# Emotions and Environment: Unlocking Students' Potential in Mathematics

**Yusharina Yusof, Amirah Hana Mohamed Nor, Sharifah Norhuda Syed Wahid , Nurmarni Athirah Abdul Wahid**

**College of Computing, Informatics and Mathematics, Universiti Teknologi MARA Pahang Bandar Tun Abdul Razak Jengka, Pahang, Malaysia**

**DOI: https://dx.doi.org/10.51244/IJRSI.2025.1210000352**

**Received: 06 November 2025; Accepted: 14 November 2025; Published: 24 November 2025**

## ABSTRACT

Learning mathematics depends on an individual's emotion and environment. Emotion and environment play crucial roles in students' performance in mathematics, influencing both their ability to engage with the subject and their overall academic success. Emotions is a complex psychological state that is defined as the readiness of the mind in interpreting current situations and the thoughts that play in mind which involves experience, behavioural response and physiological response. In this context, the environment encompasses a range of internal and external conditions that shape how individuals perceive and engage with mathematics. Environment can be divided into several main components including educational environment, social environment, cultural environment, personal environment and physical environment. Understanding these environmental factors can help in developing strategies to manage and reduce mathematics anxiety. Creating a positive, supportive environment can make a significant difference in understanding how students experience and regulate anxiety associated with mathematics. Thus, the objective of this research was to assess the influence of emotional and environmental factors on student performance in mathematics through a regression analysis approach. In total, 325 students from selected higher learning institutions responded to the questionnaire voluntarily. The findings showed that there was a significant negative effect of both factors on student performance where the environment was a more significant factor ($\beta$ = -.685, p = <.001) than emotion ($\beta$ = -.246, p = <.001). This study concludes that more efforts need to be made to reduce the level of negative emotions towards mathematics by providing a better learning environment so that students show a high level of motivation and display enhanced self-assurance when engaging with mathematics.

**Keywords:** Emotion, Environment, Mathematics Anxiety, Students' Performance, Potential

## INTRODUCTION

Mathematics is more than just numbers and formulas. It stands as a foundation of science, technology and problem solving, while also representing a deep personal learning journey. In this journey, emotions such as confidence, tension, avoidance and fear often interact with learning environment to shape students' academic outcomes. Performance in mathematics is therefore not determined by cognitive skills alone but is strongly influenced by emotional and environmental dimensions. When negative emotions or unsupportive environments dominate, learning tends to become more stressful and difficult, whereas positive emotions and supportive environments foster greater confidence and achievement.

Math anxiety strongly affects students' emotions, but the study did not consider how the classroom setting or performance might also shape this problem [1]. Math anxiety is deeply tied to negative emotions and past learning environments, and addressing these factors can help rebuild confidence [2]. Previous studies [13]–[15] highlighted that emotional intelligence and study orientation are pivotal in mathematics achievement, suggesting that math anxiety must be understood not only as a cognitive challenge but also as an emotional and learning-environment challenge. Recent systematic reviews highlight a robust negative link between math

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

anxiety and performance [7], [50]. Furthermore, emotional competence and academic self-concept have been shown to mediate how students approach mathematical tasks [27], [47]. Family support, including parental involvement, motivation, and the provision of learning resources, plays a key role in enhancing students' mathematics performance, while factors such as larger family size can reduce individualized attention, making emotional and academic support from parents crucial for better achievement [32], [33]. Positive social support from teachers and peers promotes positive emotions such as enjoyment and pride, which in turn are linked to better academic performance, while lack of support contributes to negative emotions such as anxiety and boredom [34]. At the same time, both ongoing patterns of anxiety and short-term anxious feelings can shape their learning experiences, with stronger effects observed among students with specific learning difficulties [23]. For high-performing students, emotions may even play a stronger role than environmental factors [44]. Altogether, the study's outcomes emphasize intertwined roles of emotion and environment in shaping mathematics achievement.

## LITERATURE REVIEW

Studies have consistently highlighted the significant role of emotional conditions in academic success. Among the emotions studied in mathematics education, mathematics anxiety has received consistent attention as it uniquely captures how fear and tension disrupt the ability to think clearly during solving mathematics problems. The phenomenon of math anxiety has been recognized for decades. The Mathematics Anxiety Rating Scale (MARS) was introduced to show that negative emotions toward mathematics could be systematically measured [41]. For instance, emotions such as anxiety and enjoyment strongly affect students' motivation and performance in mathematics [35].

Specifically, anxiety impairs cognitive processes and analytical skills [18]. Positive emotions help students solve math problems more effectively, while negative emotions like anxiety disrupt thinking [46]. When students feel anxious about mathematics, their working memory becomes overloaded, making problem solving more difficult, which in turn leads to declines in mathematical performance [3]–[5]. Similarly, [25] revealed that students who felt anxious about mathematics often turned to coping strategies, such as practicing more, seeking help, or managing their emotions, and these strategies were shaped by both their personal feelings and the classroom environment. While [38] proposed the Control-Value Theory as a comprehensive framework explaining how emotions such as enjoyment, anxiety, monotony, and curiosity enhance engagement and performance. The theory was later expanded to include emotional appraisal and perceived control as key components in academic achievement [36].

Beyond anxiety, recent studies using the Achievement Emotions Questionnaire (AEQ-M) have shown that positive emotions like enjoyment and pride help students perform better, while negative emotions such as shame, anger, hopelessness, and boredom tend to lower performance [8],[39], [49].

Mathematics anxiety negatively affects students' confidence in math, with lower self-efficacy linked to higher anxiety [42]. Anxiety during tests has the strongest negative effect, while feeling confident and having lower trait anxiety helps students, especially those with learning difficulties, achieve better results [40]. This nuanced perspective underscores that mathematics performance is embedded in a broader spectrum of emotions, not just anxiety alone.

Environmental factors, including classroom settings, teacher-student interactions, and parental support, significantly influence students' mathematical abilities. Supportive environments with positive feedback, well-designed classrooms, and adequate resources foster a growth mindset and enhance performance [19], [21], [28], [48]. Supportive social environments foster emotional resilience, which, although not examined directly in relation to mathematics, is crucial for mitigating anxiety and sustaining performance [10]. Emotional factors, particularly emotional intelligence and academic self-concept, further mediate learning outcomes. Students with stronger emotional awareness and regulation, combined with effective study habits, tend to perform better and manage anxiety more successfully [17], [27], [31], [44].

Fear can stay in the mind even after people are told it is no longer needed, which helps explain why feelings like math anxiety can be hard to overcome and still affect students' learning [24]. Math anxiety can

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

significantly impair performance, especially in stressful situations. According to [9], pressure disrupts working memory, making it harder for students to solve math problems. Extending this, [26] found that students with high math anxiety even show brain activation in pain-related regions before attempting math tasks, highlighting the strong emotional and physiological impact of math anxiety on learning.

Mathematics anxiety remains a key emotional barrier, especially for low-performing students, as heightened anxiety consumes working memory and reduces problem-solving abilities [5]. Conversely, high-performing students benefit from positive emotional experiences, which mitigate anxiety and improve achievement [44]. Targeted interventions, including narrative sharing, resilience frameworks, and gamified learning, have been shown to reduce anxiety, increase engagement, and enhance autonomy and motivation [2], [16], [29].

The physical and social learning environment also plays a critical role. Active learning classrooms, perceived supportive environments, and reduced external stressors improve confidence and performance, while poorly structured or resource-limited settings hinder achievement [12], [22], [43]. The COVID-19 pandemic further highlighted the impact of environmental constraints, where inadequate technology and connectivity affected learning outcomes [30].

Overall, students thrive when both emotional well-being and environmental support are prioritized. Positive emotions, strong emotional intelligence, and conducive learning environments collectively enhance engagement, reduce anxiety, and improve mathematics performance.

This study therefore examines the interaction between emotion and environment, and their combined effect on student achievement in mathematics as outlined in the following research framework in Figure 1.

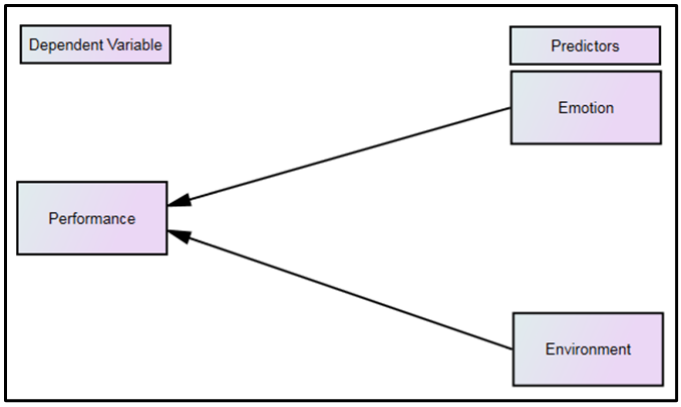


Fig. 1 Research Framework

## RESEARCH METHODS

A set of questionnaires was adapted from a previous study by [45] as an instrument for data collection. The questionnaire was divided into four parts, namely Part A (respondent's demographic background), B (six items of emotion), C (seven items of environment) and D (respondents' performance in mathematics). For Parts B and C, a 10-point Likert scale ranging from 1 (strongly disagree) to 10 (strongly agree) was administered. This study is based on two predictors (X); X1 (emotion) and X2 (environment), and the dependent variable (Y) is respondents' performance in mathematics.

The IBM-SPSS AMOS 24 software was used to analyse the collected data including the normality test, multicollinearity test, descriptive statistics and regression analysis. Pilot data indicated that the two predictors were reliable and valid to be used in real survey since the Cronbach's alpha values for both exceeded 0.7. Therefore, the objectives of this study can be proceeded using the available instrument to test the following hypotheses.

H1: There exists a significant effect of emotion on mathematics performance.
H2: There exists a significant effect of the environment on mathematics performance.

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

There will be enough evidence to support the hypotheses if the significance value (p-value) obtained from the regression analysis approach is at least less than 5% level of significance.

This study involved students from a public higher learning institution who were randomly selected to participate. The respondents completed the survey during their scheduled class sessions under the supervision of the researchers to ensure full participation. Measures were taken to safeguard confidentiality, and students were instructed to complete the questionnaire independently to uphold the assumption of sample independence. Additionally, the data in Part D consisted of the students' mathematics achievement marks, which were obtained directly from their respective lecturers.

The normality test indicated that the data were reasonably normally distributed, as reflected by the skewness values for emotion (–.407), environment (–0.683), and mathematics performance (.952), all of which fall within the acceptable threshold. The analysis further showed no evidence of multicollinearity between the two predictors, as the correlation coefficient (r = .76) remained below the recommended upper limit of .85.

## FINDING AND DISCUSSION

In total 325 respondents were involved in the study with 120 (36.92%) are males and 205 (63.08%) are females in higher learning institutions aged between 18 to 24 years old. Majority of them are from science and technology programs (205, 63.08%) closer to mathematics compared to social science students. The descriptive analysis indicates that, on average, the respondents reported a strong agreement regarding their emotional engagement (M = 7.80) and the influence of environmental factors (M = 8.22) on their mathematics learning. The mean (M) values suggest that environment factors play a slightly more prominent role in shaping mathematics performance compared to emotional influence.

The regression analysis indicates that both emotional and environmental factors have a significant impact on mathematics performance among higher education students, as the p-values (P) were below the 1% significance level as stated in Table 1. These results support both hypotheses. Notably, emotion exerts a significant negative effect on mathematics performance ($\beta = -.246$, $p < .001$), suggesting that negative emotional states are associated with lower mathematics achievement. lower mathematics performance. The result is in line with previous studies that found emotional feeling to have effects on mathematics achievement [6], [11], [20], [37], [47]. In addition, results also reveal that environment has significant negative effect on mathematics performance among students at higher learning institution ($\beta = .685$, p-value = < .001), proves that better and attractive environment will improve students' performance as supported by [9], [12],[22], [43]. Meanwhile, poor conditions in the environment negatively affect their learning process and thus their performance is influenced directly. This study also found that the environment factor gives a more significant effect on students' performance in mathematics compared to emotional effect, consistent with descriptive results. The mathematics performance among students at higher learning institutions will be expected to decrease by 0.685 based on environment compared to emotion which only decreased by 0.246.

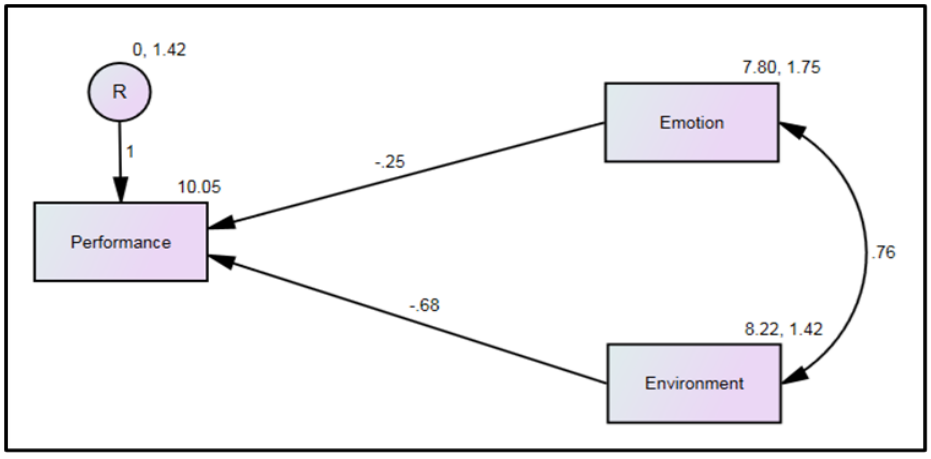


Fig 2. The Regression Path Coefficient

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

Table 1. Regression Weight and Its Significance

| Estimate | S.E. | C.R. | P | Result | Decision |
|---|---|---|---|---|---|
| -.246 | .057 | -4.308 | *** | Significant | $H_1$ is supported |
| -.685 | .063 | -10.822 | *** | Significant | $H_2$ is supported |

## LIMITATION AND FUTURE RESEARCH

This study focused primarily on emotional and environmental factors, which were found to significantly influence students' mathematics performance, with environmental conditions showing a particularly strong effect. A limitation of the study is that it did not include other potentially influential factors, such as self-efficacy, instructional strategies, demographic differences, or technological influences. In addition, the reliance on self-reported questionnaire data may affect the objectivity of emotional and environmental assessments.

Future research should explore longitudinal effects of persistent emotional states, evaluate targeted interventions for emotion and environment management, and examine demographic variations, technological influences, and subject-specific strategies to optimize mathematics learning outcomes across diverse student populations.

## CONCLUSION

Negative emotional states, such as anxiety, hinder mathematical problem-solving, especially among students with high working memory load, while a supportive, resource-rich learning environment enhances focus, engagement, and achievement. The findings emphasize that although emotions and environment influence performance differently, their interplay can exacerbate math anxiety if not addressed. Educators and policymakers should prioritize fostering positive learning environments, alongside interventions that strengthen students' emotional competence, self-esteem, and motivation.

## ACKNOWLEDGMENT

We wish to thank all the respondents from the UiTM branch campuses who participated in this study, as well as the management teams and staff for their cooperation in ensuring the successful conduct of this study.

## REFERENCES

1. Auguis MRT et.al.,Leron JE, Mondez SB, Palencia JLE, Rivera LCG and Zotomayor JJP (2024) Student's anxiety level towards mathematics: Basis for intervention program. International Journal of Science and Research Archive, 2024, 11(02), 1007–1017. https://doi.org/10.30574/ijsra.2024.11.2.0510
2. Alves KL, Pará T, Wilder SJ and Baker J (2024) Performing 1-1 Interventions to Address Mathematics Anxiety – An Intervention Case Study of 3 Brazilian Women Who Believed They Were Stupid in Mathematics. International Journal of Studies in Education and Science (IJSES), 5(4): 354-373. https://doi.org/10.46328/ijses.104
3. Ashcraft, M. H., & Krause, J. A. (2007). Working memory, math performance, and math anxiety. Psychonomic Bulletin & Review, 14(2), 243–248. DOI: 10.3758/BF03194059
4. Ashcraft MH (2002) Math Anxiety: Personal, educational, and Cognitive Consequences. Current Direction in Psychological Science. 11(5): 181-185. Ashcraft, M.H., & Krause, J.A. (2007). Working memory, math anxiety, and performance. Cognition & Emotion, 21(2), 258-277. DOI: 10.1111/1467-8721.00196.
5. Ashcraft, M. H., & Kirk, E. P. (2001). The relationships among working memory, math anxiety, and performance. Journal of Experimental Psychology: General, 130(2), 224–237. DOI: 10.1037/0096-3445.130.2.224
6. Aurora, A., & Tudor, B. (2014). The Students` Emotional Life and Their Attitude toward

Mathematics Learning. Procedia - Social and Behavioural Sciences, 180 (2015) 744 – 750 Journal Name, Volume(Issue), page numbers. https://doi.org/10.1016/j.sbspro.2015.02.192

7. Barroso, C., Ganley, C. M., McGraw, A. L., Geer, E. A., Hart, S. A., & Daucourt, M. C. (2021). A meta-analysis of the relation between math anxiety and math achievement. Psychological Bulletin, 147(2), 134–168. https://doi.org/10.1037/bul0000307
8. Bieleke, M., Götz, T., Yanagida, T., Botes, E., Frenzel, A. C., & Pekrun, R. (2023). Measuring emotions in mathematics: The Achievement Emotions Questionnaire—Mathematics (AEQ-M). *ZDM — Mathematics Education, 55*(2), 269–284. https://doi.org/10.1007/s11858-022-01425-8
9. Beilock, S. L. (2008). Math performance in stressful situations. Current Directions in Psychological Science, 17(5), 339–343. https://doi.org/10.1111/j.1467-8721.2008.00602.xCabrera AF, Gonzalez MEP, Balmonte JL, Robles AS (2020) Learning Mathematics with Emerging Methodologies—The Escape Room as a Case Study. Mathematics 2020, 8, 1586; doi:10.3390/math8091586.
10. Daud, H. M., Yussuf, A., & Kadir, F. A. A. (2023). Influence of the social environment on development of students' morals and characters: Future issues and challenges. International Journal of Academic Research in Progressive Education and Development, 12(2), 1245–1257. https://doi.org/10.6007/IJARPED/v12-i2/17540
11. Dmitrieva ES, Zaitseva KA. Orlov A, Gelman V (2003) Influence of Emotional Perception on Achievements in Mathematics. In: European Conference on Educational Research, University of Hamburg, 17-20 September 2003
12. Dogan H (2012). Emotion, Confidence, Perception and Expectation Case of Mathematics. International Journal of Science and Mathematics Education, 10(1): 49–69
13. Erasmus P (2014) Assessment Strategy in Mathematics for Second Language Learners. Literacy Information and Computer Education Journal (LICEJ), 5(4).
14. Erasmus P (2013a) Relationship Between Emotional Intelligence, Study Orientation in Maths and Maths Achievement of Middle Adolescent Boys and Girls. GSE Journal Education 2013 (ISSN 2289-3970) WorldConferences.net, 12-21
15. Erasmus, P. (2013b). The mid-adolescent's achievement in maths: The role of emotional intelligence and study orientation. Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie, 32(1), a418. https://doi.org/10.4102/satnt.v32i1.418
16. Ersozlu Z (2024) The role of technology in reducing mathematics anxiety in primary school students.Contemporary Educational Technology, 16(3), ep517. https://doi.org/10.30935/cedtech/14717
17. Francisco P (2017). "How Do You Feel about Math?": Relationships between Competence and Value Appraisals, Achievement Emotions and Academic Achievement. European Journal of Psychology and Education, 32(3): 385-405
18. Hembree, R. (1990). The nature, effects, and relief of mathematics anxiety. Journal for Research in Mathematics Education, 21(1), 33–46. https://doi.org/10.2307/749455
19. Just, J., & Siller, H.-S. (2022). The role of mathematics in STEM secondary classrooms: A systematic literature review. Education Sciences, 12(9), 629. DOI: 10.3390/educsci12090629
20. Khasawneh E, Gosling C, Williams B (2021) What impact does maths anxiety have on university students? BMC Psychology 2021 9:37. doi: 10.1186/s40359-021-00537-2
21. Kuhl, J. (2000). A theory of self-regulation: Action versus state orientation, self-regulation of motivation, and the role of personality. In: Boekaerts, M., Pintrich, P.R., & Zeidner, M. (Eds.), Handbook of self-regulation (pp. 35-78). Academic Press. doi:10.1111/j.1464-0597.1992.tb00688.x
22. Lau NTT, Hawes Z, Tremblay P, Ansari D (2021) Disentangling the Individual and Contextual Effects of Math Anxiety: A Global Perspective. PNAS 2022 Vol. 119 No. 7 e2115855119. doi: 10.1073/pnas.2115855119
23. Lievore, R., Caviola, S., & Mammarella, I. C. (2024). How trait and state mathematics anxiety could affect performance: Evidence from children with and without Specific Learning Disorders. Learning and Individual Differences, 112, Article 102459. https://doi.org/10.1016/j.lindif.2024.102459
24. Luck, C. C., & Lipp, O. V. (2015). A potential pathway to the relapse of fear? Conditioned negative stimulus evaluation (but not physiological responding) resists instructed extinction. Behaviour Research and Therapy, 66, 18–31. https://doi.org/10.1016/j.brat.2015.01.001

25. Luu-Thi HT, Ngo-Thi TT, Nguyen-Thi MT, Thao-Ly T, Nguyen-Duong BT, Tran-Chi VL (2021) An Investigation of Mathematics Anxiety and Academic Coping Strategies Among High School Students in Vietnam: A Cross-Sectional Study. Front. Educ. 6:742130. 1-14. doi: 10.3389/feduc.2021.742130
26. Lyons, I. M., & Beilock, S. L. (2012). When math hurts: Math anxiety predicts pain network activation in anticipation of doing math. PLOS ONE, 7(10), e48076. https://doi.org/10.1371/journal.pone.0048076
27. Maree, J. G., Fletcher, L., & Erasmus, P. (2013). The relationship between emotional intelligence, study orientation in mathematics and the mathematics achievement of the middle adolescent. Journal of Psychology in Africa, 23(2), 205–211. https://doi.org/10.1080/14330237.2013.10820616
28. Marsh, H.W. & Martin, A.J.(2006). Academic self-concept and academic achievement: A meta-analysis. Journal of Educational Psychology, 98(2), 397–413. https://doi.org/ DOI: 10.1348/000709910X503501
29. Meghalai R, Saraladevi K (2015) Impact of Gender, Positive and Negative Emotions on Manifest Anxiety among Mathematics High Achievers. International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization), 4(3):1274-1283
30. Mamolo LA (2022) Online Learning and Students' Mathematics Motivation, Self-Efficacy, and Anxiety in the "New Normal". Hindawi Education Research International. Volume 2022: 1-10 doi: 10.1007/s10212-016-0299-4
31. Mulyani and Lubis (2024) The Effect of Intellectual Intelligence (IQ) and Emotional Intelligence (EQ) on Student Mathematics Learning Outcomes. Prisma Sains:Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram, 12(2): 354-363 https://doi.org/10.33394/jps.v12i2.11225
32. Oginni, O. I. (2018). Home background and students' achievement in mathematics. Journal of Sociology and Anthropology, 2(1), 14–20.
33. Oginni O.I. (2022) Comparative studies of students' psychosocial factors and performance in Mathematics. European Journal of Training and Development Studies, 9(2): 40-50 https://doi.org/10.24331/ijere.950285
34. Peixoto, F., Sanches, C., Mata, L., & Monteiro, V. (2017). "How do you feel about math?": Relationships between competence and value appraisals, achievement emotions and academic achievement. European Journal of Psychology of Education, 32(3), 385–405. https://doi.org/10.1007/s10212-016-0299-4
35. Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. Educational Psychologist, 37(2), 91–106. https://doi.org/10.1207/S15326985EP3702_4
36. Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. Educational Psychology Review, 18(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9
37. Pekrun, R., & Linnenbrink-Garcia, L. (Eds.). (2014). International handbook of emotions in education. New York: Routledge.
38. Pekrun, R., & Perry, R. P. (2014). Control-value theory of achievement emotions. In R. Pekrun & L. Linnenbrink-Garcia (Eds.), International handbook of emotions in education (pp. 120–141). New York: Taylor & Francis. https://doi.org/10.4324/9780203147875.ch8
39. Pekrun, R., Lichtenfeld, S., Marsh, H. W., Murayama, K., & Goetz, T. (2017). Achievement emotions and academic performance: Longitudinal models of reciprocal effects. Child Development, 88(5), 1653–1670. https://doi.org/10.1111/cdev.12704
40. Rachele, L., Caviola, S., & Mammarella, I. C. (2024). How trait and state mathematics anxiety could affect performance: Evidence from children with and without Specific Learning Disorders. Learning and Individual Differences, 112, 102459. https://doi.org/10.1016/j.lindif.2024.102459
41. Richardson, F. C., & Suinn, R. M. (1972). The Mathematics Anxiety Rating Scale: Psychometric Data. Journal of Counseling Psychology, 19(6), 551–554. DOI: 10.1037/h0033456
42. Rozgonjuk D, Kraav T, Mikkor K, Puurand KO, That K (2020) Mathematics anxiety among STEM and social sciences students: the roles of mathematics self-efficacy, and deep and surface approach to

learning. International Journal of STEM Education. doi: 10.1186/s40594-020-00246-z
43. Shamaki, Ado T (2015) Influence of Learning Environment on Students' Academic Achievement in Mathematics: A Case Study of Some Selected Secondary Schools in Yobe State – Nigeria. Journal of Education and Practice, 6(34): 40-44
44. Siti Hawa Omar, Sharipah Ruzaina Syed Aris, & Teoh Sian Hoon. (2022). Mathematics anxiety and its relationship with mathematics achievement among secondary school students. Asian Journal of University Education, 18(4), Article. https://doi.org/10.24191/ajue.v18i4.19992
45. Syed Wahid, S. N., Yusof, Y., & Mohamed Nor, A. H. (2018). The impact of mathematics anxiety on students' performance: A comparative study on Archievema. AIP Conference Proceedings, 1974(1). https://doi.org/10.1063/1.5041710
46. Trezise K, Reeve RA (2014) Cognition-emotion interactions: patterns of change and implications for math problem solving. Original Research Article (Frontier in Psychology) https://doi.org/10.3389/fpsyg.2014.00840
47. Van der Beek, J. P. J., Van der Ven, S. H. G., & Kroesbergen, E. H. (2017). Self-concept mediates the relation between achievement and emotions in mathematics. British Journal of Educational Psychology, 87(3), 478–495. https://doi.org/10.1111/bjep.12160
48. Wang, C., Li, X., & Wang, H. (2023). The mediating effect of math self-efficacy on the relationship between parenting style and math anxiety. Frontiers in Psychology, 14, 1197170. DOI: 10.3389/fpsyg.2023.1197170
49. Zaccoletti, S., Altoè, G., & Mason, L. (2020). Enjoyment, anxiety and boredom, and their control-value antecedents as predictors of reading comprehension. *Learning and Individual Differences, 79*, Article 101869. https://doi.org/10.1016/j.lindif.2020.101869
50. Zhang, J., Zhao, N., & Kong, Q. P. (2019). The relationship between math anxiety and math achievement: A meta-analytic investigation. Frontiers in Psychology, 10, 1613. https://doi.org/10.3389/fpsyg.2019.01613