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A Meta-Analysis of Studies on Students' Mathematics Anxiety and Mathematics Performance

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***Abstract*—** *Mathematics anxiety has been extensively studied due to its potential negative impact on students' mathematics performance. This meta-analysis synthesized the findings of five studies conducted between 2017 and 2023 in elementary and secondary schools, examining the relationship between mathematics anxiety and mathematics performance. Utilizing a descriptive quantitative research method, the study systematically investigated the correlation between these two variables. Data were sourced from the Graduate School Library of Holy Name University and the University of Bohol, Tagbilaran City, following a structured search procedure and comprehensive literature review to identify studies that met the inclusion criteria. A total of five (5) studies qualified for analysis, and the meta-analysis was conducted systematically through study coding, effect size computation, and heterogeneity assessment to ensure accurate data interpretation. The review came up with a medium effect size of -0.308, indicating moderate negative correlation between mathematics anxiety and mathematics performance. The heterogeneity analysis (Q-value = 16.236, p = 0.003; I^2 = 75.363%) suggested that a substantial portion of variability was due to actual differences between the studies rather than random sampling error. The findings emphasize the need for targeted interventions to mitigate the adverse effects of mathematics anxiety. These interventions may include promoting positive attitudes toward mathematics, implementing stress-reducing strategies, and enhancing instructional methods. Addressing these factors can help improve students' confidence and overall mathematics performance, fostering a more effective and supportive learning environment.*

***Keywords*—** *Mathematics anxiety, mathematics performance, meta-analysis*

I. INTRODUCTION

Mathematics is one of the core subjects required for all learners in many countries worldwide. It is the science of expressing and studying the relationship between quantities and magnitudes represented by numbers and symbols. Hom and Gordon (2021) noted that Mathematics has been at the forefront of every civilized society even in the most primitive cultures. Moreover, it is an accepted truism that Mathematics plays a vital role in the person's quest to understand the world's complexities. Hence, the use of Mathematics trains people to reason logically and enables them to develop clear models of problems.

As interesting as the subject is, it is labeled as one of the most difficult subjects to deal with. The lack of understanding of the basic concepts is considered the leading factor of the learners' low academic performance. Additionally, the method of teaching, lack of practice, and attention disorders among learners are potential factors for learning difficulties in the subject. Mahanta (2019) wrote that learning Mathematics is not something that comes intuitively, it takes plenty of effort. Based on the 2022 PISA result, it is a fact that the quality of Mathematics education in the Philippines remains very low. The contingent of 15-year-old Filipino students still lags in Mathematics in the assessment, earning 355 points only, compared to the global average of 472 points (Chi, 2023).

Mathematics anxiety (MA) has been a matter of concern in education for a long time. It refers to the state of fear, tension, and apprehension when individuals engage with mathematics. A range of studies showed this phenomenon is a highly prevalent problem among students from elementary schools to universities and has been suggested to decrease the mathematics performance of students. Moreover, the negative mathematics anxiety-performance link has been found in many empirical studies, which indicates the significant association between mathematics anxiety and poor performance in solving mathematics problems (Zhang et al., 2019).

Demedts et al. (2022) noted that some people suffer from mathematics anxiety which is especially manifested in and can affect mathematical learning during adolescence. Besides the negative implications that mathematics anxiety can have on the mental health and well-being of individuals, empirical studies observed a consistent negative correlation between mathematics anxiety and mathematics performance. However, the study by Field et al. (2019) revealed that mathematics anxiety only manifested a slight effect on students' mathematics performance in secondary schools across the United Kingdom. Subsequently, the gap in this study highlights the variation of study findings concerning the relationship between mathematics anxiety on students' performance.

It is in this context that the researcher aims to provide significant contributions to the field of educational research in mathematics by conducting a meta-analysis about mathematics anxiety and mathematics performance of elementary and secondary learners. In this view, the researcher uses the major findings as the basis for proposing measures to improve sustainable learners' psychological well-being and mathematics performance.

II. LITERATURE REVIEW

This meta-analysis explores the intricate relationship between mathematics anxiety and student performance, guided by three foundational theoretical frameworks: the Control-

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Value Theory of Achievement Emotions (2006), the Processing Efficiency Theory (1992), and the Theory of Planned Behavior (1991). These perspectives collectively provide a nuanced understanding of how emotions, cognitive processes, and attitudes interplay to influence students' engagement and success in mathematics.

The Control-Value Theory by Pekrun (2006) posits that learners' emotions, such as anxiety, emerge from perceptions of control and the value assigned to academic tasks. When students feel a lack of control over solving valued mathematical problems, their anxiety levels rise, often impairing performance (Khasawneh et al., 2021). Similarly, Eysenck and Calvo's Processing Efficiency Theory (1992) highlights how anxiety reduces cognitive efficiency by disrupting working memory. Worry—central to anxiety—diverts attention, impairing problem-solving capacity (Bell, 2018). Ajzen's Theory of Planned Behavior (1991) emphasizes the role of attitudes, social norms, and perceived control in shaping behavior, suggesting that students' beliefs in their mathematical abilities significantly impact engagement and performance (Sansom, 2021).

Empirical evidence from various educational contexts underscores the negative correlation between mathematics anxiety and performance. Studies by George and Mitchell (2022) in Jamaica and Zanabazar et al. (2023) in Mongolia revealed that heightened anxiety levels consistently correlate with lower mathematics achievement. Similarly, local research in the Philippines, such as Angeles et al. (2023), identified a weak negative correlation, suggesting that mathematics anxiety hampers students' capacity to perform effectively. However, some studies—such as those by Siaw et al. (2020) and Samante and Alave (2021)—present a more nuanced view, indicating that certain students exhibit resilience, succeeding despite experiencing high anxiety levels. These mixed findings suggest that factors like self-efficacy and coping strategies may moderate the negative impact of anxiety on performance.

Meta-analytic reviews further illuminate the consistency and variability of this relationship. Namkung et al. (2019) found a significant negative correlation across 131 studies, while Barroso et al. (2021) identified a small-to-moderate negative effect. Contextual factors, sample characteristics, and study designs appear to influence these variations. Interventions targeting cognitive support and emotional regulation have been effective, as evidenced by research from Sammallahti et al. (2023) and Ulum and Kugukdanaci (2022). These findings emphasize the importance of implementing strategies to mitigate the adverse effects of anxiety on mathematical performance.

Given these insights, this meta-analysis aims to evaluate the overall effect sizes of studies on mathematics anxiety and performance, while also examining significant variations across the selected studies. The findings aim to provide valuable insights for enhancing mathematics learning at the basic education level. Additionally, the results will serve as a basis for proposing practical strategies to foster a more conducive environment for improved student performance in mathematics.

III. Research Methodology

Design

This meta-analysis employed the descriptive quantitative research method, statistically combining and analyzing data from multiple quantitative studies to provide a comprehensive overview. It primarily described the overall trend across various studies rather than testing a specific hypothesis in a new experiment (McCombes, 2023). Specifically, this meta-analysis investigated the relationship between mathematics anxiety on students' mathematics performance. This research design helped the researcher find appropriate answers to the study's specific questions outlined in the sub-problems.

Sample Size

A purposive sampling method identified five studies conducted between 2017 and 2023. The inclusion criteria required that studies:

- Employed a descriptive-correlational research design.
- Focused on mathematics anxiety and performance.
- Included a minimum of 80 respondents.
- Provided statistical details necessary for calculating effect sizes.

Environment

The locale of the study is Holy Name University and University of Bohol, Tagbilaran City. The researcher selected these institutions as the research environment because these schools offered a Master of Arts in Education major in Mathematics in the Graduate Studies. Moreover, these schools conducted research which focused on mathematics anxiety and mathematics performance.

Instrument

The study utilized several research instruments for data gathering. First, study qualifying sheets were structured based on inclusion criteria to identify qualified studies during the pre-screening process and adhered to exclusion criteria to guide the researcher in selecting studies for inclusion in this meta-analysis. These sheets were adapted from a meta-analytic review conducted by Anunciado in 2021 at Holy Name University. Additionally, coding sheets adapted from Hilmayr et al. (2020) were employed. The researcher modified these standardized sheets based on the content focus of each individual study included in the review. This coding method facilitated the meta-analysis and the plotting of mapping matrices across different categorizations, enabling easier identification of patterns and trends. This process ultimately enhanced the reliability and consistency of research findings by providing a systematic framework for data interpretation. Finally, a data layout matrix was used to summarize information, guiding the systematic analysis of research findings and assisting in identifying the profile of the five qualified studies, which included details such as the title of the study, sample size, research respondents, research instruments, and key findings.

Statistical Analysis

Effect sizes (Pearson’s r) were computed to quantify the relationship between mathematics anxiety and performance. Fisher’s z transformation stabilized the sample distribution

before conversion back to correlation coefficients. Heterogeneity was assessed using Q-statistics and I^2 index.

IV. Results and Discussions

A total of seven (7) potential studies were initially screened. After thorough screening, five (5) studies met the inclusion criteria and were included in the meta-analysis. Table 1 presented the profile of studies included in the meta-analysis as to the following: title of study; sample size; respondents; instruments. and key findings. Table 2 depicts the results for effect sizes of mathematics anxiety on students' mathematics performance across five studies. Table 3 presented the random-effects modeling analysis of the five studies and Table 4 shows the variation in effect sizes of studies included in this meta-analysis.

TABLE 1. Profile of Studies Included in the Meta-Analysis

Title of Study	Sample Size	Research Respondents	Research Instruments		Key Findings
			Mathematics Anxiety	Mathematics Performance	
1. Students' Mathematics Self-Efficacy and Anxiety in Relation to Academic Performance: Proposed Intervention Program (Berou, 2017)	93	Grade 7 Students	Standard adopted from MSEAQ (Kay, 2009)	Documented Students' Mathematics Performance (1st to 4th Qtr.)	Negative correlation between mathematics anxiety and both self-efficacy and mathematics performance. Positive correlation between self-efficacy and mathematics performance.
2. Mathematics Anxiety in Relation to Academic Performance of Grade 7 Students, Batuan National High School, Batuan, Bohol (Torrejano, 2019)	100		Modified Survey Tool MARS-R (Palke & Parker, 1962)	Documented Students' Mathematics Performance (1st and 2nd Qtr.)	No significant correlation between mathematics evaluation anxiety and academic performance.
3. Anxiety and Attitude Towards Mathematics in Relation to Academic Performance Among Grade 10 Students, Bilar NHS, Bilar, Bohol (Macaambac, 2019)	158	Grade 10 Students	Modified Survey Tool MARS (Wahid et al., 2013)		No statistically significant correlation between mathematics anxiety, attitude toward mathematics, and mathematics performance.
4. Parental Roles, Math Anxiety and Children's Mathematics Performance (Maravilla, 2020)	123	Grade 6 Pupils	Modified Survey Tool MSEAQ (Kay, 2009)	Documented Students' Mathematics Performance (1st and 4th Qtr.)	Parent respondents: • Majority exhibited an authoritative parenting style • High expectations for their children's mathematics learning Pupil respondents: • 41% experienced high mathematics anxiety • Negative impact observed on mathematics performance
5. Students' Attitude, Anxiety, and Performance in Mathematics During the Blended Learning Approach (Miranda, 2022).	81	Grade 5 Pupils	Modified Survey Tool ATM (Tapia, 1996) & MSEAQ (Kay, 2009)	Teacher-Made Proficiency test (4th Qtr.)	Self-confidence positively correlated with mathematics performance Perceived value and mathematics anxiety negatively correlated with mathematics performance

Table 1 revealed several notable insights regarding the profile of studies included. The reviewed research primarily focused on the correlation between mathematics anxiety and mathematics performance, but some studies also explored additional variables, such as students' self-efficacy, attitudes toward mathematics, and parental roles in mathematics education. Sample sizes ranged from 81 to 158 respondents, with researchers employing total enumeration to include all students from specific grade levels (Grades 5, 6, 7, and 10) in their respective schools. The inclusion of participants across different age classifications contributed to variations in findings, as age plays a crucial role in shaping individuals' perceptions and interpretations of mathematics-related challenges.

Most studies (80%) used modified survey questionnaires to assess mathematics anxiety, while a similar portion documented students' mathematics performance using academic records. Variations in response scales and question wording may have influenced the comparability of results across studies. Notably, 60% of the studies found a negative correlation between mathematics anxiety and performance, while the remaining studies suggested that anxiety did not significantly impact students' mathematical outcomes. This diversity in findings underscores the complexity of factors affecting mathematics learning and highlights the need for further investigation into the nuanced relationship between anxiety and performance.

Table 2 presents the effect sizes of five studies examining the relationship between mathematics anxiety and mathematics performance. The overall correlation coefficient ($r = -0.308$) indicates a medium negative effect, suggesting that higher levels of mathematics anxiety are generally associated with lower mathematics performance.

Among the studies, Berou (2017) reported the strongest negative correlation ($r = -0.521$), indicating a large effect size, suggesting that students with higher mathematics anxiety and lower self-efficacy in mathematics tend to perform poorly in the subject. Maravilla (2020) also found a relatively strong

negative correlation (r = −0.430) with a medium effect size, highlighting the influence of parental roles and anxiety on children's mathematical performance.

TABLE 2. Effect Sizes of Studies on Mathematics Anxiety and Mathematics Performance

Study	Sample Size	Correlation (r)	Interpretation
Berou (2017)	93	-0.521	Large Effect
Torrejano (2019)	100	-0.204	Small Effect
Macaambac (2019)	158	-0.117	Small Effect
Maravilla (2020)	123	-0.430	Medium Effect
Miranda (2022)	81	-0.240	Small Effect
Overall		**-0.308**	**Medium Effect**

On the other hand, Torrejano (2019), Macaambac (2019), and Miranda (2022) reported smaller negative correlations (ranging from -0.117 to -0.240), which are interpreted as small effect sizes. These findings suggest that although mathematics anxiety influences performance, the extent of its impact may vary depending on other contextual factors such as age, educational environment, or additional variables like attitude and parental involvement.

Overall, the findings reinforce the notion that mathematics anxiety is a critical factor that educators and stakeholders must address to improve students' mathematics outcomes. The moderate overall negative effect highlights the need for targeted interventions to reduce anxiety and support positive learning experiences.

Table 3 presented the random-effects modeling analysis of the five studies.

TABLE 3. Random-Effects Modeling Analysis of the Five Studies

Study Name	Statistics for each study				
	Correlation	Lower Limit	Upper Limit	Z-value	p-value
Berou (2017)	-0.521	-0.655	-0.355	-5.481	0.000
Torrejano (2019)	-0.204	-0.385	-0.008	-2.038	0.042
Macaambac (2019)	-0.117	-0.268	0.040	-1.463	0.143
Maravilla (2020)	-0.430	-0.564	-0.274	-5.038	0.000
Miranda (2022)	-0.240	-0.436	-0.023	-2.162	0.031
Pooled	-0.308	-0.454	-0.145	-3.630	0.000
Prediction Interval	-0.308	-0.729	0.282		

The average effect size found in these studies is -0.308, implying that mathematics anxiety generally leads to lower math performance. The result indicates 95% confidence that the true average effect size in comparable studies lies between -0.454 and -0.145. To determine if this effect size is significantly different from zero, the study uses Z-value as the basis for analysis. The Z-value for the analysis is -3.630, with a p-value < 0.001. Considering that the computed p-value is much smaller than the threshold of 0.050, rejecting the null hypothesis is the decision. Such result indicates that in similar populations, mathematics anxiety does indeed have a significant impact on the respondents' academic performance in mathematics.

TABLE 4. Variation in Effect Sizes of Studies on Mathematics Anxiety on Mathematics Performance

Q-Value	df (Q)	P-value	I-squared
16.236	4	0.003	75.363

Table 4 presents the variation in effect sizes across the studies included in this meta-analysis. The Q-value of 16.236, with 4 degrees of freedom (df) and a p-value of 0.003, indicates a significant variation in effect sizes among the five studies, leading to the rejection of the null hypothesis.

Additionally, the I-squared value of 75.363% suggests that over 75% of the observed variability is attributable to true differences between the studies rather than sampling error. This substantial heterogeneity implies that the studies' results are not entirely consistent, necessitating further investigation into the potential sources of variability.

These findings align with the study by Barroso et al. (2021), which identified a small-to-moderate negative correlation between mathematics anxiety and mathematics performance. Notably, this relationship was significant across all moderators' sub-groups, except for the link between mathematics anxiety and assessments, which contributed to the observed variation in effect sizes across the reviewed studies.

V. Conclusion

Based on the medium effect size observed across the five studies included in this meta-analysis, the researcher concluded that mathematics anxiety has a moderate negative relationship with mathematics performance. However, substantial variation across studies indicates that contextual factors, such as parental involvement and learning environments, significantly influence this relationship. Differences in effect sizes are likely due to variations in sample groups, participant characteristics, research instruments used, and specific outcomes measured, underscoring the complexity of the issue. These findings highlight the need for targeted interventions to reduce mathematics anxiety and enhance mathematics performance.

Suggestions

Based on the conclusion drawn from the study, the researchers formulated the following recommendations:

1. The result suggests that schools should introduce anxiety-reducing programs like mindfulness, peer tutoring, and small group discussions, alongside technology integration. These strategies help alleviate anxiety and improve performance, addressing the moderate negative

relationship between mathematics anxiety and performance.

2. Administrators should implement age-specific intervention programs, as variations in the effects of mathematics anxiety across grade levels were observed. Additionally, professional development for teachers should focus on strategies to reduce anxiety and enhance student engagement, ensuring tailored approaches that address the unique needs of students at different developmental stages.
3. Schools should engage parents in home mentoring to foster a growth mindset and support students, while encouraging peer tutoring and remedial classes. Parental involvement and peer collaboration reduce anxiety and build student confidence, improving performance.
4. Teachers should guide students in setting study routines and incorporate real-world applications and game-based learning. Structured learning and relevant, engaging content reduce anxiety and increases student engagement, improving academic performance.
5. Future studies should examine moderator variables, such as age groups, educational contexts, sample characteristics, research instruments, and socio-cultural influences, to better understand the factors contributing to variations in research findings. Identifying these factors will provide deeper insights into the complex relationship between mathematics anxiety and performance.

REFERENCES

[1] American Psychological Association (2025). Anxiety and performance: The processing efficiency theory. Retrieved from https://psycnet.apa.org/record/1993-16373-001
[2] Angeles, A. L., Sanone, C. J., Combo, A., Garcia, A. D., Alejandro, A. M., Bambo, M. G., Ybañez, S. M., Padlan, E. M., & Teodoro, V. (2023). A correlational analysis on math anxiety and mathematical performance of Grade 10 students in Morong National High School. https://ejournals.ph/article.php?id=21523
[3] Bakır-Yalçın, E., & Usluel, Y. K. (2023). Investigating the antecedents of engagement in online learning: do achievement emotions matter? Education and Information Technologies, 29(4), 3759–3791. https://doi.org/10.1007/s10639-023-11995-z
[4] Barroso, C., Ganley, C. M., McGraw, A. L., Geer, E. A., Hart, S. A., & Daucourt, M. C. (2020). A meta-analysis of the relation between math anxiety and math achievement. Psychological Bulletin, 147(2), 134–168. https://doi.org/10.1037/bul0000307
[5] Bell, C. (2018). Overcoming math anxiety. LINCS | Adult Education and Literacy | U.S. Department of Education. https://lincs.ed.gov/professional-development/resource-collections/profile-1133
[6] Charlesworth Author Services (2022). The importance of having large sample sizes for your research. Retrieved from https://www.cwauthors.com/article/importance-of-having-large-sample-sizes-for-research
[7] Chi, C. (2023, December 9). Philippines still lags behind world in math, reading and science — PISA 2022. Philstar.com. https://www.philstar.com/headlines/2023/12/06/2316732/philippines-still-lags-behind-world-math-reading-and-science-pisa-2022
[8] deJonge, J. (2015). Different survey questions on the same topic : How to make responses comparable? Researchgate. https://www.narcis.nl/publication/RecordID/oai:repub.eur.nl:78339
[9] Delgado, K. D. D., & Kassim, S. R. (2019). Mathematics Anxiety among Young Filipino Learners: Investigating the Influence of Gender and Socio-Economic Status. Researchgate, 31(3), 575–579. https://files.eric.ed.gov/fulltext/ED596724.pdf
[10] Demedts, F., Reynvoet, B., Sasanguie, D., & Depaepe, F. (2022). Unraveling the role of math anxiety in students' math performance. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.979113
[11] Dodongan, E. B. (2022). Math anxiety, learning engagement and perceived usefulness of technology as predictors to mathematics performance of students. International Journal of Trends in Mathematics Education Research, 5(1), 12–18. https://doi.org/10.33122/ijtmer.v5i1.104
[12] Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and Performance: The Processing Efficiency Theory. Cognition & Emotion, 6(6), 409–434. https://doi.org/10.1080/02699939208409696
[13] Field, A. P., Evans, D., Bloniewski, T., & Kovas, Y. (2019). Predicting maths anxiety from mathematical achievement across the transition from primary to secondary education. Royal Society Open Science, 6(11), 191459. https://doi.org/10.1098/rsos.191459
[14] Flack, A. (2021). Exploring mathematics anxiety amongst pupils at a pupil referral unit. Retrieved from https://bsrlm.org.uk/wp-content/uploads/2021/08/BSRLM-CP-41-2-06.pdf
[15] Frost, J. (2021). Understanding significance levels in statistics. Retrieved from https://statisticsbyjim.com/hypothesis-testing/significance-levels/
[16] Gabriel, F., Buckley, S., & Barthakur, A. (2020). The impact of mathematics anxiety on self-regulated learning and mathematical literacy. Australian Journal of Education, 64(3), 227–242. https://doi.org/10.1177/0004944120947881
[17] Geary, D. C. (2024). Facing up to math anxiety: How it affects achievement and what can be done about it. Retrieved from https://www.cis.org.au/publication/
[18] George, L., & Mitchell, L. (2022). Exploring mathematics anxiety among primary school students: Prevalence, mathematics performance and gender. International Electronic Journal of Mathematics Education, 17(3), em0692. https://doi.org/10.29333/iejme/12073
[19] Ginoo, S. J. A., Maique, G. A., & Inoc, M. J. (2023). Math anxiety, resiliency, and math performance of the Grade 7 students during the limited face-to-face class. Zenodo (CERN European Organization for Nuclear Research). https://doi.org/10.5281/zenodo.8305058
[20] Glass, G. V. (2015). Meta-analysis at middle age: a personal history. Research Synthesis Methods, 6(3), 221–231. https://doi.org/10.1002/jrsm.1133
[21] Gumpili, S. P., & Das, A. V. (2022). Sample size and its evolution in research. IHOPE Journal of Ophthalmology, 1, 9–13. https://doi.org/10.25259/ihopejo_3_2021
[22] Halme, H., Trezise, K., Hannula-Sormunen, M. M., & McMullen, J. (2022). Characterizing mathematics anxiety and its relation to performance in routine and adaptive tasks. Journal of Numerical Cognition, 8(3), 414–429. https://doi.org/10.5964/jnc.7675
[23] Hom, E. J., & Gordon, J. (2021, November 11). What is mathematics? livescience.com. https://www.livescience.com/38936-mathematics.html
[24] Hübel, E., Stan, M., & Tasente, T. (2023). How respondents' age influence perceptions of socio-economic issues in the context of sustainable local development. Eximia, 11, 41–56. https://doi.org/10.47577/eximia.v11i1.277
[25] Kabir, H. (2015). Is there any minimum number for studies that should be included in meta-analysis? Retrieved from https://www.researchgate.net/post/Is-there-any-minimum-number-for-studies-that-should-be-included-in-meta-analysis
[26] Khasawneh, E., Gosling, C., & Williams, B. (2021a). What impact does maths anxiety have on university students? BMC Psychology, 9(1). https://doi.org/10.1186/s40359-021-00537-2
[27] Khasawneh, E., Gosling, C., & Williams, B. (2021b). What impact does maths anxiety have on university students? BMC Psychology, 9(1). https://doi.org/10.1186/s40359-021-00537-2
[28] Levordashka, A. (n.d.). Effects of questionnaire design on respondent experience and data quality. Docslib. https://docslib.org/doc/9830654/effects-of-questionnaire-design-on-respondent-experience-and-data-quality
[29] Levy, R. (2018, July 6). 5 tips for improving students' success in math. Edutopia. https://www.edutopia.org/article/5-tips-improving-students-success-math/
[30] Lopez-Garrido, G. (2023). Bandura's Self-Efficacy Theory of Motivation in Psychology. Simply Psychology. https://www.simplypsychology.org/self-efficacy.html
[31] Magnate, F., Rey, J., & Sulatra, S. (2023). Mathematics Performance as influenced by Mathematics Anxiety and Self-Efficacy: A Modeling study. Journal for Educators Teachers and Trainers, 14(5). https://doi.org/10.47750/jett.2023.14.05.028
[32] Mahanta, P. (2019). 4 reasons why students struggle with math and how to overcome it. Prodigy. https://www.prodigygame.com/main-en/blog/4-reasons-why-students-struggle-with-math-and-how-to-overcome-it/
[33] McCombes, S. (2020, June 22). Descriptive Research | Definition,

Types, Methods & Examples. Scribbr. https://www.scribbr.com/methodology/descriptive-research/
[34] Moroscallo, T. (2024). Mathematics Anxiety's impact on Grade 11 General Mathematics performance. Journal of Interdisciplinary Perspectives, 2(7). https://doi.org/10.69569/jip.2024.0100a
[35] Myung, S. (2023). How to review and assess a systematic review and meta-analysis article: a methodological study (secondary publication). Journal of Educational Evaluation for Health Professions, 20, 24. https://doi.org/10.3352/jeehp.2023.20.24
[36] Namkung, J. M., Peng, P., & Lin, X. (2019). The Relation Between Mathematics Anxiety and Mathematics Performance among School-Aged Students: A Meta-Analysis. Review of Educational Research, 89(3), 459–496. https://doi.org/10.3102/0034654319843494
[37] Navida, G. S. (2022). Mathematics Anxiety, Conception and Performance of the University Freshmen students. International Journal of Scientific and Management Research, 05(03), 11–22. https://doi.org/10.37502/ijsmr.2022.5302
[38] 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
[39] Riboroso, R. A., Llagas, Jr. R. M., & Taan, J. L. R. (2018). Mathematics self-efficacy and anxiety and mathematics performance of elementary education students. Retrieved from https://www.ijser.org/researchpaper/
[40] Ruark, A. D. (2019). The effect of expressive writing on the math anxiety scores of middle school students enrolled in a public school in east Texas. Scholars Crossing. https://digitalcommons.liberty.edu/doctoral/1971/
[41] Salahot, E. D. (2022). The Effects of Mathematics Anxiety on Mathematics Performance among Secondary School Students in Tanzania: A Case of Arusha City Council. International Journal of Scientific Research and Management (IJSRM), 10(12), 425–436. https://doi.org/10.18535/ijsrm/v10i12.m001
[42] Samante, J., & Alave, A. (2021). Anxiety And Performance In Mathematics Of Grade Four Pupils. Globus Journal of Progressive Education, 11(1). https://doi.org/10.46360/globus.edu.220211001
[43] Sammallahti, E., Finell, J., Jonsson, B., & Korhonen, J. (2023). A Meta-Analysis of math anxiety interventions. PsychArchives. https://psycharchives.org/en/item/48e9420e-a161-4798-81fa-4a8864f7f7a7
[44] Sánchez-Pérez, N., Fuentes, L. J., & González-Salinas, C. (2021). Assessing math anxiety in elementary schoolchildren through a Spanish version of the Scale for Early Mathematics Anxiety (SEMA). PLoS ONE, 16(8), e0255777. https://doi.org/10.1371/journal.pone.0255777
[45] Sansom, R. (2021). Theory of planned behavior. Change Theories Collection. https://ascnhighered.org/ASCN/change_theories/collection/planned_behavior.html
[46] Siaw, E. S., Shim, G. T. G., Azizan, F. L., & Shaipullah, N. M. (2020). Understanding the relationship between students' mathematics anxiety levels and mathematics performances at the foundation level. Journal of Education and Learning, 10(1), 47. https://doi.org/10.5539/jel.v10n1p47
[47] Simmons, A. E. (2022, March 24). The disadvantages of a small sample size. Sciencing. https://www.sciencing.com/disadvantages-small-sample-size-8448532/
[48] Ulum, H., & Küçükdanaci, T. (2022). The Relationship between Mathematics Anxiety and Mathematics Achievement: Meta Analysis Study. Research on Education and Psychology, 6(2), 193–206. https://doi.org/10.54535/rep.1206987
[49] Zanabazar, A., Deleg, A., Ravdan, M., & Tsogt-Erdene, E. (2023). The Relationship between Mathematics Anxiety and Mathematical Performance among Undergraduate Students. Jurnal Ilmiah Peuradeun, 11(1), 309. https://doi.org/10.26811/peuradeun.v11i1.780
[50] Zhang, J., Zhao, N., & Kong, Q. P. (2019a). The Relationship between math anxiety and math Performance: A Meta-Analytic Investigation. Frontiers in Psychology, 10. https://doi.org/10.3389/fpsyg.2019.01613
[51] Zhang, J., Zhao, N., & Kong, Q. P. (2019b). The Relationship between math anxiety and math Performance: A Meta-Analytic Investigation. Frontiers in Psychology, 10. https://doi.org/10.3389/fpsyg.2019.01613