www.ijarp.com ISSN 2456-9992 Page: 01-11

International Journal Advanced Research Publications

Research Article

Volume: 02
Issue: 05

TEACHING-LEARNING APPROACHES AND CHALLENGES IN TEACHING MATHEMATICS AND THEIR INFLUENCE ON PUPILS' PERFORMANCE IN ELEMENTARY SCHOOLS

***Jonaira Macasindel Lumina, Allan K. Sugandi, PhD**

Cotabato Foundation College of Science and Technology, Doroluman, Arakan, Cotabato, Philippines.

Article Received: 12 April 2026, Article Revised: 02 May 2026, Published on: 22 May 2026

***Corresponding Author: Jonaira Macasindel Lumina**
Cotabato Foundation College of Science and Technology, Doroluman, Arakan, Cotabato, Philippines.

DOI: https://doi-doi.org/101555/ijarp.5480

2. ABSTRACT

This study examined teaching-learning approaches and challenges in teaching Mathematics and their influence on pupils' performance in elementary schools in the Municipality of Arakan, specifically in Arakan East, West, and North Districts. Employing a descriptive-correlational research design, the study involved 300 Grade 3 to Grade 6 Mathematics teachers as respondents. Data were gathered through a validated survey questionnaire and analyzed using mean scores and Spearman's rho correlation. Results revealed a 'very high' level of difficulty in teaching-learning approaches (overall mean = 4.47) and a 'very high' level of challenges in teaching Mathematics (overall mean = 4.47), particularly in problem-solving, order of operations, lack of instructional materials, and students' weak foundational skills. Despite these challenges, pupils recorded a 'very high' level of performance in Mathematics (mean = 4.47). Correlation and regression analyses showed no statistically significant relationship or influence between teaching-learning approaches, teaching challenges, and pupils' performance, suggesting that other factors—such as student motivation, prior knowledge, and instructional quality—play more decisive roles in mathematical achievement. These findings underscore the need for learner-centered methodologies, enhanced instructional materials, ongoing professional development, and targeted remediation programs to strengthen foundational mathematics skills among elementary learners.

KEYWORDS: teaching-learning approaches; challenges in mathematics teaching; pupils' performance; descriptive-correlational; elementary mathematics; Philippines

4. INTRODUCTION

Mathematics is a foundational discipline that underpins critical thinking, logical reasoning, and problem-solving abilities essential to academic and everyday life success. However, the teaching and learning of Mathematics in elementary schools remains one of the most persistent challenges confronting educators worldwide. Despite numerous reforms and instructional innovations, many pupils continue to struggle with mathematical concepts, particularly in multi-step problem solving, understanding the order of operations, and applying basic arithmetic operations in routine and non-routine problem contexts (García-García, Chamoso, & Vicente, 2023; Mambajao et al., 2023).

In the Philippines, TIMSS 2023 data highlighted ongoing concerns about elementary learners' mathematical proficiency, indicating that a significant number of pupils fail to achieve expected competency levels in Mathematics (TIMSS, 2025). The K to 12 Mathematics curriculum (Department of Education, 2016) emphasizes the development of numeracy skills and problem-solving competencies; yet, classroom realities often reveal a disconnect between curriculum intentions and learning outcomes. Teachers encounter significant instructional challenges related to pupils' weak foundational skills, inadequate learning materials, and complex pedagogical demands, all of which potentially affect the quality of mathematics instruction (Jita & Mokhele, 2023; Ling & Mahmud, 2023).

In the Municipality of Arakan, Cotabato, the challenges in Mathematics education are particularly pronounced in public elementary schools, where resource limitations, diverse learner needs, and instructional gaps compound teachers' difficulties. Understanding the extent of these challenges and their relationship to pupils' performance is crucial to developing informed, evidence-based interventions. To date, limited empirical research has documented the specific difficulties experienced by Mathematics teachers in the Arakan district and their connection to pupil achievement.

This study sought to address this gap by examining the level of difficulty in teaching-learning approaches, the level of challenges in teaching Mathematics, and the level of pupils' performance, and by determining whether significant relationships and influences exist among these variables. The findings are intended to guide school administrators, curriculum planners, and teachers in designing targeted interventions and professional development

programs that can improve Mathematics instruction and learning outcomes in the elementary grades.

5. MATERIALS AND METHODS

Research Design

This study employed a descriptive-correlational research design to assess the teaching-learning approaches and challenges in teaching Mathematics and their influence on pupils' performance. The descriptive component characterized the levels of difficulty in teaching-learning approaches, the challenges encountered in teaching Mathematics, and the level of pupils' performance. The correlational and regression components determined the nature and strength of relationships and influences among the identified variables.

Locale and Respondents

The study was conducted in public elementary schools in the Municipality of Arakan, specifically in three school districts: Arakan East, Arakan West, and Arakan North Districts. A total of 300 Grade 3 to Grade 6 teachers handling Mathematics subjects served as respondents of the study. These teachers were selected using complete enumeration, covering all Mathematics teachers in the identified districts.

Research Instrument

Data were gathered through a researcher-made questionnaire consisting of three parts: (1) Level of Difficulty in Teaching-Learning Approaches, covering two- to three-step problem solving, understanding the order of operations, and solving routine and non-routine problems involving basic operations; (2) Level of Challenges in Teaching Mathematics, covering learners' skills in basic operations, learning materials and models, and teaching pedagogy; and (3) Level of Pupils' Performance in Mathematics, covering multiple indicators such as problem-solving accuracy, test performance, classroom participation, and critical thinking. All items were rated using a five-point Likert scale ranging from 1 (Very Low) to 5 (Very High). The instrument was subjected to content validity review by experts and pilot-tested for reliability.

Statistical Analysis

Descriptive statistics (weighted mean) were used to determine the levels of the variables. Spearman's rho correlation was employed to examine the relationship between the independent variables (teaching-learning approaches, teaching challenges) and the dependent variable (pupils' performance). Multiple regression analysis was used to determine the

significant influence of the independent variables on pupils' performance. The significance level was set at $p < 0.05$.

6. RESULTS AND DISCUSSION

Level of Difficulty in Teaching-Learning Approaches

Table 1 presents the summary of results on the level of difficulty in teaching-learning approaches as experienced by Grade 3 to Grade 6 Mathematics teachers.

Table 1. Summary of Results on the Level of Difficulty in Teaching-Learning Approaches.

Indicators	Categorical Mean	Qualitative Interpretation
Solving Routine and Non-Routine Problems Involving Basic Operation	4.50	Very High
Two-Three Steps Problem Solving	4.46	Very High
Understanding Order of Operations	4.44	Very High
Overall Categorical Mean	4.47	Very High

Legend: 4.21–5.0 = Very High; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; 1.00–1.80 = Very Low

All three teaching-learning approach indicators were rated 'Very High' in terms of difficulty, yielding an overall categorical mean of 4.47. Solving routine and non-routine problems involving basic operations recorded the highest mean (4.50), followed by two- to three-step problem solving (4.46) and understanding the order of operations (4.44). These findings suggest that teachers consistently encounter substantial difficulties in facilitating mathematical problem-solving competencies across all grade levels.

The high difficulty in two- to three-step problem solving aligns with findings by Matney et al. (2022) and Myers et al. (2022), who documented persistent challenges among elementary learners in organizing and sequencing multi-step mathematical tasks. Similarly, misconceptions about the order of operations have been widely reported in mathematics education literature (Kalder, 2012; Imbo & Vandierendonck, 2021), indicating that these are long-standing instructional challenges not unique to the local context. The difficulty in routine and non-routine problem solving corroborates findings by Magallanes (2023), who found that pupils often rely on procedural rather than conceptual knowledge, limiting their ability to transfer skills to novel problem contexts.

Level of Challenges in Teaching Mathematics

Table 2 presents the summary of challenges encountered by Mathematics teachers in the three domains assessed.

Table 2. Summary of Results on the Level of Challenges in Teaching Mathematics.

Indicators	Categorical Mean	Qualitative Interpretation
Teaching Pedagogy	4.49	Very High
Learning Materials and Models	4.47	Very High
Learners' Skills in Basic Operation	4.46	Very High
Overall Categorical Mean	4.47	Very High

Legend: 4.21–5.0 = Very High; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; 1.00–1.80 = Very Low

The overall level of challenges in teaching Mathematics was rated 'Very High' (mean = 4.47). Teaching pedagogy received the highest mean (4.49), with classroom discourse management identified as the most challenging aspect (M = 4.51). Learning materials and models followed closely (4.47), with the unavailability of mathematics magazines, workbooks, and textbooks as the most frequently cited concerns (M = 4.50–4.51). Learners' skills in basic operations recorded a mean of 4.46, with pupils' limited ability to demonstrate the four fundamental operations being the primary concern (M = 4.48).

These findings are consistent with Jita and Mokhele (2023), who identified teacher expertise, resource limitations, and learner preparedness as major challenges in Mathematics teaching. Ball, Thames, and Phelps (2008) emphasized that effective mathematics teaching demands both content knowledge and pedagogical competence—a dual requirement that many teachers find difficult to fulfill simultaneously, particularly in under-resourced contexts. The scarcity of instructional materials reported in this study mirrors findings by Uwitatse, Niyibizi, and Mutarutinya (2023), who noted that insufficient resources significantly hinder effective mathematics instruction and limit students' practice opportunities.

Level of Pupils' Performance in Mathematics

Table 3 presents selected key indicators of pupils' performance in Mathematics as rated by teachers.

Table 3. Level of Pupils' Performance in Mathematics. (Selected Key Indicators)

Indicators	Mean	Qualitative Interpretation
Ability to solve non-routine problems using basic operations	4.54	Very High
Accuracy of answers in word problems	4.53	Very High
Understanding of order of operations	4.50	Very High
Positive attitude and motivation toward mathematics	4.49	Very High
Problem-solving ability in multi-step tasks	4.42	Very High
Categorical Mean	4.47	Very High

Legend: 4.21–5.0 = Very High; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; 1.00–1.80 = Very Low

Despite the high levels of difficulty and challenges reported, pupils demonstrated a 'Very High' level of performance in Mathematics (categorical mean = 4.47). The highest-rated indicator was pupils' ability to solve non-routine problems using basic operations (M = 4.54), followed by accuracy in word problems (M = 4.53) and understanding of the order of operations (M = 4.50). These results suggest that, notwithstanding instructional challenges, pupils in the Arakan district exhibit commendable mathematical competence.

This finding corroborates Brunner and Star (2024), who highlighted that the quality of learning and performance in Mathematics is shaped by multiple contextual factors beyond instructional challenges alone. The high performance levels may be attributed to other mediating factors such as student motivation, prior mathematical experience, supportive family environments, or the inherent effort of teachers to compensate for resource and pedagogical limitations—factors not directly measured in this study.

Relationship Between Teaching Challenges and Pupils' Performance

Table 4 presents the Spearman's rho correlation coefficients between the teaching challenges and pupils' performance in Mathematics.

Table 4. Relationship Between Challenges in Teaching Mathematics and Pupils' Performance.

Variable	Correlation Coefficient (ρ)	Sig. (2-tailed)	Decision
Learners' Skills in Basic Operations	.007	.898	Not Significant

Variable	Correlation Coefficient (ρ)	Sig. (2-tailed)	Decision
Learning Materials and Models	-.002	.978	Not Significant
Teaching Pedagogy	-.028	.623	Not Significant

p < 0.05 significant; **p < 0.01 highly significant

The Spearman's rho correlation analysis revealed no statistically significant relationship between any of the teaching challenge indicators and pupils' performance in Mathematics. The correlation coefficients were negligible (ρ = .007 for learners' basic operation skills; ρ = −.002 for learning materials and models; ρ = −.028 for teaching pedagogy), with all p-values exceeding the 0.05 threshold.

These results suggest that challenges in teaching Mathematics, when examined in isolation, are not reliable predictors of pupils' mathematical achievement. This is consistent with findings by Ocampo, Mobo, and Cutillas (2023), who similarly found that certain learner-related and instructional characteristics do not directly predict mathematical success. The null findings may indicate that other unmeasured variables—such as students' intrinsic motivation, home support, or the quality of classroom interactions—exert greater influence on performance outcomes.

Relationship Between Teaching-Learning Approaches and Pupils' Performance

Table 5 presents the Spearman's rho correlation coefficients between the teaching-learning approaches and pupils' performance.

Table 5. Relationship Between Teaching-Learning Approaches and Pupils' Performance.

Variable	Correlation Coefficient (ρ)	Sig. (2-tailed)	Decision
Two-Three Steps Problem Solving	0.103	0.075	Not Significant
Understanding Order of Operations	0.013	0.822	Not Significant
Solving Routine and Non-Routine Problems	0.017	0.773	Not Significant

p < 0.05 significant; **p < 0.01 highly significant

Similarly, no statistically significant relationship was found between teaching-learning approaches and pupils' performance. All correlation coefficients were near zero, with p-values exceeding 0.05. Hattie (2009) observed that the effectiveness of teaching methods

depends more on their implementation quality and alignment with students' needs than on the methods themselves, which may explain the absence of direct correlations in this study.

Influence of Teaching Challenges and Teaching-Learning Approaches on Pupils' Performance

Multiple regression analysis confirmed the null hypotheses for both teaching challenges and teaching-learning approaches as predictors of pupils' performance (Table 6 and Table 7).

Table 6. Influence of Challenges in Teaching Mathematics on Pupils' Performance (Multiple Regression)

Predictor	B	Std. Error	Beta	t	Sig.
Constant	4.490	0.274	—	16.401	.000
Learners' Skills in Basic Operation	.006	.034	.009	.163	.871
Learning Materials and Models	-.003	.037	-.006	-.095	.924
Teaching Pedagogy	-.009	.034	-.016	-.280	.780

$R^2 = 0.001$; $F = 0.041$; $p = 0.989$

Table 7. Influence of Teaching-Learning Approaches on Pupils' Performance (Multiple Regression.)

Predictor	B	Std. Error	Beta	t	Sig.
Constant	4.073	0.261	—	15.600	.000
Two-Three Steps Problem Solving	.064	.032	.116	2.007*	.046
Understanding Order of Operations	.008	.035	.014	.238	.812
Solving Routine and Non-Routine Problems	.014	.031	.027	.465	.642

$R^2 = 0.014$; $F = 1.379$; $p = 0.249$ | *$p < 0.05$

The regression model for teaching challenges yielded an F-value of 0.041 ($p = 0.989$) and $R^2 = 0.001$, indicating that the identified teaching challenges accounted for only 0.1% of the variance in pupils' performance. None of the individual predictor variables were statistically significant.

For teaching-learning approaches, the overall model was also non-significant ($F = 1.379$; $p = 0.249$; $R^2 = 0.014$). However, two- to three-step problem solving demonstrated a slight but statistically significant individual effect ($B = 0.064$; $p = 0.046$), suggesting that this particular approach had a minimal positive association with performance. The broader model, however, lacked predictive power, explaining only 1.4% of the variance in pupils' performance.

These results are aligned with the National Research Council (2001), which posited that mathematical proficiency encompasses conceptual understanding, procedural skills, strategic competence, adaptive reasoning, and productive disposition—a multidimensional construct that cannot be fully explained by instructional challenges or approaches alone. Darling-Hammond et al. (2020) further emphasized that student performance is shaped by cognitive, social, and emotional dimensions of learning that extend well beyond classroom pedagogical practices.

7. CONCLUSION

This study found that Grade 3 to Grade 6 Mathematics teachers in the Municipality of Arakan consistently face 'Very High' levels of difficulty in teaching-learning approaches and challenges in teaching Mathematics. Despite these challenges, pupils demonstrated commendably 'Very High' levels of performance in Mathematics, suggesting that instructional difficulties alone do not determine academic achievement. The absence of significant correlations and regression effects between the independent variables (teaching-learning approaches and teaching challenges) and the dependent variable (pupils' performance) underscores the complexity of mathematics learning and the influence of unmeasured factors such as student motivation, prior knowledge, and learning environment. Two- to three-step problem solving was the only approach that yielded a marginal significant influence on performance, highlighting its potential importance as a focus area for instructional enhancement. These findings call for a comprehensive, multi-dimensional approach to improving Mathematics education in elementary schools, encompassing learner-centered instruction, strengthened remediation programs, enriched instructional resources, and sustained professional development for teachers.

8. ACKNOWLEDGEMENTS

The authors expresses sincere gratitude to the school administrators, master teachers, and Grade 3 to Grade 6 Mathematics teachers of Arakan East, Arakan West, and Arakan North Districts for their participation and cooperation in this study. Special thanks are extended to the Graduate School Faculty of Cotabato Foundation College of Science and Technology for their guidance and to advisory committee for their invaluable mentorship throughout the research process.

9. REFERENCES

1. Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? Journal of Teacher Education, 59(5), 389–407. https://doi.org/10.1177/0022487108324554
2. Brunner, E., & Star, J. R. (2024). Conceptual understanding and procedural fluency in mathematics instruction. Journal of Mathematics Education, 17(2), 112–128.
3. Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. Applied Developmental Science, 24(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791
4. Department of Education. (2016). K to 12 curriculum guide: Mathematics. Department of Education.
5. García-García, J., Chamoso, J. M., & Vicente, S. (2023). Teacher difficulties in mathematics instruction and their relationship with pupils' academic performance. Mathematics Education Research Journal, 35(4), 721–739. https://doi.org/10.1007/s13394-023-00721-9
6. Hattie, J. (2009). Visible learning: A synthesis of over 800 meta-analyses relating to achievement. Routledge.
7. Imbo, I., & Vandierendonck, A. (2021). The role of working memory in solving arithmetic problems requiring order of operations. Acta Psychologica, 218, 103353. https://doi.org/10.1016/j.actpsy.2021.103353
8. Jita, L. C., & Mokhele, M. L. (2023). Teacher expertise, resources, and learner preparedness as challenges in mathematics teaching. African Journal of Research in Mathematics Education, 27(2), 135–151.
9. Kalder, R. S. (2012). Rethinking PEMDAS: Student misconceptions in the order of operations. Mathematics Teacher Education and Development, 14(1), 63–78.
10. Ling, A. N. B., & Mahmud, M. S. (2023). Challenges of teachers when teaching sentence-based mathematics problem-solving skills. Frontiers in Psychology, 13, Article 1074202. https://doi.org/10.3389/fpsyg.2022.1074202
11. Mambajao, E. S., Sabacajan, B. T., Morados, A. N., & Nahial, W. L. (2023). Challenges encountered in teaching four basic operations in mathematics and academic performance among pupils. International Journal of Multidisciplinary: Applied Business and Education Research, 6(2). https://doi.org/10.11594/ijmaber.06.02.11

12. Matney, G., Bostic, J. D., Fox, M., Hicks, T., May, T., & Stone, G. (2022). Fourth-grade students' sensemaking during multi-step problem solving. Journal of Mathematical Behavior, 65, 100933. https://doi.org/10.1016/j.jmathb.2022.100933
13. Myers, J. A., Witzel, B. S., Powell, S. R., Li, H., Pigott, T. D., Xin, Y. P., & Hughes, E. M. (2022). A meta-analysis of mathematics word-problem solving interventions for elementary students. Review of Educational Research, 92(5), 695–742. https://doi.org/10.3102/00346543211070049
14. National Research Council. (2001). Adding it up: Helping children learn mathematics. National Academy Press.
15. Ocampo, E. N., Mobo, F. D., & Cutillas, A. L. (2023). The relationship between learning styles and mathematics performance. Journal of Educational Sciences, 7(1), 45–58.
16. TIMSS. (2025). TIMSS 2023 international results in mathematics and science. International Association for the Evaluation of Educational Achievement. https://doi.org/10.6017/timss2023.math
17. Uwitatse, M. C., Niyibizi, E., & Mutarutinya, V. (2023). Instructional materials and learners' academic performance in mathematics. African Journal of Educational Studies in Mathematics and Sciences, 19(1), 59–74.