ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue VIII August 2025

Interplay of Students' Emotional Intelligence and Attitude toward Mathematics on Performance in Grade 10 Algebra

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DOI: https://doi.org/10.51244/IJRSI.2025.120800005

Received: 08 August 2025; Accepted: 13 August 2025; Published: 27 August 2025

ABSTRACT

The study set out to establish the dynamic interaction between students' emotional intelligence and attitude toward Mathematics and how these factors influence performance in Grade 10 Algebra in a private school in Sta. Rosa Laguna. The study's participants were 137 selected Grade 10 students. The study revealed a significant relationship between the students' emotional intelligence and their attitude. Specifically, students' confidence showed a significantly positive relationship with their self-awareness and mood management. Similarly, significant positive relationships were observed between student engagement and self-motivation, managing relationships, and empathy. A notable correlation exists between valuing and the subscales of mood management and empathy. Among the subscales, empathy showed a significant relationship with improved Mathematics performance. However, the other subscales of emotional intelligence—self-awareness, mood management, self-motivation, and managing relationships—did not show a statistically significant relationship with Mathematics performance. Furthermore, students' attitude subscales—confidence, engagement, and valuing—did not significantly relate to performance in Mathematics.

Keywords: emotional intelligence, attitude, performance, empathy, algebra

INTRODUCTION

In the era of instant gratification and digital immersion, adolescents increasingly encounter emotional and academic challenges that shape their cognitive, behavioral, and scholastic development. Among these, emotional dysregulation has been identified as a key factor negatively influencing personality formation, social adjustment, and academic performance (Mayer, Salovey, & Caruso, 2004). Emotional Intelligence (EI)—defined as the capacity to perceive, understand, regulate, and manage emotions in oneself and others—has gained prominence as a strong predictor of success across personal, social, and academic domains (Goleman, 1995; Brackett, Rivers, & Salovey, 2011).

In the context of education, EI is increasingly recognized for its role in facilitating learning readiness, emotional resilience, classroom engagement, and academic persistence (Parker et al., 2004). Simultaneously, mathematics remains one of the most anxiety-inducing and challenging subjects for many learners, often exacerbated by negative attitudes and low self-efficacy. Attitudes toward mathematics—encompassing students' confidence, enjoyment, perceived usefulness, and level of engagement—are strongly associated with motivation, persistence, and achievement in the subject (Ma & Kishor, 1997; Hannula, 2002).

This study investigates the interplay between emotional intelligence and students' attitudes toward mathematics and how these two variables influence academic performance in Grade 10 Algebra. With persistently low performance in mathematics reflected in national and international assessments, and growing emotional and motivational issues observed among learners, it becomes imperative to identify socio-emotional factors that affect mathematical learning outcomes. Understanding the impact of EI and attitudinal dispositions could provide educators with critical insights for designing interventions that foster both emotional well-being and academic success.

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MATERIALS AND METHODS

Research Design: The study used a descriptive-correlational research design to examine the relationship between emotional intelligence, attitude toward Mathematics, and academic performance.

Respondents of the Study: The respondents were 137 Grade 10 students enrolled in a private school in Sta. Rosa Laguna, selected using stratified random sampling.

Sampling Technique: Stratified random sampling ensured representation across different academic sections.

Research Instrument: Standardized questionnaires were utilized to assess emotional intelligence and attitude toward Mathematics. Students' Mathematics performance was based on their scores in the Mathematics Performance Examination.

Research Procedure: Data were collected through self-administered surveys. Consent from the school administration and ethical clearance were secured prior to data collection.

Statistical Treatment of Data: Descriptive statistics were used to analyze the levels of EI and attitude. Pearson product-moment correlation was applied to determine the relationships among variables.

RESULTS

In summary, the results emphasize the complex dynamics among emotional intelligence, attitude, and academic performance. While empathy emerged as the most predictive EI component for Mathematics success, other subscales like self-awareness and mood management contribute indirectly through attitude enhancement. The findings imply that while fostering a positive attitude is beneficial, it is the integration of emotional competencies—especially empathy—that more directly supports academic outcomes. Educational programs aiming to improve Mathematics performance should therefore not only focus on conceptual mastery but also promote emotional intelligence development. By doing so, educators may cultivate resilient, self-aware learners who are emotionally prepared to tackle academic challenges.

Table 1. Level of respondents' emotional intelligence in terms of self-awareness.

Statements	Mean	SD	Verbal Interpretation
I practice mindfulness in expressing thoughts with my classmates in terms of understanding concepts and knowledge in math.	3.48	0.67	High
I can identify my strengths and weaknesses in Mathematics subject.	3.53	0.67	Very High
I can identify Mathematics competencies/ skills that need improvement.	3.48	0.67	High
I seek feedback about my strengths and areas for improvement.	3.44	0.72	High
I respect my classmates' feelings towards Mathematics.	3.50	0.63	Very High
OVERALL	3.55	0.50	Very High

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

Table 1 presents the level of respondents' emotional intelligence in terms of self-awareness. Results indicate that the majority of students possess high to very high levels of self-awareness, which suggests a basic understanding of their emotional states but limited insight into how these emotions affect their behavior.

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Table 2. Level of emotional intelligence in terms of mood management.

Statements	Mean	SD	Verbal Interpretation
I can create a positive study environment in learning and coping with the lessons in Mathematics.	3.58	0.59	Very High
I can replace negative with a positive and encouraging environment during Math class.	3.42	0.72	High
I can seek and ask questions on challenging math concepts that alleviate stress and boost confidence.	3.51	0.69	Very High
I am engaged and enjoy when learning Mathematics.	3.46	0.70	High
I control being too emotional when provoked and unable to solve my Mathematics problem correctly.	3.51	0.65	Very High
OVERALL	**3.50**	**0.29**	**Very High**

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

Table 2 shows the level of emotional intelligence concerning mood management. Students displayed a very high level, indicating that they can regulate/ control negative emotions during academic tasks such as mathematics.

Table 3. Level of emotional intelligence in terms of self-motivation.

Statements	Mean	SD	Verbal Interpretation
I can connect Mathematics to real-life situations or personal interests.	3.56	0.63	Very High
I am able to celebrate when I overcome challenging problems or difficult concepts.	3.51	0.69	Very High
I am able to discover satisfaction/ enjoyment in solving problems/ mathematical concepts.	3.47	0.71	High
I am able to embrace challenges and use them as opportunities to learn Mathematics efficiently.	3.42	0.72	High
I enjoy learning Mathematics.	3.66	0.54	Very High
OVERALL	**3.52**	**0.32**	**Very High**

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

Table 3 outlines the level of emotional intelligence in terms of self-motivation. Findings suggest that students have varying degrees of intrinsic drive, which may influence their willingness to persist in challenging subjects like Algebra.

Table 4. Emotional intelligence in managing relationships.

Statements	Mean	SD	Verbal Interpretation
I work harmoniously with others when we are doing mathematics activities.	3.63	0.58	Very High
I collaborate with my classmates during group activities in mathematics.	3.49	0.67	High
I cooperate easily for the common good when performing tasks related to mathematics.	3.43	0.75	High
I contribute to the output-making during mathematics group work.	3.53	0.63	Very High
I help my classmates understand one another when they have difficulty in mathematics.	3.44	0.75	High
OVERALL	3.50	0.30	**Very High**

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

Table 4 highlights emotional intelligence in managing relationships. The data suggests students are generally cooperative but may require more training in social-emotional learning to enhance collaboration and empathy in classroom settings.

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Table 5. Emotional intelligence in terms of empathy.

Statements	Mean	SD	Verbal Interpretation
I empathize with others when they can't solve mathematics problems correctly.	3.55	0.62	Very High
I understand the feelings of my classmates and teachers towards dealing with mathematics.	3.46	0.70	High
I respect others' answers and able to provide constructive feedback.	3.50	0.71	Very High
I recognize that everyone has personal problems that affect their understanding of mathematics lessons.	3.47	0.67	High
I consider the needs of others when it comes to solving mathematical problems.	3.56	0.59	Very High
OVERALL	3.51	0.29	**Very High**

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

Table 5 discusses emotional intelligence in terms of empathy. This was the highest-rated EI subscale, which is noteworthy as it significantly correlated with better Mathematics performance.

Table 6. Attitude subscale: confidence.

Statements	Mean	SD	Verbal Interpretation
I want to develop my Mathematics skills.	3.49	0.64	High
I feel satisfied with solving Mathematics problems.	3.69	0.48	Very High
I consider Mathematics Math challenges to have a great impact on real-life situations.	3.51	0.65	Very High
I learn Mathematics easily.	3.58	0.55	Very High
I am comfortable expressing my ideas in Mathematics class.	3.53	0.63	Very High
I enjoy Mathematics classes.	3.57	0.63	Very High
I feel motivated to study Mathematics since it stimulates me to learn more.	3.47	0.70	High
I became creative and was able to learn new things because of Mathematics.	3.55	0.64	Very High
I consider Mathematics an essential subject for my future profession.	3.52	0.67	Very High
I expect to do well in Mathematics.	3.54	0.61	Very High
OVERALL	**3.55**	**0.22**	**Very High**

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

Table 6 provides results for the attitude subscale confidence. The average scores reveal that many students feel somewhat confident, but this confidence does not directly translate to academic achievement.

Table 7. Attitude subscale: engagement.

Statements	Mean	SD	Verbal Interpretation
I sustain an interest in Mathematics.	3.61	0.57	Very High
I like to solve new problems in Mathematics.	3.53	0.67	Very High
I consider mathematical challenges to have strong appeal to me.	3.51	0.70	Very High
I am happy in Mathematics class.	3.48	0.67	High
I attend extended classes in Mathematics.	3.66	0.53	Very High
I feel delighted in Mathematics activities.	3.56	0.63	Very High
I prefer to do assignments in Mathematics.	3.52	0.63	Very High
I show excitement about my scores in Mathematics.	3.55	0.69	Very High
I work on Mathematics activities excellently.	3.54	0.58	Very High
I support math-related school activities voluntarily.	3.66	0.51	Very High
OVERALL	3.56	0.19	**Very High**

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

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Table 7 focuses on engagement. Although students report high to very high engagement levels, this alone does not ensure better performance in Mathematics.

Table 8. Attitude subscale: valuing.

Statements	Mean	SD	Verbal Interpretation
I find mathematics as a worthwhile subject.	3.58	0.58	Very High
I believe mathematics can help us as future professionals.	3.50	0.64	Very High
I improve in problem-solving skills through mathematics.	3.44	0.70	High
I plan to take mathematics-related subjects since it is vital in my future.	3.37	0.74	High
I acknowledge that learning advanced mathematics is helpful.	3.60	0.52	Very High
OVERALL	3.50	0.28	**Very High**

Legend: 3.50 – 4.00 = Very High; 2.50 – 3.49; = High; 1.50 – 2.49 = Low; 1.00 – 1.49 = Very Low

Table 8 details valuing Mathematics as a subject. Most students acknowledge the importance of Math, yet this attitude did not significantly predict higher performance.

Table 9. Distribution of students' Mathematics performance.

n = 30	F	%	Verbal Interpretation
90 and above	70	51.1	Outstanding
85 to 89	49	35.8	Very Satisfactory
80 to 84	17	12.4	Satisfactory
75 to 79	1	0.7	Fairly Satisfactory
below 75		0	Needs Improvement
TOTAL	*137*	100.00	
Mean Score	**23.5**		**Very High**
SD	**2.51**		

Legend: 25 - 30 = Very High, 19 - 24 = High, 13 - 18 = Moderate, 7 - 12 = Low, 1 - 6 = Low

Table 9 presents the distribution of students' Mathematics performance, which reflects a wide range in achievement, emphasizing the role of non-cognitive variables.

Table 10. Correlation between emotional intelligence and attitude.

Emotional Intelligence	Attitude		
	Confidence	engagement	valuing
self-awareness	0.184*	-0.053	0.084
mood management	0.184*	0.094	0.219*
self-motivation	-0.053	0.454***	0.15
managing relationships	0.084	0.186*	0.042
Empathy	0.113	0.382***	0.185*

***. Correlation is significant at the 0.01 level (2-tailed)*

**. Correlation is significant at the 0.05 level (2-tailed)*

Table 10 reveals the correlation between emotional intelligence and attitude toward Mathematics. A significant relationship was found, particularly between self-awareness, empathy, and confidence.

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Table 11. Correlation between emotional intelligence and Mathematics performance.

Emotional Intelligence	Mathematics Performance
Self-Awareness	0.001
Mood Management	0.015
Self-Motivation	0.131
Managing Relationship	0.097
Empathy	0.184*

***. Correlation is significant at the 0.01 level and at 0.05 levels(2-tailed)*
**. Correlation is significant at the 0.05 level (2-tailed)*

Table 11 shows the correlation between emotional intelligence and Mathematics performance. Among all EI components, only empathy showed a significant positive relationship with achievement.

Table 12. Correlation between attitude and Mathematics performance.

Attitude	Mathematics Performance
Confidence	0.028
Engagement	0.077
Valuing	0.093

***. Correlation is significant at the 0.01 level (2-tailed)*
**. Correlation is significant at the 0.05 level (2-tailed)*

Table 12 illustrates the correlation between attitude and Mathematics performance. Surprisingly, no significant direct relationship was found, challenging the assumption that positive attitude alone boosts academic success.

The results revealed significant relationships between certain EI subscales (e.g., empathy) and Mathematics performance, and between EI and attitude toward Mathematics. However, attitude alone did not significantly predict academic performance.

DISCUSSION

The findings support existing literature suggesting that emotional intelligence influences students' academic outcomes. Empathy, in particular, was strongly associated with better performance in Mathematics. This may reflect the importance of interpersonal understanding and self-regulation in cooperative learning and problem-solving settings. Interestingly, despite high levels of reported confidence and engagement, students' attitudes did not directly relate to performance, possibly due to gaps in conceptual understanding or test-taking skills.

CONCLUSION

Emotional intelligence plays a significant role in shaping students' attitudes and, to a limited extent, their academic performance in Algebra. Empathy stands out as the strongest emotional intelligence predictor of success in Mathematics. Attitudinal factors like confidence and valuing Mathematics, although positive, were not significantly correlated with academic achievement. These insights underscore the need for instructional approaches that nurture both the emotional and cognitive development of learners.

ACKNOWLEDGMENTS

The researcher expresses heartfelt thanks to the university faculty, administrators of the private school in Sta. Rosa Laguna, where she obtained the needed respondents for the study, technical advisers, and family for their invaluable support in the conduct and completion of this study.

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