Quest Journals
Journal of Research in Applied Mathematics
Volume 11 ~ Issue 12 (December 2025) pp: 11-18
ISSN (Online): 2394-0743 ISSN (Print): 2394-0735
www.questjournals.org

Research Paper

The Role of Teachers in Fostering Motivation and Interest in Mathematics: A Study of Senior High Schools in Mampong Municipality, Ghana

Philip Owusu Bempah
Department of Mathematics
St. Monica's Senior High School
P. O Box 17, Ashanti Mampong, Ghana

Abstract
Motivation is a critical determinant of student engagement and achievement in mathematics,yet a pervasive lack of it remains a significant challenge in Ghanaian schools. This study investigates the specific strategies employed by mathematics teachers to foster and sustain student interest at the Senior High School level in the Mampong Municipality of Ghana. Employing a quantitative survey design, data were collected from 408 participants (378 students and 30 teachers) selected through stratified and simple random sampling from three schools. While results indicate that teachers, on average, are perceived to perform their motivational roles effectively, a significant disparity was found between teacher and student perceptions, as evidenced by a marked difference in mean scores (Teacher M=3.48, Student M=3.13). This perception gap suggests that teachers may overestimate the efficacy of their strategies, particularly in making mathematics relevant to real-life contexts. The study concludes that without aligned understanding, motivational efforts may be misdirected. This study recommend that head teachers and education directorates implement targeted professional development and support systems to help teachers refine their motivational practices based on student feedback, thereby bridging this perceptual gap and enhancing student engagement in mathematics.
Keywords*: mathematics education, teacher motivation, student interest, perceptual gap, Ghana, senior high school*

Received 05 Dec., 2025; Revised 10 Dec., 2025; Accepted 13 Dec., 2025 © The author(s) 2025.
Published with open access at ***www.questjournas.org***

I. Introduction

Mathematics is universally recognized as a critical discipline, fundamental to scientific progress, technological innovation, and informed citizenship [1]. The knowledge and problem-solving skills acquired through mathematics education are not only vital for individual intellectual development but also for a nation's socio-economic advancement [2]. In Ghana, the Ministry of Education explicitly positions mathematics as a cornerstone for national development [3]. Despite this acknowledged importance, a persistent challenge exists: a significant proportion of Ghanaian students demonstrate low achievement and a pronounced disinterest in the subject [4], [5].

International assessments consistently place Ghanaian students' performance in mathematics among the lowest globally, with a key contributing factor being a lack of student motivation and interest [5]. Trend analyses of the West African Senior School Certificate Examination (WASSCE) reveal volatile but persistently poor performance, with failure rates often exceeding 50% in certain years [4], [6]. Researchers attribute this crisis to a complex interplay of factors, including students' perception of mathematics as inherently difficult [7], a lack of self-confidence [4], and inadequate teaching methodologies [8].

Within this challenging landscape, the role of the teacher emerges as a pivotal lever for change. Extensive educational research underscores that teacher-driven motivation is a powerful predictor of student interest, engagement, and ultimate academic success [9], [10]. When students are motivated, they are more likely to engage in deeper learning strategies and sustain their interest in a subject [11], [12]. However, a critical gap often exists between teacher intentions and student perceptions of motivational support [13]. While recent data, such as the 2020 WASSCE results which showed a 65.71% pass rate [14], indicate promising improvement, the question remains: how can stakeholders sustain this progress?

Much of the existing research in Ghana has focused broadly on factors affecting mathematics achievement, often placing disproportionate blame on teachers without providing context-specific evidence of their actual practices. There is a scarcity of empirical research within the Mampong Municipality that directly investigates the specific strategies mathematics teachers employ to motivate students and whether these efforts are effectively perceived by the students themselves. This study, therefore, seeks to fill this gap by examining the roles Senior High School mathematics teachers in the Mampong Municipality perform to motivate and sustain their students' interest, while also exploring potential gender disparities in these motivational practices.

1.1 Purpose of the Study and Research Question

The purpose of this quantitative study was to investigate the role of mathematics teachers in motivating and sustaining student interest in learning mathematics at the Senior High School level in the Mampong Municipality.The study was guided by the research questions:

1. How do Senior High School (SHS) mathematics teachers motivate and sustain their students' interest in learning mathematics?

II. Literature Review

This review synthesizes the theoretical and empirical literature central to understanding the teacher's role in motivating mathematics students. It is structured to first establish the core theoretical frameworks of motivation and interest, then examine the specific strategies and factors influencing their development in the mathematics classroom, and finally, identify the gap this study addresses.

2.1 Theoretical Foundations of Motivation and Interest

Two theoretical models provide the primary framework for this study:Self-Determination Theory (SDT) and the Four-Phase Model of Interest Development.

2.1.1 Self-Determination Theory (SDT)

SDT posits that optimal motivation arises from the support of three basic psychological needs: autonomy (feeling in control of one's actions), competence (feeling effective in one's endeavours), and relatedness (feeling connected to others) [9], [15]. In the mathematics classroom, this translates to pedagogical choices that provide students with meaningful choices, opportunities for mastery, and a supportive, respectful environment. SDT crucially distinguishes between autonomous motivation (driven by personal value or interest) and controlled motivation (driven by external pressures), with the former being linked to deeper learning and persistence [16], [17].

2.1.2 The Four-Phase Model of Interest Development

Hidi and Renninger conceptualize interest as a dynamic state that evolves through four phases: 1) Triggered Situational Interest (a short-term spark from a captivating lesson or puzzle), 2) Maintained Situational Interest (sustained engagement through meaningful tasks), 3) Emerging Individual Interest (a developing personal predisposition to re-engage), and 4) Well-Developed Individual Interest (a deep, enduring personal passion) [18]. This model is critical as it delineates the specific process—from triggering to sustaining—that teachers must intentionally facilitate [19].

2.2 The Teacher's Pivotal Role in the Motivation-Interest Dynamic

The teacher is the primary architect of the classroom environment and, as such, holds significant influence over student motivation and interest. Research consistently shows that teacher enthusiasm, support, and the use of varied, engaging pedagogical strategies are strongly correlated with higher student interest and engagement [20], [10].

Effective teacher practices for motivation, as synthesized from the literature [21], [22], include:

- ✓ Fostering a Growth Mind-set: Emphasizing that ability can be developed through effort.
- ✓ Building Self-Efficacy: Providing appropriately challenging tasks and scaffolding support.
- ✓ Minimizing Negative Competition: Focusing on mastery and personal improvement over social comparison.
- ✓ Setting Authentic Learning Goals: Guiding students toward goals focused on understanding rather than just grades.
- ✓ Providing Constructive Feedback: Offering timely, specific feedback that supports competence.

In the Ghanaian context, where student performance in mathematics has been persistently low [4], [5], the teacher's role becomes even more critical. Studies attribute this underperformance to a lack of student interest and motivation, often linked to pedagogical approaches and student perceptions of mathematics as difficult and irrelevant [7], [23].

2.3 Empirical Linkages: Teacher Practices, Interest, and Achievement

Empirical evidence firmly establishes a positive relationship between teacher-driven motivation, student interest, and academic achievement. Students with higher interest in mathematics demonstrate better problem-solving skills, greater persistence, and higher achievement [24], [25]. This relationship is often mediated by factors like academic self-concept and intrinsic motivation [26].

Crucially, teacher practices directly impact this cycle. For instance, differentiated instruction has been shown to increase interest among low-achievers [27], while emphasizing the real-world utility and career relevance of mathematics can build value and trigger situational interest [28], [29]. Furthermore, teacher support and enthusiasm are key factors in mitigating the well-documented decline in adolescent students' interest in mathematics [30].

2.4 The Critical Perceptual Gap and the Present Study

A pivotal, yet often under-researched, aspect is the potential disparity between teacher and student perceptions of motivational practices. As Umbach and Wawrzynski note, what teachers believe they are providing and what students actually experience can be misaligned [13]. While extensive research in Ghana has catalogued broad factors affecting mathematics achievement, there is a scarcity of studies that concurrently gather data from both teachers and students within a specific locale like the Mampong Municipality to investigate this perceptual gap.

This study fills this void by quantitatively assessing and comparing the perceptions of SHS mathematics teachers and their students regarding the teachers' roles in motivating and sustaining interest. By doing so, it moves beyond simply identifying problems to providing a nuanced diagnosis of the classroom dynamic, offering targeted insights for teacher professional development and ultimately contributing to improved student outcomes in mathematics.

III. Methodology

3.1 Research Design and Philosophical Worldview

This study was guided by a postpositivist worldview. Postpositivism is a philosophical stance that emphasizes the use of the scientific method to develop knowledge through objective observation and measurement, while acknowledging that such knowledge is fallible and must be critically examined [31]. This worldview aligns with the study's aim to investigate the objective reality of teacher motivational roles by collecting numerical data, testing specific research questions, and making unbiased, evidence-based conclusions.

Consistent with this worldview, a quantitative research approach was employed, utilizing a cross-sectional survey design. This design is appropriate for collecting data at a single point in time to describe attitudes and opinions within a population, allowing for generalization from a sample [32]. The design enabled the researcher to efficiently gather data on the perceptions of both students and teachers regarding motivational practices in mathematics classrooms.

3.2 Population and Sampling

The study population comprised all Senior High School(SHS) students and mathematics teachers in the Mampong Municipality. The accessible population was 3,520 SHS2 students and 45 mathematics teachers from three public schools within the Mampong Township.

A multi-stage sampling technique was employed. First, three schools were selected using convenience sampling due to their accessibility. Subsequently, a stratified random sampling technique was used to ensure proportional representation from each school. With a 95% confidence level and a 5% margin of error, a final sample of 378 students (251 females, 127 males) and 30 mathematics teachers was selected using simple random sampling within each stratum [33], [34].

3.3 Data Collection Instrument and Procedure

Data were collected using two close-ended questionnaires:the Teacher Motivation Roles Questionnaire for Students (TMRQS) and a modified version for Teachers (TMRQT). The instruments were structured around three primary constructs: Teacher Support (15 items), Teacher Motivation (13 items), and Teacher Knowledge (15 items). Responses were captured on a 4-point Likert scale (1=Strongly Disagree to 4=Strongly Agree) to prevent neutral responses.

Several items were adapted from established instruments with proven reliability and validity [30], [35], while the remainder were developed by the researcher based on the literature review. Permission for data collection was obtained from the Mampong Municipal Education Directorate and participating schools. Questionnaires were administered with the assistance of Heads of Mathematics Departments, with the researcher providing clear instructions to participants.

3.4 Data Analysis

The collected data were analysed using descriptive statistics,including frequencies, percentages, and means. This allowed for a clear presentation of the participants' perceptions and enabled comparisons between student and teacher responses to address the research questions.

3.5 Reliability and Validity

The instruments demonstrated high internal consistency. For the TMRQS, Cronbach's alpha values were .926 (Teacher Support), .893 (Teacher Motivation), .914 (Teacher Knowledge), and .967 overall. For the TMRQT, the values were .864, .664, .834, and .928, respectively, indicating acceptable to high reliability for all constructs [36].

Validity was ensured through multiple measures. Face validity was confirmed by expert review. Construct validity was assessed using Pearson's correlation coefficient, which showed significant inter-item correlations ($p < .01$) for all items within their respective constructs, confirming that the items measured the intended underlying concepts.

IV. Results And Discussion

4.1 How SHS Mathematics Teachers Motivate and Sustain Student Interest

To address the research question,data were analysed based on three constructs.

Table 1: Comparative Presentation of Teachers' and Students' Response to Likert Scale Items on the TMRQ**.**

Constructs	Perspectives	N	Mean	Std. Deviation
Teacher Support	Teachers	30	3.39	0.342
	Students	378	3.10	0.640
Teacher Motivation	Teachers	30	3.56	0.236
	Students	378	3.24	0.544
Teacher Knowledge	Teachers	30	3.48	0.301
	Students	375	3.07	0.638
Overall	Teachers	30	**3.48**	**0.277**
	Students	378	**3.13**	**0.591**

Source: Researcher's field work (2023)

4.1.1 Teacher Support: The Foundation for Psychological Needs

From the teachers'perspective, results indicated a strong consensus that they provide support (Overall Mean (M)=3.39). They strongly agreed that they encourage questions (M=3.67), support learning (M=3.59), and provide constructive feedback (M=3.59). However, students, while in agreement, reported lower levels of perceived support (Overall M=3.10). The highest-rated support by students was that teachers "expect us to do our best" (M=3.45), while the lowest was that teachers "give rewards" (M=2.36).Summary result is shown in Table 1 above. Detail result is shown in the Appendix A.

Discussion: This disparity highlights a potential misalignment in the experience of support. Teachers' strong self-ratings suggest they believe they are creating an environment rich in the elements of Self-Determination Theory (SDT)—namely, relatedness and competence [15]. However, the students' more moderate agreement suggests that the quality or consistency of this support may not be fully perceived. The low score on rewards aligns with the literature suggesting that extrinsic motivators like tangibles are less effective and can even undermine intrinsic motivation [21], [15].

4.1.2 Teacher Motivation: Enthusiasm as a Catalyst

From Table 1, teachers reported a high level of personal motivation(Overall M=3.56), strongly agreeing that they are happy when the class improves (M=3.80) and proud to be mathematics teachers (M=3.77). Students also agreed that their teachers exhibited motivation (Overall M=3.24), most strongly noting teacher happiness with class improvement (M=3.55) and punctuality (M=3.48). However, the item "serves as a learning model" received the lowest score from students (M=2.97). The detail result is shown in Appendix B.

Discussion: The high scores from both groups on affective elements (e.g., happiness, pride) are encouraging, as this emotional contagion can trigger situational interest [18]. The lower student rating on teachers serving as "learning models" is critical. It suggests that while teachers are seen as enthusiastic, they may not be explicitly demonstrating the thinking processes, problem-solving strategies, and attitudes of a lifelong mathematician. This explicit modelling is a key practice for moving students from situational to individual interest [19].

4.1.3 Teacher Knowledge and Pedagogy: Bridging the Abstract and Real World

From Table 1, teachers strongly agreed that they possess and effectively deploy their knowledge(Overall M=3.48), citing the use of varied explanations (M=3.63) and content expertise (M=3.60). Students agreed with this assessment, though less strongly (Overall M=3.07). They most valued collaborative learning (M=3.41) and teacher expertise (M=3.34), but gave lower ratings to pedagogical strategies that connect mathematics to the real world,such as discussing successful mathematicians (M=2.74) and linking concepts to real-life situations (M=2.96). The detail result is shown in Appendix C.

Discussion: This construct reveals the most significant opportunity for growth. The theoretical model of interest development posits that for interest to be maintained, content must be made personally relevant and meaningful [18]. The fact that students rated these relevance-building strategies lowest indicates a significant gap. While teachers may be explaining mathematical concepts clearly, they are potentially less effective at answering the perennial student question: "Why do we need to learn this?" Making these connections explicit is a fundamental requirement for sustaining interest [28], [29].

4.2 The Perceptual Gap: Teacher and Student Disparities

The most salient finding of this study is the consistent and meaningful disparity between teacher and student perceptions across all three constructs(Overall Teacher M=3.48 vs. Overall Student M=3.13).

Discussion: This perceptual gap is a critical insight. It aligns with existing research suggesting that teachers' self-assessments often do not fully align with the student experience of the classroom [13]. This gap can be interpreted through the lens of SDT: teachers may be providing support, motivation, and knowledge, but students are not fully internalizing it, thus limiting its power to foster autonomous motivation. This finding underscores the necessity of moving beyond teacher self-reports and incorporating student voice into professional development.

V. Summary, Conclusions, And Recommendations

5.1 Summary

The persistent challenge of low student interest and achievement in mathematics in Ghana provided the impetus for this study. Grounded in Self-Determination Theory [15] and the Four-Phase Model of Interest Development [18], this research sought to investigate the specific roles mathematics teachers play in motivating Senior High School students in the Mampong Municipality. The study adopted a postpositivity worldview and a quantitative, cross-sectional survey design. A sample of 408 participants (30 teachers and 378 students) was selected through stratified and simple random sampling. Data were collected using two parallel questionnaires (TMRQT and TMRQS) designed around three constructs: Teacher Support, Teacher Motivation, and Teacher Knowledge.

The key findings revealed that teachers reported a high level of performance in their motivational roles, with overall mean scores indicating "Strong Agreement." Students agreed that their teachers perform these roles, but their level of agreement was consistently and significantly lower. The most pronounced disparity was observed in the Teacher Knowledge construct, particularly regarding practices that make mathematics relevant. A critical "perceptual gap" was identified, indicating a misalignment between teachers' self-assessment and students' experiences.

5.2 Conclusions

Based on the findings of this study,the following conclusions are drawn:

1. **Teachers are Willing but Perceptually Misaligned:**SHS mathematics teachers are actively engaged in roles intended to motivate students. However, the significant disparity between teacher and student perceptions suggests that the efficacy of these efforts is not being fully realized from the students' perspective.
2. **The Centrality of Relevance:**The study concludes that while teachers are proficient in delivering content and providing general support, they are less effective in employing pedagogical strategies that explicitly bridge mathematical concepts to real-world applications and future careers.
3**. The Perceptual Gap as a Key Insight:**The consistent gap in perceptions concludes that teacher motivation and effort, while necessary, are insufficient without a parallel focus on how these actions are received and interpreted by students.

5.3 Recommendations

In light of the findings and conclusions,the following recommendations are proposed:

A. For Mathematics Teachers and School Administrators:
1. **Implement Reflective Practice through Student Feedback:** Schools should establish structured, anonymous student feedback mechanisms to provide teachers with direct data on their students' perceptions.
2. **Prioritize "Relevance-Building" Pedagogy:** Teachers should consciously and consistently integrate real-world problem-solving and discussions about mathematics-based careers into their lessons.

B. For the Ghana Education Service and Teacher Training Institutions:
1. **Revise Professional Development Curricula:** In-service training and pre-service teacher education should include modules focused specifically on student motivation and strategies for making mathematics relevant.

C. For Future Research:
1. **Qualitative Inquiry:** A follow-up qualitative study is recommended to explore the underlying reasons for the perceptual gap.
2. **Expanded Geographical Scope:** Similar research should be conducted in other municipalities and regions of Ghana.

VI. Appendices

A: Descriptive statistics of Teacher Support Construct items on the TMRQ

SN	Construct Items	Teachers' Perspective			Students' Perspective		
		N	Mean	SD	N	Mean	SD
1	Encourage students to ask questions when they do not understand what is being taught	30	3.67	.479	376	3.24	.956
2	Support students in their learning	29	3.59	.501	373	3.22	.901
3	Gives comments that help students to improve	29	3.59	.501	378	3.08	.834
4	Show interest in the learning progress of every student.	30	3.53	.507	378	3.19	.826
5	Allow students to present their opinions	30	3.50	.509	376	3.25	.812
6	Expect students to do their best in mathematics	30	3.50	.509	375	3.45	.718
7	Provide additional support to students if they need it	30	3.40	.563	378	2.99	.887
8	Stay patient even when students proceed slowly	30	3.40	.498	374	3.13	.890
9	Teach students how to solve problems in their way	30	3.30	.651	371	2.96	.897
10	Provide individual attention when the need arises	30	3.30	.651	376	3.03	.857
11	Reward students when they contribute to mathematics lessons	30	3.27	.640	377	2.36	.988
12	Believe in student that they can learn mathematics	29	3.24	.577	378	3.32	.808
13	Teach students how to correct their own mistakes	30	3.13	.571	378	3.10	.913
14	Explain everything until students understand	29	3.03	.680	376	3.13	.976
	Overall Teacher Support Score		**3.39**	**.342**		**3.10**	**.640**

B: Descriptive statistics of Teacher Motivation Construct items on the TMRQ

SN	Construct Items	Teachers			Students		
		N	Mean	SD	N	Mean	SD
1	Always happy when the class is improving in performance	30	3.80	.407	378	3.55	.709
2	Proud to be a mathematics teacher	30	3.77	.430	378	3.36	.765
3	See it to be a duty to teach students to understand.	30	3.70	.466	378	3.32	.733
4	Always regular in class	30	3.67	.479	376	3.41	.724
5	Serve as a learning model to students	30	3.67	.479	375	2.97	1.03
6	Cordially relate to students during lessons	30	3.60	.621	376	3.16	.868
7	Teach with enthusiasm	30	3.57	.504	376	3.11	.796
8	Always present on time during mathematics lessons	30	3.53	.507	378	3.48	.710
9	Exhaust the duration of mathematics lessons before leaving the class	29	3.52	.574	376	3.11	.912
10	Teach with joy and delight.	29	3.45	.506	378	3.18	.913
11	Give exercises and assignments regularly	30	3.27	.583	378	3.16	.736
12	Provide feedback on exercises and assignments on time	30	3.23	.626	374	3.02	.852
	Overall Teacher Motivation Score		**3.56**	**.236**		**3.24**	**.544**

C: Descriptive statistics of Teacher Knowledge Construct items on the TMRQT

SN	Construct Items	Teachers			Students		
		N	Mean	SD	N	Mean	SD
1	Use a variety of ways when explaining concepts to students.	30	3.63	.490	369	3.11	.879
2	Show expertise in whatever is taught very well.	30	3.60	.498	375	3.34	.770
3	Present lessons in an orderly manner.	30	3.53	.507	375	3.10	.884
4	Give opportunities for students to learn from theircolleagues.	30	3.53	.507	369	3.41	.721
5	Make mathematics lessons attractive to the students in class	30	3.50	.509	375	3.02	1.063
6	Encourage the use of student's knowledge for a start of a new concept	30	3.50	.509	371	2.83	.951
7	Make learning mathematics enjoyable and interesting to students.	30	3.50	.509	369	3.12	1.019
8	Do not insult or become furious when students ask further questions.	30	3.50	.572	366	3.22	.885
9	Relate what is taught to real-life situations.	30	3.47	.507	375	2.96	.876
10	Explain difficult things clearly to students.	30	3.47	.507	369	3.08	1.026
11	Talk to students about people who are successful in the field of mathematics.	30	3.47	.681	369	2.74	.987
12	Explain the usefulness of mathematics in our lives to students.	30	3.43	.504	375	3.02	.891
13	Ask questions that make students think.	30	3.43	.504	369	3.11	.967
14	Expose students to job opportunities in the area of mathematics	30	3.17	.592	375	2.86	.911
	Overall Teacher Knowledge Score		**3.48**	**.301**		**3.07**	**.637**

Source: All data are from Researcher's fieldwork (2023)

References

[1]. National Council of Teachers of Mathematics, "The role of mathematics in educational systems," NCTM, 2018.

[2]. S. Z. M. Win and T. Win, "The impact of motivation on student academic achievement in mathematics," J. Educ. Pract., vol. 11, no. 18, pp. 45–51, 2020.

[3]. Ghana Ministry of Education, Teaching Syllabus for Mathematics (Senior High School). Curriculum Research and Development Division, 2017.

[4]. M. K. Abreh, "Trends in performance of WASSCE candidates in Ghana: A case of core mathematics," University of Cape Coast Institutional Repository, 2018.

[5]. L. Stoffelsma and W. Spooren, "The relationship between student motivation and language and science achievement in Ghana," Lang. Educ., vol. 33, no. 3, pp. 245–262, 2019.

[6]. J. Fletcher, "An analysis of student performance in core mathematics: The case of WASSCE in Ghana," Ghana Education Service, 2016.

[7]. K. A. Gafoor and A. Kurukkan, "Why high school students feel mathematics difficult? An exploration of affective beliefs," UGC Approved J., vol. 6, no. 5, pp. 1–5, 2015.

[8]. S. Keuneke, Students' Difficulties in Understanding and Learning Mathematics. Verlag für Wissenschaft und Forschung, 2002.

[9]. R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivations: Classic definitions and new directions," Contemp. Educ. Psychol., vol. 25, no. 1, pp. 54–67, 2000.

[10]. H. Tambunan, "The effectiveness of the problem solving strategy and the scientific approach to students' mathematical capabilities in high order thinking skills," Int. Electron. J. Math. Educ., vol. 14, no. 2, pp. 293–302, 2019.

[11]. Y. Dissou, D. A. Yarhands, and A. C. Gyeabour, "Students' interest and long-term development in mathematics achievements: The role of motivation and learning strategies," J. Educ. Res. Pract., vol. 4, no. 2, pp. 45–60, 2014.

[12]. J. M. Harackiewicz, J. L. Smith, and S. J. Priniski, "Interest matters: The importance of promoting interest in education," Policy Insights Behav. Brain Sci., vol. 5, no. 2, pp. 153–159, 2018.

[13]. P. D. Umbach and M. R. Wawrzynski, "Faculty do matter: The role of college faculty in student learning and engagement," Res. High. Educ., vol. 46, no. 2, pp. 153–184, 2015.

[14]. S. Kale-Dery, "2020 WASSCE results impressive – WAEC," Graphic Online, Dec. 10, 2020.

[15]. R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions," Contemp. Educ. Psychol., vol. 61, p. 101860, 2020.

[16]. E. L. Deci and R. M. Ryan, "Self-determination theory: A macrotheory of human motivation, development, and health," Can. Psychol., vol. 49, no. 3, pp. 182–185, 2008.

[17]. M. Gagne and E. L. Deci, "Self-determination theory and work motivation," J. Organ. Behav., vol. 26, no. 4, pp. 331–362, 2005.

[18]. S. Hidi and K. A. Renninger, "The four-phase model of interest development," Educ. Psychol., vol. 41, no. 2, pp. 111–127, 2006.

[19]. K. A. Renninger and S. E. Hidi, The Power of Interest for Motivation and Engagement. Routledge, 2016.

[20]. R. Lazarides, H. Gaspard, and A. L. Dicke, "Dynamics of classroom motivation: Teacher enthusiasm and the development of math interest and teacher support," Learn. Instr., vol. 65, p. 101250, 2018.

[21]. A. Chuter, "Motivating students: A guide for teachers," TeachThought, 2019.

[22]. J. Y. Koawo, "Motivation in the classroom," Unpublished manuscript.

[23]. Y. D. Arthur, S. K. Asiedu-Addo, and C. K. Assuah, "Students' perception and its impact on Ghanaian students' interest in mathematics: Multivariate statistical analytical approach," Int. J. Adv. Educ. Res., vol. 2, no. 5, pp. 01–07, 2017.

[24]. L. P. Juang and T. Knight, "The role of interest in mathematics and science," J. Educ. Psychol., vol. 111, no. 5, pp. 829–840, 2019.

[25]. S. Ozel, F. Dereli, and M. Tasdan, "The relationship between interest in mathematics and academic achievement," Int. J. Prog. Educ., vol. 17, no. 2, pp. 1–12, 2021.

[26]. R. Pekrun, A. J. Elliot, and M. A. Maier, "Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance," J. Educ. Psychol., vol. 101, no. 1, pp. 115–135, 2009.

[27]. A. Ojonugwa, J. N. Igbo, A. A. Apeh, and R. A. Ndukwu, "Effect of differentiated instruction on low achievers' interest in mathematics based on gender," J. Math. Educ., vol. 5, no. 1, pp. 1–12, 2020.

[28]. S. K. Asiedu-Addo, Y. D. Arthur, and C. K. Assuah, "Compulsion and future career influence on students' interest in mathematics," Int. J. Math. Stat. Stud., vol. 4, no. 4, pp. 1–12, 2016.

[29]. E. Ortlieb, "Effective teaching: A review of the literature," J. Lang. Literacy Educ., vol. 10, no. 1, pp. 1–16, 2014.

[30]. R. Lazarides and J. Dietrich, “Teaching motivation and teacher enthusiasm: The role of teaching practices,” J. Educ. Psychol., vol. 111, no. 3, pp. 497–512, 2019.
[31]. J. W. Creswell and J. D. Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th ed. SAGE Publications, 2018.
[32]. J. W. Creswell, Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research, 4th ed. Pearson, 2012.
[33]. G. D. Israel, “Determining sample size,” University of Florida Cooperative Extension Service, 1992.
[34]. H. Taherdoost, “Determining sample size; How to calculate survey sample size,” Int. J. Econ. Manag. Syst., vol. 2, pp. 237–239, 2017.
[35]. R. Lazarides, H. Gaspard, and A.-L. Dicke, “Dynamics of classroom motivation: Teacher enthusiasm and the development of math interest and teacher support,” Learn. Instr., vol. 65, p. 101250, 2020.
[36]. L. Cohen, L. Manion, and K. Morrison, Research Methods in Education, 6th ed. Routledge, 2007.