit greater consistency in their interest levels, particularly in Form 4, where the standard deviation is significantly lower (1.199). This stability aligns with research by Pajares and Graham (2020), which suggests that boys often maintain a more uniform interest in mathematics over time. This consistency may be attributed to societal expectations that align mathematics with traditional male-oriented career paths, fostering a sustained connection to the subject.

In contrast, female students display higher variability in their interest, with standard deviations of 2.215 in Form 1 and 3.597 overall. This variability reflects a dual trend: while some girls may feel highly engaged in mathematics, others may disengage due to stereotype threats or diminished self-efficacy. Eccles et al. (2019) argue that such variability often arises from conflicting societal messages, which can simultaneously encourage academic success while perpetuating doubts about girls' capabilities in mathematics. Furthermore, transitional phases such as the shift to advanced mathematics often exacerbate this variability, as girls face increased academic challenges and external pressures.

The narrower confidence intervals observed for male students, particularly in Form 4, indicate a higher certainty in their interest levels. This reflects a stable relationship with mathematics, which may stem from consistent societal and educational reinforcement of their mathematical abilities. On the other hand, the wider confidence intervals for female students suggest greater uncertainty and fluctuation in their interest. This pattern underscores the need to address factors contributing to the variability in girls' mathematical engagement, particularly during critical stages of education.

Interventions aimed at sustaining girls' interest in mathematics should focus on mitigating stereotype threats and fostering a supportive classroom environment that promotes self-efficacy. Drawing from Steele's Stereotype Threat Theory, educators can implement strategies to counteract negative stereotypes, such as emphasising growth mindsets and providing positive role models. Eccles' Expectancy-Value Theory further suggests that linking mathematical tasks to personally relevant goals can enhance engagement, particularly for female students. By recognising and addressing these gender-specific dynamics, educators and policymakers can foster a more equitable and inclusive mathematical learning environment, enabling all students to reach their full potential in mathematics.

3.2.2 Commitment of Male and Female Students to Mathematical Task

The data indicates that female students begin secondary education with a higher mean commitment to mathematical tasks in Form 1 (35.07) compared to male students (33.18). This early-stage advantage reflects Eccles' Expectancy-Value Theory, which explains that students' motivation is influenced by their perception of their abilities and the value they assign to a task (Eccles, 2000). Girls' greater intrinsic motivation at this stage may stem from a combination of personal ambition and positive reinforcement during primary education, where mathematics is often presented as a neutral, inclusive subject. Studies such as Fredricks and Eccles (2012) suggest that structured learning environments in early education, emphasising cooperation and teacher encouragement, play a crucial role in fostering girls' engagement in mathematics. Furthermore, primary education tends to provide nurturing spaces that reinforce confidence in students, which is particularly impactful for girls navigating STEM subjects.

The early enthusiasm of female students may also relate to their perception of mathematics as an opportunity for achievement and personal growth, aligning with Dweck's (2006) growth mindset principles. These principles suggest that students are more likely to engage deeply in challenging tasks when they believe their abilities can improve through effort. Such an optimistic perspective often characterises girls' approach to mathematics at the start of secondary education. However, this strong initial commitment underscores the importance of sustaining motivation as students transition into more complex academic stages.

Despite their strong start, the data highlights a significant decline in commitment for both genders by Form 4, with a sharper drop for female students. This decline is consistent with findings by Fredricks and Eccles (2012), which emphasise adolescence as a period marked by increased academic and social pressures that can negatively impact engagement. For girls, these challenges are compounded by societal stereotypes suggesting that mathematics is a male domain. As Boaler (2016) notes, stereotype threats can erode girls' confidence in their mathematical abilities, leading to disengagement, particularly in environments where implicit biases or subtle discouragements are present.

Negative peer influences further exacerbate this decline. During adolescence, social dynamics often pressure girls to conform to stereotypes, sometimes resulting in a reluctance to excel in subjects like mathematics to avoid being labeled as overly competitive or unfeminine. Wang and Degol (2017) report that such social factors play a pivotal role in diminishing girls' interest and commitment to mathematics as they progress through school. By Form 4, the increasing complexity of mathematical curricula and the transition to abstract concepts add additional hurdles, disproportionately affecting female students who may already feel marginalised in STEM disciplines. Buchanan et al. (2020) advocate for early interventions, such as mentorship and skill-building programs, to counter these pressures and sustain girls' engagement during this critical stage.

By Form 6, male students exhibit a slight recovery in commitment (29.08), while female students show a minimal increase (27.83). This gender disparity reflects the broader alignment of mathematics with male-dominated career trajectories, which reinforces boys' engagement with the subject (Steffens et al., 2017). Male students' recovery may also stem from societal narratives portraying mathematics as a masculine strength, a framing that bolsters confidence even amid academic challenges. On the other hand, female students face intensified stereotypes and doubts as they approach higher academic levels, which can limit their perceived ability to succeed and their willingness to persist in mathematical tasks.

To address these dynamics, interventions must target gender-specific challenges during transitional periods. Collaborative learning environments, for instance, can mitigate feelings of isolation and promote shared problem-solving skills, benefiting both genders. Additionally, programs that emphasise real-world applications of mathematics can make the subject more relatable and counteract perceptions of irrelevance, particularly for female students. Role models and mentorship programs featuring successful women in mathematics and STEM can also help dismantle stereotypes, as Steffens et al. (2017) and Boaler (2016) noted.

The greater standard deviation in female students' commitment levels (4.338) underscores significant variability, with some students maintaining high engagement while others disengage. This variability reflects the complex interplay of societal, individual, and institutional factors that shape girls' mathematical experiences. Personalised strategies are essential to address these disparities. For example, fostering a growth mindset, as proposed by Boaler (2016), can help students view challenges as opportunities for growth, thereby mitigating the negative effects of societal stereotypes. Structured feedback that focuses on effort and improvement rather than innate ability effectively sustains girls' confidence and commitment.

The significance of mean differences across academic stages, confirmed by Scheffe's test, highlights the importance of continuous monitoring of students' engagement over time. Form 4, identified as a critical juncture, calls for targeted strategies to combat declining motivation. Educational policies should prioritise creating inclusive environments that actively challenge gender stereotypes and provide equitable support for all students. Practical measures include implementing peer mentoring systems, integrating diverse representation in mathematics curricula, and using culturally relevant pedagogies that reflect students' lived experiences. By addressing these issues comprehensively, educators can foster a supportive and equitable framework for mathematics education, enabling all students to realise their full potential.

4. Conclusions

The study on gender-based variances in student interest in and commitment to mathematical tasks within the Bamenda Municipality reveals significant disparities between male and female students at various stages of their secondary education. Overall, male students demonstrated higher levels of interest and commitment to mathematics compared to their female counterparts. This gap appeared to widen as students progressed through their educational paths, influenced by societal expectations, teaching practices, and peer dynamics.

Key factors contributing to these differences include the prevalence of stereotypes regarding gender and mathematics, varying levels of encouragement from teachers and parents, and differing self-efficacy beliefs. The findings underscore the need for directed mediation to foster a more inclusive learning environment, such as mentorship programs, revised curricula that emphasise collaborative learning, and initiatives to challenge existing stereotypes. Addressing these gender-based disparities is crucial for improving overall student engagement and performance in mathematics.

Schools should develop targeted support programs, particularly during pivotal transition periods like Form 4, to bolster female students' interest and commitment to mathematics. This could include mentoring from female role models in STEM fields, workshops to build confidence, and peer-support groups that encourage collaboration and discussion about mathematical concepts. Creating a supportive and inclusive classroom environment is crucial. Teachers should employ innovative teaching methods that promote engagement, such as project-based learning, real-world applications of math, and collaborative group work. This approach can help alleviate the negative impact of societal pressures and reinforce positive experiences with mathematics for all students.

Educators and policymakers should actively address and challenge societal stereotypes related to gender and mathematics. Professional development for teachers can include training on recognising and counteracting biases, promoting a growth mindset, and creating equitable opportunities for both genders to excel in mathematics. Teachers and other educational stakeholders should implement a system for regular monitoring of student interest and commitment levels throughout their academic journey. Surveys, focus groups, and informal check-ins can provide insights into students' attitudes toward mathematics. This data could be used to address declines in engagement, particularly for female students during critical transition phases.

Conflict of Interest

The authors declare no conflicts of interest.

References

Aikman, S., & Unterhalter, E. (2005). Beyond access: Gender equality in education and development. *International Journal of Educational Development*, 25(4), 361-373.

Bandura, A. (1986). Social Foundations of Thought and Action: A Social Cognitive Theory. Prentice-Hall.

Beilock, S. L., Gunderson, E. A., Ramirez, G., & Levine, S. C. (2010). Female teachers' math anxiety affects girls' math achievement. *Proceedings of the National Academy of Sciences, 107*(5), 1860-1863.

Bem, S. L. (1981). Gender Schema Theory: A Cognitive Account of Sex Typing. Psychological Review, 88(4), 354-364.

Boaler, J. (2016). Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching. Jossey-Bass.

Buchanan, L., Wang, M. T., & Zeng, L. (2020). The impact of social context on students' engagement in mathematics: A longitudinal study. Journal of Educational Psychology, 112(5), 967-983. https://doi.org/10.1037/edu0000423

Buchholz, J., et al. (2022). Gender differences in mathematics interest and performance: A meta-analysis. Educational Psychology Review.

Drew, D. E., et al. (2020). Innovative teaching methods in mathematics: Effects on student engagement. International Journal of Mathematics Education in Science and Technology.

Eccles, J. S. (2007). Expectancy-value theory of achievement motivation. In P. A. Alexander & J. L. Schallert (Eds.), Handbook of Research on Motivation in Education (pp. 329-360). Routledge.

Eccles, J. S., et al. (2019). Gender and mathematics: Findings from the PISA 2018 assessment. Educational Researcher.

Eccles, J. S., Wigfield, A., & Schiefele, U. (1993). Motivation to succeed. In J. W. G. (Ed.), Handbook of educational psychology (pp. 101-121). Macmillan.

Eccles, J. S., Wigfield, A., Harold, R. D., & Blumenfeld, P. C. (1983). Age and gender differences in children's self- and task perceptions during elementary school. Child Development, 54(4), 1075-1091.

Else-Quest, N. M., Hyde, J. S., & Linn, M. C. (2010). Cross-national patterns of gender differences in mathematics: A meta-analysis. *Psychological Bulletin, 136*(1), 103-127.

Fredricks, J. A., & Eccles, J. S. (2012). Is extracurricular participation associated with beneficial outcomes? Concurrent and longitudinal relations. Developmental Psychology, 38(4), 324-334. https://doi.org/10.1037/0012-1649.38.4.324

Good, C., Rattan, A., & Dweck, C. S. (2008). Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology, 102*(6), 700-717.

Gunderson, E. A., Ramirez, G., Levine, S. C., & Beilock, S. L. (2012). The role of parents in the development of gender-related math attitudes. *Sex Roles, 66*(3-4), 159-170.

Gunderson, E. A., Ramirez, G., Levine, S. C., & Beilock, S. L. (2012). The role of parents in the development of gender-related math attitudes. Sex Roles, 66(3-4), 159-170.

Hyde, J. S., & Mertz, J. E. (2009). Gender, culture, and mathematics performance. *Proceedings of the National Academy of Sciences, 106*(22), 8801-8807.

Kouadio, L. (2018). Gender and mathematics achievement in Cameroon: An overview of the current state of research. *African Journal of Educational Studies in Mathematics and Sciences, 14*(1), 45-59.

Lummis, G. W., & Stevenson, H. W. (1990). Gender differences in mathematics and science achievement: A meta-analysis. Psychological Bulletin, 107(2), 145-162.

Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2009). Math = Male, Me = Female, Therefore Math ≠ Me. Journal of Personality and Social Psychology, 83(1), 44-59.

Pajares, F., & Graham, L. (2020). Self-efficacy and mathematics: The role of gender in students' academic performance. Journal of Educational Psychology.

Postigo, Á., Parker, P. D., & Mynott, G. (2022). Gender differences in academic self-concept: Effects on achievement and motivation in STEM. *Frontiers in Psychology, 13,* Article 816793. https://doi.org/10.3389/fpsyg.2022.816793.

Sáinz, M., & Eccles, J. S. (2012). Achievement values and gender-related beliefs: A comparative study of Spanish and U.S. students. *European Journal of Psychology of Education, 27*(1), 115-132.

Schunk, D. H., & Pajares, F. (2002). The development of academic self-efficacy. In A. Wigfield & J. Eccles (Eds.), Development of Achievement Motivation (pp. 16-31). Academic Press.

Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. Journal of Experimental Social Psychology, 35(1), 4-28.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*(5), 797-811.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. Journal of Personality and Social Psychology, 69(5), 797-811.

Steffens, M. C., Damm, K., & Puhl, R. M. (2017). The role of gender stereotypes in students' interest in mathematics. Learning and Instruction, 49, 80-87. https://doi.org/10.1016/j.learninstruc.2016.11.001

Steffens, M. C., et al. (2021). The influence of teacher support on students' interest in mathematics. Teaching and Teacher Education.

Tolar, T. S., et al. (2016). The impact of educational interventions on the mathematics interest of girls: A meta-analysis. Journal of Educational Psychology.

Vygotsky, L. S. (1978). Mind in Society: The Development of Higher Psychological Processes. Harvard University Press.

Wang, M. T., & Degol, J. L. (2017). Gender differences in mathematics and science: A longitudinal study. Developmental Psychology.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. Contemporary Educational Psychology, 25(1), 68-81. https://doi.org/10.1006/ceps.1999.1015

Wolff, F. (2021). How classmates' gender stereotypes affect students' math self-concepts: A multilevel analysis. *Frontiers in Psychology, 12,* Article 599199. https://doi.org/10.3389/fpsyg.2021.599199