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IMPACT OF TEACHER PERFORMANCE AND STUDENT MOTIVATION VIS-À-VIS MATHEMATICS PERFORMANCE

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Abstract:
This study assessed the teaching performance of Mathematics teachers, student motivation, and the academic performance of Grade nine students at a public high school in Mandaue City, Cebu, Philippines utilizing a descriptive-correlational research design. There were 248 respondents who were chosen to participate in the study through simple random sampling. The data gathered were treated using descriptive and inferential statistics. The results revealed that Mathematics teachers have very good performance in planning, development and results. Moreover, students demonstrated a high level of motivation towards learning Mathematics. However, most of them have only satisfactory performance in Mathematics. Notably, there was a significant weak positive relationship between teacher performance and students' mathematics performance, at the same time, significant weak positive relationship between students' motivation and Mathematics performance. These findings underscore the need for strategic interventions to further enhance Mathematics teaching and learning outcomes.

Keywords: teacher performance, student motivation, mathematics performance, grade nine students

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1. Introduction

Mathematics is frequently considered a core indicator of academic ability, yet, in reality, it represents one of the most persistent challenges faced by students across educational systems (Hirsh-Pasek *et al.*, 2020). The difficulties embedded in learning mathematics are commonly tied to its inherent level of abstraction, the often-intricate nature of problem-solving, and the need to continually build on prior knowledge. When students struggle in this subject, it does not just stall their academic development; it can narrow future possibilities in fields where mathematical proficiency is essential, such as STEM disciplines (Koerfer *et al.*, 2025). Addressing this longstanding challenge demands careful investigation into the factors that truly shape students' mathematical achievement. Among these, the quality of instruction—specifically, teachers' effectiveness—and the degree of student motivation frequently emerge as pivotal forces. When educators understand and respond to students' needs, and when students themselves are engaged and motivated, the likelihood of meaningful improvement in mathematics outcomes grows considerably (Bobis *et al.*, 2021).

The influence of teacher performance on how mathematics is taught and perceived cannot be overemphasized (Chand *et al.*, 2021). When educators deliver clear instruction, maintain order in the classroom, provide constructive feedback, and encourage critical thinking, students are far more likely to engage meaningfully with mathematical ideas. Strong teaching practices foster structured and encouraging environments, allowing students to develop a sense of confidence with the material. Teachers who display high levels of pedagogical skill and dedication are often more successful at alleviating math anxiety and helping students approach abstract ideas with greater openness (Hussein & Csíkos, 2023). Equally significant is student motivation. Even the most talented teacher faces challenges if students are not inclined to learn; motivation is truly crucial. When learners approach mathematics with curiosity and a willingness to persevere, they give themselves a real opportunity for academic growth. Students' recognition of mathematics as relevant and rewarding fuels increased effort and deeper engagement (Victor-Edema, 2024).

The role of the teachers and students' motivation can be some of the important factors to explore to solve the pressing issues of poor students' mathematics performance (Boström & Bostedt, 2020). Moreover, enhancing students' mathematical success is always the prevalent concern in different countries around the world, even in developed countries. On the other hand, this concern is most evident in developing countries like the Philippines, where the educational system has not been fully established despite the government's effort to elevate the standards of its educational system (Symaco & Bustos, 2022).

With these, students in the Philippines face a multifaceted set of challenges that hinder their mathematics performance, often reflecting broader international trends. In the country, the learning crisis has also been evident. Despite achieving universal primary enrollment, the Program for International Student Assessment (PISA) results of

Filipino students remained low in 2018. A 2021 paper confirms that less than 1 in 3 students in the Philippines had the ability to answer level 2 or above questions in mathematics, highlighting the need for targeted interventions to improve mathematical competencies (Beatty *et al.*, 2021). Anchored on these results, the Department of Education (DepEd) crafted programs to ease the burden of teachers in order to focus on the delivery of instruction to enhance the quality of teaching. Besides, the agency also focused on motivating students to perform well in school amidst the prevalence of technology, which distracts students' focus on learning.

The combined effect of these two factors—strong teaching and student motivation—creates the conditions necessary for improved mathematical achievement. Thus, any effort to enhance educational outcomes in mathematics must consider both the quality of instruction and students' willingness to invest effort in learning. However, there has been a lack of research which delves into the role of teachers' performance and students' motivation in enhancing students' mathematics performance, particularly in the Philippine context. Thus, it is imperative to explore how these factors influence students' math success. With this, the study focuses on assessing the influence of teachers' performance and students' motivation on their mathematics performance in a public high school in Mandaue City, Cebu, Philippines. The results of this provide significant insights that will be the basis for enhancing the country's educational system to achieve its goal of providing the utmost quality education to every Filipino citizen.

2. Literature Review

This research is anchored on Competency-Based Theory, as outlined by Norton (1987), which emphasizes the development of specific, observable, and measurable competencies that individuals must demonstrate to perform tasks effectively. In the context of teaching, this theory suggests that educators should possess a defined set of professional skills and knowledge areas that ensure they can facilitate learning, manage classrooms, and assess student outcomes successfully. The competency model shifts the focus from theoretical knowledge to the ability to apply skills in real teaching scenarios, promoting practical readiness over abstract preparation.

Recent research has supported the notion that well-defined competences result in better teaching methods and student results when applying competency-based theory to teacher performance. For instance, Maphalala and Mpofu (2023) emphasized that teachers' capacity to use digital resources and adjust to a variety of classroom environments significantly increases when they receive competency-based professional development. Additionally, Boereboom *et al.* (2022) found that a competency-based approach in teacher training positively influenced self-reflection and instructional decision-making, reinforcing Norton's original claim that competency clarity enhances professional growth and effectiveness.

In modern education systems, Competency-Based Theory has also proven essential in aligning teacher preparation with 21st-century demands, including

technology integration, collaborative learning, and differentiated instruction. According to Chikodzi and Nyoni (2024), teachers equipped with targeted competencies show higher self-confidence and adaptability, which directly influences learner engagement and achievement. This reinforces Norton's (1987) original perspective that performance quality is grounded in mastering competencies rather than solely accumulating theoretical knowledge, making competency-based frameworks highly relevant in today's evolving educational landscapes.

Another theory anchored in this study is Self-Determination Theory by Deci and Ryan (1985), which explains how intrinsic and extrinsic motivation influence student learning and achievement. This theory suggests that students perform better academically when they experience autonomy (a sense of control over their learning), competence (confidence in their ability to succeed), and relatedness (a feeling of connection with their teachers and peers). In the context of this study, student motivation in learning mathematics is a key factor in their academic performance. Students who are intrinsically motivated (enjoy learning mathematics for personal satisfaction) or extrinsically motivated (influenced by rewards, grades, or teacher encouragement) tend to exert more effort and achieve better results. The study seeks to assess the level of students' motivation in mathematics and its correlation with their academic performance. By understanding how motivation affects learning outcomes, educators can implement strategies that foster student engagement, leading to improved mathematics achievement.

In addition to the theories, Constructivist Learning Theory, which was developed by Jean Piaget and Lev Vygotsky, emphasizes that learners actively construct knowledge through experiences rather than passively absorbing information. Piaget (1952) focused on cognitive development, highlighting how learners progress through stages of mental growth as they interact with their environment, while Vygotsky (1978) introduced the concept of social interaction and the Zone of Proximal Development (ZPD) as central to cognitive development. Both perspectives argue that students' understanding is built through exploration, problem-solving, collaboration, and reflection, leading to deeper learning and improved academic performance.

In the modern classroom, constructivist principles have shown a significant impact on student performance. Recent research by Awidi and Paynter (2019) found that constructivist-based learning environments, particularly those integrating digital tools and collaborative problem-solving, enhanced student engagement and critical thinking skills in higher education settings. Similarly, Doménech-Betoret *et al.* (2017) observed that students taught through constructivist strategies demonstrated higher levels of academic performance, motivation, and self-regulated learning compared to those in traditional lecture-based settings. These findings confirm that active involvement and social interaction, key components of Piaget's and Vygotsky's theories, positively influence student learning outcomes.

Moreover, constructivist learning environments empower students to develop transferable skills beyond memorization, such as creativity, adaptability, and

collaboration — all of which are essential for long-term academic and personal success. As highlighted by Prakoso *et al.* (2022), students exposed to constructivist teaching models showed improved problem-solving abilities and confidence in handling unfamiliar academic challenges. These modern studies reinforce Piaget and Vygotsky's original ideas, proving that student-centered, interactive, and socially enriched environments lead to better cognitive development and overall academic achievement.

3. Purpose of the Study

This research assessed the teacher performance, student motivation and students' mathematics performance at a public high school in Mandaue City, Cebu, Philippines. Specifically, this study sought to answer the following objectives:

1) To determine the level of their teachers' performance in teaching Mathematics,
2) To determine the level of motivation of the students in learning Mathematics,
3) To determine the level of academic performance of the respondents in Mathematics,
4) To test the relationship between teacher performance and students' mathematics performance,
5) To test the relationship between students' motivation and their mathematics performance.

4. Materials and Methods

4.1 Research Design

The study employed a descriptive correlational research design to explore the relationships between teacher performance, student motivation, and mathematics achievement. This design was appropriate and justified, as the primary aim of the study was not to manipulate variables or establish causation, but rather to describe existing conditions and to determine the extent of relationships among the variables within a real-world educational context. Given that the research tool was survey-based, the design was thought to be suitable for the investigation. The weighted mean, standard deviation, and Pearson correlation were used to treat the gathered data.

4.2 Population and Sampling

The respondents of the study were the Grade nine students who were officially enrolled in a public high school in Mandaue City, Cebu, Philippines, for the school year 2024-2025. There were 248 respondents who participated in the study out of the 508 enrolled students. The respondents were chosen using simple random sampling. The determination of the number of respondents for this study was based on Slovin's formula, a widely accepted statistical tool for calculating sample size when the population is known. Slovin's formula provides a way to obtain a representative sample while accounting for a specific margin of error, ensuring the results are reliable and

generalizable. This approach ensures that the sample is statistically sufficient to reflect the views and characteristics of the entire population while maintaining accuracy and precision in the findings.

4.3 Data Collection Tools

This research utilized adopted questionnaires from Moreno-Murcia *et al.* (2015) to evaluate the teachers' performance in three areas: planning, development, and results. On the other hand, the students' motivation was assessed using the survey questionnaire from Fiorella *et al.* (2021) with 19 indicators. The respondents answered the questionnaires using a 5-point Likert scale, namely: 5-Strongly Agree, 4-Agree, 3-Undecided, 2-Disagree, and 1-Strongly Disagree. Furthermore, the third-quarter grades of the current school year were used to calculate the student respondents' math performance. These grades were sourced from official school records, as they serve as a standardized and reliable indicator of the students' academic achievement in mathematics.

4.4 Data Collection Process

The study's initial phase was the pre-data collection process, which involved identifying the participating respondents and collecting data from them. After that, a letter requesting permission to conduct the study was sent to the district supervisor. Once approved, the researchers orient the school principal and the faculty in charge of the approved requests, and then administer the tests. However, informed consent was secured from each respondent before they were allowed to participate in the data gathering process. The finalized survey form was distributed to the randomly selected respondents via online forms or hard copy. Participants were given ample time to complete the survey, with follow-up reminders sent to maximize the response rate. All responses were treated with strict confidentiality, and participants were assured of their anonymity throughout the research process.

4.5 Data Analysis

The data gathered were sorted, tallied, treated and analyzed using appropriate statistical tools. Weighted mean was used to determine the level of teachers' performance in handling the Mathematics class and the level of respondents' motivation in learning Math concepts. Standard deviation was used to assess the extent of the spread of the responses for every indicator assessing the variables. Pearson Product-Moment Correlation Coefficient was utilized to test the significance of the relationship between the teacher's performance, motivation, and the respondents' academic performance in Mathematics.

5. Results and Discussion

This section presents the results of the teachers' performance in teaching Mathematics, student motivation, and students' mathematics performance. Moreover, it also presents the test of the relationship between these variables.

5.1 Level of Teachers' Performance in Teaching Mathematics

Table 1 presents a summary of the level of teachers' performance in teaching Mathematics across three main components: planning, development, and results. Among the three, the development component received the highest weighted mean of 3.82 with a standard deviation of 1.16, indicating that teachers are perceived to perform most strongly in delivering and managing classroom instruction and student engagement.

Table 1: Teachers' Performance in Teaching Mathematics

Components	WM	SD	Verbal Description
Planning	3.62	1.22	Very Good
Development	3.82	1.16	Very Good
Result	3.73	1.18	Very Good
Grand Mean	3.72		Very Good
Grand Standard Deviation		1.19	

This is followed by the result component, with a WM of 3.73 and an SD of 1.18, reflecting positive outcomes in terms of student understanding, application of competencies, and the use of assessment tools. The planning component recorded the lowest WM of 3.62 with an SD of 1.22, though still within the "Very Good" category, showing effective but relatively less consistent performance in course preparation and instructional design.

Overall, the grand mean across all components is 3.72, which indicates a very good performance by Mathematics teachers as perceived by the respondents. Globally, the level of mathematics teaching performance remains a significant factor influencing student achievement. A study by Orcan-Kacan *et al.* (2023) found that in Turkey, teacher competence in mathematical content knowledge and pedagogical strategies significantly correlated with student learning outcomes. Teachers who effectively integrate real-life applications and foster mathematical thinking were observed to have better student engagement and achievement. In addition, a path-model study from Agusan del Sur, Philippines, revealed that teaching strategies implemented by teachers significantly influence student performance—alongside motivation, attitude, and learning style—highlighting the central role of teacher methodology in mathematics education effectiveness (Pizon & Ytoc, 2021).

5.2 Level of Motivation of the Respondents in Learning Mathematics

Students' motivation in learning mathematics is greatly influenced by the teacher's instructional strategies and classroom environment. Table 2 presents the level of motivation of the respondents in learning Mathematics.

Table 2: Level of Motivation of the Respondents in Learning Mathematics

S/N	Indicators	WM	SD	Verbal Description
1	I enjoy learning math	3.46	1.08	High
2	I find learning math interesting	3.57	1.16	High
3	I like math that challenges me	3.37	1.24	Moderate
4	I put enough effort into learning the math	3.61	1.28	High
5	If I am having trouble learning the math, I try to figure out why	3.65	1.14	High
6	I use strategies that ensure I learn math well	3.58	1.11	High
7	I prepare well for math tests and quizzes	3.25	1.15	Moderate
8	I am confident I will do well in math assignments and projects	3.58	1.14	High
9	I am confident I will do well on math tests	3.30	1.16	Moderate
10	I believe I can master the knowledge and skills in the math course	3.15	1.22	Moderate
11	I believe I can earn a grade of "A" in the math course	3.03	1.22	Moderate
12	I think about how the math I learn will be helpful to me	3.85	1.17	High
13	I think about how I will use math learn	3.64	1.12	High
14	I think about how learning math can help me get a good job	3.90	1.10	High
15	I think about how learning math can help my career	3.86	1.19	High
16	I become anxious when it is time to take a math test	3.55	1.22	High
17	I am nervous about how I will do on the math tests	3.74	1.22	High
18	I worry about failing math tests	4.13	1.21	High
19	I am concerned that the other students are better in math	3.64	1.33	High
Aggregate Weighted Mean		**3.57**		**High**
Aggregate Standard Deviation			**1.18**	

Legend: 4.21-5.00-Very High; 3.41-4.20-High; 2.61-3.40-Moderate; 1.81-2.60-Low; 1.00-1.80-Very Low

In general, the aggregate weighted mean of 3.57 with 1.18 standard deviation suggests that students generally exhibit a high level of motivation in learning Mathematics. Learner motivation is essential in mathematics as it encourages students to actively engage with challenging problems. When motivated, students are more likely to persist through difficulties and develop problem-solving resilience. In the study of Al Umairi (2023), his findings suggest that motivation significantly influences the relationship between students' confidence in mathematics and their actual performance.

5.3 Level of Academic Performance of the Respondents in Mathematics

One of the most important measures of pupils' academic development and the efficacy of education is their proficiency in mathematics. It showed how effectively students

understand mathematical ideas and use problem-solving techniques in diverse settings. Based on their numerical results, the respondents' degree of mathematical proficiency is displayed in Table 3.

Table 3: Level of Academic Performance of the Respondents in Mathematics

Level	Numerical Range	f	%
Advanced	90-100	50	20.16
Proficient	85-89	65	26.21
Approaching Proficiency	80-84	81	32.66
Developing	75-79	51	20.56
Beginning	Below 75	1	0.40
Total		**248**	**100.00**
Mean		84.47	
St. Dev.		5.42	

The overall mean performance of the group is 84.47, indicating that the respondents are on the Approaching Proficiency level, and the standard deviation is 5.42, indicating a moderate spread of scores around the mean. This distribution suggested that the majority of students performed satisfactorily to very satisfactorily in Mathematics. Learner performance in mathematics reflects the effectiveness of instruction and the student's understanding of concepts. Strong performance indicates mastery of skills, which builds confidence and readiness for more advanced topics.

5.4 Test of Significance between Teachers' Performance and Academic Performance in Mathematics

The teacher's performance played a critical role in shaping students' academic outcomes in mathematics. A strong correlation often exists between effective teaching practices and higher student achievement in the subject.

Table 4: Correlation Analysis between the Teacher's Performance and the Respondents' Academic Performance in Mathematics

Variables	r-value	Strength of Correlation	p - value	Decision	Remarks
Teacher's Performance and Mathematics Performance	0.395*	Weak Positive	0.000	Reject Ho	Significant

*significant at $p<0.05$ (two-tailed)

Table 4 presents the test of the relationship between the teacher's performance and the respondents' academic performance in Mathematics. The computed r-value of 0.395 suggests a weak positive correlation between teachers' performance and the respondents' academic performance in Mathematics. On the other hand, the computed p-value of 0.000, which is less than 0.05, leads to the rejection of the null hypothesis. This confirmed that there is a statistically significant relationship between teacher performance and student performance in Mathematics. This means that while the relationship between

teacher performance and student academic performance is weak, there is still a meaningful connection between these variables.

Previous studies found statistically significant positive associations between various aspects of teacher performance—such as qualifications, content knowledge, instructional methods, classroom management, and professional competence—and student mathematics achievement. For example, teacher qualifications, mastery of content, and effective instructional methods are consistently linked to better student outcomes in mathematics across diverse educational settings (Joshi, 2023; König *et al.*, 2023; Polly *et al.*, 2022; Susuoroka *et al.*, 2023). However, this finding is contradicted by the study of Cuabo *et al.* (2024), which found that teachers' classroom management—an aspect of teacher performance—had no significant relationship with student mathematics performance.

5.5 Test of Significance between Motivation and Academic Performance in Mathematics

Students' motivation is a significant factor influencing their academic performance in mathematics. Those with higher motivation tend to exhibit better focus, persistence, and results in mathematical tasks and assessments. Table 9 showed the test of the relationship between the respondents' motivation and their academic performance in Mathematics.

Table 5: Correlation Analysis between the Respondents' Motivation and Their Academic Performance in Mathematics

Variables	r-value	Strength of Correlation	p - value	Decision	Remarks
Motivation and Mathematics Performance	0.411*	Weak Positive	0.000	Reject Ho	Significant

*significant at p<0.05 (two-tailed)

Table 5 presents the test of the relationship between the respondents' motivation and their academic performance in Mathematics. The results indicated an r-value of 0.411, which denotes a weak positive correlation and a computed p-value of 0.000, which is less than the significance level of 0.05. Since the p-value is below the threshold, the null hypothesis is rejected, and it is concluded that there is a statistically significant relationship between student motivation and academic performance in Mathematics.

Multiple studies across diverse educational contexts consistently demonstrate that higher student motivation predicts better mathematics performance. Motivation not only correlates with achievement but also explains a substantial portion of the variance in mathematics outcomes, even after accounting for background factors like socioeconomic status and prior achievement (Abiodun *et al.*, 2025; Baclay *et al.*, 2025; Fiorella *et al.*, 2021).

6. Conclusion

Based on the study's findings, it can be concluded that teachers' performance plays a significant role in ensuring students' better performance in Mathematics. The influence on how the teachers deliver their lessons yields significant effects on how the students perform in mathematics. Hence, it is important that teachers are aware of the effects of their performance on students' mathematical success to avoid actions that would compromise students' learning. This suggests that when teachers demonstrate high levels of competence, enthusiasm, and effective teaching strategies, students are more likely to perform better in Mathematics. On the other hand, an increased motivation fosters better engagement, deeper understanding, and improved academic outcomes. Thus, the study highlights the critical role that teachers play not only in delivering content but also in shaping students' interest and confidence in the subject. Therefore, efforts to improve mathematics achievement should focus not only on enhancing instructional quality but also on fostering a classroom environment that encourages student motivation and active participation to ensure optimal students' mathematical success.

Conflict of Interest Statement
The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

Abiodun, T., Chinaka, T., Asanre, A., & Research, M. (2025). The Role of Students' Motivation and Self-Concept as Predictors of Mathematics Performance in Secondary Schools. *Indonesian Journal of Multidisciplinary Research*. https://doi.org/10.17509/ijomr.v5i1.81381.

Al Umairi, K. S. (2023). Role of mathematics motivation in the relationship between mathematics self-efficacy and achievement. *Journal of Pedagogical Research*, 7(1), 1–10. https://doi.org/10.33902/JPR.202317536

Awidi, I. T., & Paynter, M. (2019). The impact of a flipped classroom approach on student learning experience. *Computers & Education, 128*, 269-283. https://doi.org/10.1016/j.compedu.2018.09.013

Baclay, M., Cortado, C., Acosta, V., & Miranda, A. (2025). Relationship between Motivational Strategies and Mathematics Performance among First-year Students

at A State College in the Davao Region. *Asian Journal of Education and Social Studies*. https://doi.org/10.9734/ajess/2025/v51i51929.

Beatty, A., Berkhout, E., Bima, L., Pradhan, M., & Suryadarma, D. (2021). Schooling progress, learning reversal: Indonesia's learning profiles between 2000 and 2014. *International Journal of Educational Development, 82*, 102-109. https://doi.org/10.1016/j.ijedudev.2021.102436

Bobis, J., Russo, J., Downton, A., Feng, M., Livy, S., McCormick, M., & Sullivan, P. (2021). Instructional moves that increase the chances of engaging all students in learning mathematics. *Mathematics*, *9*(6), 582. https://doi.org/10.3390/math9060582

Boereboom, T., Timmerman, M. E., Dijkstra, A., & Meijer, P. C. (2022). Supporting teacher competency development: An exploratory study on the use of video and peer feedback in teacher education. *Teaching and Teacher Education, 117*, 103817. https://doi.org/10.1016/j.tate.2022.103817

Boström, L., & Bostedt, G. (2020). What about study motivation? Students and teachers' perspectives on what affects study motivation. *International Journal of Learning, Teaching and Educational Research*, *19*(8), 40-59. http://dx.doi.org/10.26803/ijlter.19.8.3

Chand, S., Chaudhary, K., Prasad, A., & Chand, V. (2021). Perceived causes of students' poor performance in mathematics: A case study at Ba and Tavua secondary schools. *Frontiers in applied mathematics and statistics*, *7*. https://doi.org/10.3389/fams.2021.614408

Chikodzi, D., & Nyoni, N. (2024). Competency-based education and teacher preparedness for 21st century skills: A critical analysis. *International Journal of Educational Development, 104*. https://doi.org/10.1016/j.ijedudev.2024.102887

Cuabo, F. M. P., Mangulad, K. P., Palisbo, J. T., Bacus, J. A., Baluyos, G. R., Entera, R. C., & Beringuel, E. G. (2024). Teachers' classroom Management, Students' attitude and home Environment: Predictors of Mathematics performance. *International Journal of Research and Innovation in Social Science, VIII(III)*, 1208–1227. https://doi.org/10.47772/ijriss.2024.803090

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Berlin: Springer Science & Business Media. https://doi.org/10.1007/978-1-4899-2271-7

Doménech-Betoret, F., Abellán-Roselló, L., & Gómez-Artiga, A. (2017). Self-efficacy, satisfaction, and academic achievement: The mediator role of students' expectancy-value beliefs. *Frontiers in Psychology, 8*, 1193. https://doi.org/10.3389/fpsyg.2017.01193.

Fiorella, L., Yoon, S., Atit, K., Power, J., Panther, G., Sorby, S., Uttal, D., & Veurink, N. (2021). Validation of the Mathematics Motivation Questionnaire (MMQ) for secondary school students. *International Journal of STEM Education*, 8, 1-14. https://doi.org/10.1186/s40594-021-00307-x.

Hirsh-Pasek, K., Hadani, H. S., Blinkoff, E., & Golinkoff, R. M. (2020). A new path to education reform: playful learning promotes 21st century skills in school and

beyond. *Policy Brief*, 1-25. https://www.brookings.edu/articles/a-new-path-to-education-reform-playful-learning-promotes-21st-century-skills-in-schools-and-beyond/

Hussein, Y., & Csíkos, C. (2023). The effect of teaching conceptual knowledge on students' achievement, anxiety about, and attitude toward mathematics. *Eurasia journal of mathematics, science and technology education*, *19*(2). https://doi.org/10.29333/ejmste/12938

Joshi, P. (2023). Relationship of Teacher Characteristics on Students' Mathematics Performance. *Investigations in Mathematics Learning*, 16, 1 - 17. https://doi.org/10.1080/19477503.2023.2257087.

Koerfer, E., Polverini, G., Elmgren, M., Eriksson, L. H., Freyhult, L., Herbert, R. B., ... & Eckerdal, A. (2025). Teachers' conceptions of the role of mathematics in STEM higher education. *Disciplinary and Interdisciplinary Science Education Research*, *7*(1), 15. https://doi.org/10.1186/s43031-025-00135-x

König, J., Blömeke, S., Jentsch, A., Schlesinger, L., Nehls, C., Musekamp, F., & Kaiser, G. (2021). The links between pedagogical competence, instructional quality, and mathematics achievement in the lower secondary classroom. *Educational Studies in Mathematics*, 107, 189-212. https://doi.org/10.1007/S10649-020-10021-0.

Maphalala, M. C., & Mpofu, N. (2023). Competency-based teacher professional development for digital education integration in sub-Saharan Africa. *International Review of Education, 69*(1), 37–55. https://doi.org/10.1007/s11159-023-09956-1

Moreno-Murcia, J. A., Torregrosa, Y. S., & Pedreño, N. B. (2015b). Questionnaire evaluating teaching competencies in the university environment. Evaluation of teaching competencies in the university. *Journal of New Approaches in Educational Research*, *4*(1), 54–61. https://doi.org/10.7821/naer.2015.1.106

Norton, R. E. (1987). *The competency movement: Issues, concerns, and prospects*. Columbus, OH: National Center for Research in Vocational Education, The Ohio State University.

Orcan-Kacan, M., Dedeoglu-Aktug, N., & Alpaslan, M. M. (2023). Teachers' mathematics pedagogical content knowledge and quality of early mathematics instruction in Turkey. *South African Journal of Education*, *43*(4), 1–19. https://doi.org/10.15700/saje.v43n4a2289

Piaget, J. (1952). *Origins of intelligence in children.* New York: International Universities Press. Retrieved from https://psycnet.apa.org/record/2007-10742-000

Pizon, M. G., & Ytoc, S. T. (2021). A path model to infer mathematics performance: the interrelated impact of motivation, attitude, learning style and teaching strategies variables. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2105.05850

Polly, D., Wang, C., Petty, T., & Binns, I. (2022). Exploring the empirical connection between student, teacher, school, and district-level variables on fifth-grade students' mathematics achievement. *School Science and Mathematics*. https://doi.org/10.1111/ssm.12520.

Prakoso, A. F., Subroto, W. T., Andriansyah, E. H., Sari, V. B. M., Ginanjar, A. E., & Srisuk, P. (2025). How do anxiety and self-efficacy affect the problem-solving skills of undergraduate economics students as prospective teachers in Indonesia? The role of metacognition as a mediating variable. *Cogent Education*, *12*(1). http://dx.doi.org/10.1080/2331186X.2025.2521160

Symaco, L. P., & Bustos, M. T. A. (2022). Overview of Education in the Philippines. In *International Handbook on Education in South East Asia* (pp. 1-27). Singapore: Springer Nature Singapore.

Susuoroka, G., Momori, I., & Padmore, E. (2023). Teacher Quality Factors as Determinant of Students' Performance in Mathematics. *Journal of Education and Teaching Methods*. https://doi.org/10.58425/jetm.v2i3.196.

Victor-Edema, U. A. (2024). Exploring the Role of Mathematics Anxiety in Students' Commitment to Science Education in the Niger Delta. *International Journal of Functional Research in Arts and Humanities (IJFRAH)*, *3*(2). https://ijfrah.com/journal/article/view/47

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press. https://doi.org/10.2307/j.ctvjf9vz4