

Problem-Solving Skills, Attitude Towards Mathematics, and Academic Performance of Learners

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ABSTRACT

This study, titled “Problem-Solving Skills, Attitude towards Mathematics, and Academic Performance of Learners”, investigated whether problem-solving skills and attitudes toward mathematics affect learners’ academic performance. The respondents were 349 Grade 8 learners enrolled in four big schools within a single division in Negros Occidental during the school year 2026–2027. Employing a quantitative design with a descriptive–correlational method, problem-solving skills were measured using the questionnaire of Dayaganon et al. (2022), while attitudes toward mathematics were assessed through the instrument of Bautista and Dones (2025). Findings revealed that learners generally demonstrated a high level of problem-solving skills, with creative thinking rated highest and decision-making lowest among the subcategories. Their attitude toward mathematics was found to be neutral, while their academic performance was classified as very satisfactory. The results further showed no significant relationship between problem-solving skills and academic performance. However, a significant relationship was observed between attitude toward mathematics and academic performance, indicating that learners’ attitudes toward mathematics directly influence their academic outcomes.

Keywords: Problem-Solving Skills; Attitude Toward Mathematics; Academic Performance; Grade 8 Learners; Mathematics Education

INTRODUCTION

Academic performance is a key measure of student learning and readiness for future opportunities. It refers to the measurable outcomes of a student’s learning, typically assessed through grades, standardized tests, and other indicators of mastery in academic subjects (Cogn-IQ Educational Content Team, 2025). Performance in mathematics, in particular, is widely recognized as a critical benchmark of cognitive development and problem-solving ability, making it a central focus of educational research and policy (Kumar et al., 2021). Studies show that academic performance is shaped by both cognitive and affective dimensions. Alinsunurin (2021) emphasized that socioeconomic, cognitive, and affective factors collectively influence success, while Villarta et al. (2021) demonstrated that favorable attitudes toward mathematics enhance confidence and achievement. This highlights the multidimensional nature of performance, requiring analysis of skills, attitudes, and challenges in mathematics learning.

Problem-solving skills are one of the most critical competencies in mathematics, enabling learners to apply concepts to real-world contexts and manage complex tasks (Lit et al., 2026). Students who excel in problem-solving demonstrate higher achievement because they can analyze situations, strategize, and evaluate solutions effectively. Sionicio and Barbacena (2021) found that teaching through problem-solving enhances metacognition and performance, while Gamarra and Pujay (2021) linked problem-solving approaches to cognitive growth and academic success. Conversely, deficiencies in this area often result in poor outcomes, making it a vital variable in performance studies.

Attitudes toward mathematics also significantly shape outcomes. Learners with confidence, enjoyment, and value for mathematics perform better, while negative attitudes foster anxiety and avoidance (Villarta et al.,

2021). Harun et al. (2021) confirmed that attitudes strongly predict success, and Mahajan (2021) found persistence and interest correlate positively with achievement. Fostering positive attitudes is therefore essential to engagement and performance.

Despite these insights, Filipino learners continue to perform poorly in mathematics. The 2022 PISA results revealed that the Philippines scored 355 in mathematics, far below the OECD average of 472, with only 16% of students reaching minimum proficiency (OECD, 2023). Similarly, the Congressional Policy and Budget Research Department (2024) emphasized that the Philippines ranked 77th out of 81 countries in the 2022 PISA cycle, confirming that mathematics achievement remains critically low. Placigo (2026) further highlighted that despite reforms, Filipino students continue to struggle in mathematics, with systemic issues in instruction and learner support contributing to poor outcomes. These findings emphasized the urgent need to explore interventions that can improve mathematics performance.

This study therefore investigates whether problem-solving skills and attitudes toward mathematics collectively influence Grade 8 learners' academic performance. By identifying these relationships, the research aims to provide evidence-based insights that can guide school administrators in designing interventions to improve learner's performance.

METHODOLOGY

This study employed a quantitative descriptive-correlational design to determine the levels of problem-solving skills, attitude toward Mathematics, and academic performance of Grade 8 learners and examine the relationships among these variables. The respondents were 349 Grade 8 learners selected from four big schools across two divisions in the Negros Island Region during school year 2026–2027. From a population of 2,702 learners, the sample was determined using Yamane's formula with a 5% margin of error. Proportionate stratified sampling and simple random sampling through the draw-lots method were employed.

Data were gathered using three instruments: a 30-item problem-solving skills questionnaire adapted from Dayaganon et al. (2022), a 20-item attitude toward Mathematics questionnaire adapted from Bautista and Dones (2025), and a 25-item DepEd Mathematics Summative Test. The attitude questionnaire demonstrated high internal consistency (Cronbach's $\alpha = 0.836$) and obtained a content validity index of 0.85 based on the evaluation of seven experts. The Mathematics Summative Test was validated by DepEd personnel for curriculum alignment.

Permission was secured from the Schools Division Superintendent and participating school principals before data collection. The researcher administered and retrieved the instruments personally, checked their completeness, coded the responses, and maintained respondent confidentiality and anonymity. The data were then encoded and statistically analyzed. Mean and standard deviation were used to describe problem-solving skills, attitude toward Mathematics, and academic performance, while the Spearman Rank-Order Correlation Coefficient was employed to determine the significant relationships between problem-solving skills and academic performance and between attitude toward Mathematics and academic performance.

RESULTS AND DISCUSSIONS

Level of Problem-Solving Skills of Learners

Table 2. Level of Problem-Solving Skills of Grade 8 Learners.

Statements	Mean	SD	Interpretation
Creative Thinking	3.96	0.26	High
I make charts and tables to help me in finding answers on problems.	3.99	0.63	High

I can create my own formula on the given mathematical problem.	4.16	0.61	High
I try to find out another efficient way to solve the problem when I hear some ideas or some solutions.	3.95	0.60	High
Once I choose a solution, I develop an implementation plan with the sequence of events necessary for completion.	3.78	0.61	High
I make a drawing related to the problem.	3.92	0.63	High
Analysis	3.95	0.25	High
I check my calculations by calculating again.	4.00	0.62	High
I reorganize and clarify the confused points after class.	4.10	0.60	High
I select relevant steps to solve the problem.	3.96	0.62	High
I evaluate potential solutions carefully and thoroughly against a predefined standard.	3.78	0.62	High
When evaluating solutions, I take time to think about how I should between options.	3.91	0.63	High
Decision Making	3.96	0.25	High
I usually question what I heard or what I learned in math class, and judge if this information is persuasive.	3.97	0.63	High
I make final decision in the end of my problem-solving process.	4.15	0.62	High
I modify whether my decisions are working and promptly modify them as needed.	3.95	0.60	High
I select relevant materials to solve the problem.	3.80	0.61	High
I take time to decide and design an action plan before actually calculating.	3.92	0.61	High
Emotional Intelligence	3.95	0.26	High
I do not experience mental breakdown especially when I got low scores on quizzes and activities.	4.00	0.62	High
I reflect on the answer only if all is checked giving a clear, exact and precise answer	4.09	0.60	High
I don't let problems upset me, no matter how difficult they are.	3.93	0.60	High
I am confident with my answer because I have all the solution to the problem.	3.82	0.63	High

When answering a problem in mathematics, I follow my instincts that my answers are correct.	3.93	0.63	High
Researching Skills	3.94	0.26	High
I try to find out another efficient way to solve the problem from books and internet sources	4.01	0.62	High
I select relevant materials to solve the problem.	4.06	0.63	High
I do look for other solution to the problem to have options.	3.89	0.61	High
I acquire knowledge through online research or courses.	3.84	0.63	High
I consult more experienced colleagues in mathematics.	3.91	0.63	High
Team Working	3.94	0.26	High
I show great skills in mathematics and abilities to be resourceful in a team and uses available resources to achieve the highest possible result.	3.95	0.64	High
I will gather more information about the problem by brainstorming with other team members.	4.14	0.61	High
I drive team-related work and activities in mathematics forward and ensure task are handled to completion	3.93	0.61	High
I participate actively in all mathematics activity in our group and displays positive attitude.	3.79	0.62	High
I offer workable solutions to the various problems we encountered in mathematics and ideas being faced by the team.	3.91	0.63	High
Problem-Solving Skills as a Whole	3.95	0.12	High

Legend: (4.21 – 5.00)-Very High; (3.41 – 4.20)-High; (2.61 – 3.40)-Moderate; (1.81 – 2.60)-Poor; (1.00 – 1.80)-Very Poor

Table 2 presents the mean score for problem-solving skills as a whole, which is ($M = 3.95$, $SD = 0.12$), indicating that Grade 8 learners generally possess a high level of problem-solving skills. The relatively small standard deviation also suggests that learners' scores are closely clustered around the mean, meaning most of them consistently demonstrate strong abilities. This implies that Grade 8 learners perform well across different dimensions such as creative thinking, analysis, decision-making, emotional intelligence, researching skills, and teamwork, with only minimal variation among them. Additionally, instructional strategies can be applied uniformly, as most learners share similar levels of skills, requiring only limited differentiation to address individual needs.

This aligns with the study of Harun et al. (2021), who revealed that top-performing students demonstrated a high-level of problem-solving skills. This means that learners have ability to apply multiple strategies, such as logical reasoning, algebraic manipulation, and contextual analysis that led them to arrive at precise solutions. This high level of skills directly contributed to their strong academic performance, showing that confidence and competence in problem-solving are closely tied to achievement. Similarly, Hwang and Son (2021) found that outstanding performers consistently demonstrated high level of skills in problem-solving and reasoning. These

students were able to handle complex, multi-step problems with accuracy, apply advanced reasoning strategies, and sustain high achievement across different mathematics domains.

On the other hand, the study of Oracion and Abina (2021) found that many Filipino learners often achieved only satisfactory performance in problem-solving tasks. This means that students were able to apply basic techniques to routine problems but struggled when faced with complex tasks that required flexible reasoning or multiple approaches. Their mastery was limited to average strategies, reflecting adequate understanding but lacking the depth and consistency needed to reach higher achievement levels.

In terms of subcategories, all six falls under high level of problem-solving skills, but looking at extremes, the highest subcategory is creative thinking ($M = 3.96$, $SD = 0.26$). The strongest item under this category is “I can create my own formula on the given mathematical problem” ($M = 4.16$, $SD = 0.61$), while the lowest is “Once I choose a solution, I develop an implementation plan with the sequence of events necessary for completion” ($M = 3.78$, $SD = 0.61$). This indicates that learners excel in originality and flexibility but are less systematic in planning solutions, emphasizing that instruction should balance creativity with structured approaches, guiding students to translate innovative ideas into organized implementation.

This result is consistent with Bicer et al. (2021), who found that creativity-directed tasks foster originality, and with Bicer (2021), who noted that instructional practices emphasizing flexibility enhance mathematical creativity. Likewise, Joklitschke et al. (2021) confirmed that creativity in mathematics education is linked to learners’ ability to generate novel solutions.

Next is the analysis with a result of ($M = 3.95$, $SD = 0.25$). The highest mean is “I reorganize and clarify the confused points after class” ($M = 4.10$, $SD = 0.60$), while the lowest is “I evaluate potential solutions carefully” ($M = 3.78$, $SD = 0.62$). This indicates that learners are strong in reviewing and reorganizing information but need reinforcement in evaluating solutions critically. Therefore, teachers should integrate reflective activities that require comparing and critiquing multiple approaches to strengthen evaluative skills.

Vasquez and Garcellano (2021) similarly found that Grade 8 learners show strong skills in reorganizing information but require reinforcement in evaluative judgment. Anggoro et al. (2021) further emphasized that open-ended learning enhances analytical thinking, supporting the need for reflective activities to strengthen evaluative skills.

Team working ($M = 3.95$, $SD = 0.26$) also ranked highly. The strongest item under this category is “I will gather more information about the problem by brainstorming with other team members” ($M = 4.14$, $SD = 0.61$), while the lowest is “I participate actively in all mathematics activity in our group and display positive attitude” ($M = 3.79$, $SD = 0.62$). This shows that learners excel in collaborative brainstorming and peer interaction. Thus, fostering cooperative learning strategies is necessary, as teamwork enhances problem-solving outcomes.

This is similar with Klang et al. (2021), who highlighted the importance of peer acceptance in cooperative problem-solving. Gillies (2021) further reinforced that cooperative learning strategies improve outcomes, while Sujatha and Vinayakan (2022) showed that collaborative group work fosters deeper mathematical understanding.

For decision making ($M = 3.91$, $SD = 0.25$), the highest mean is “2. I make final decision in the end of my problem-solving process” ($M = 4.15$, $SD = 0.62$), while the lowest is “I modify whether my decisions are working and promptly modify them as needed” ($M = 3.80$, $SD = 0.61$). This implies that learners are confident in reaching conclusions during their problem-solving process but are less adaptive when adjustments are required. Thus, decision-making among learners is characterized by decisiveness rather than flexibility.

This aligns with Iringan (2021), who noted that instructional exposure promotes critical thinking and decisiveness in mathematics learning. Similarly, Desender and Sasanguie (2021) found that metacognitive insight supports confident decision-making but highlighted that learners often struggle to revise decisions when faced with errors. Kooloos et al. (2021) further emphasized that teachers’ in-the-moment decision-making influences learners’ adaptability, suggesting that classroom practices should model flexible approaches.

In emotional intelligence ($M = 3.95$, $SD = 0.26$), the highest mean is “I reflect on the answer only if all is checked giving a clear, exact and precise answer” ($M = 4.09$, $SD = 0.60$), while the lowest is “4. I am confident with my answer because I have all the solution to the problem” ($M = 3.82$, $SD = 0.63$). This implies that learners place strong emphasis on accuracy and precision, ensuring that their solutions are thoroughly verified before finalizing them. However, their confidence in their answers appears to be less consistent, highlighting that while they value correctness, they may struggle with self-assurance when solving complex problems.

This finding is supported by Syaiful and Huda (2021), who identified that emotional quotient plays a significant role in mathematics performance, particularly in accuracy and precision. Similarly, Siagian et al. (2021) found that emotional intelligence is positively correlated with mathematical connection ability, but confidence levels vary depending on task difficulty. Imaludin (2021) further confirmed that while emotional intelligence enhances achievement, learners often require confidence-building strategies to sustain self-assurance in problem-solving.

Finally, the researching skills ($M = 3.94$, $SD = 0.26$) shows the highest mean in “I select relevant materials to solve the problem” ($M = 4.06$, $SD = 0.63$), while the lowest is “4. I acquire knowledge through online research or courses.” ($M = 3.84$, $SD = 0.63$). This suggests that learners are resourceful in identifying and selecting appropriate materials to address mathematical problems, showing strength in resource utilization. However, their tendency to acquire knowledge through online research or courses is comparatively weaker, suggesting limited initiative in exploring diverse learning platforms.

These findings are consistent with Faulkner et al. (2021), who profiled students’ procedural and problem-solving skills and found that while resource selection was strong, exploration of diverse strategies was limited. Similarly, Ukobizaba et al. (2021) emphasized that assessment strategies should encourage independent inquiry and broaden learners’ approaches to problem-solving. Artuz and Roble (2021) further demonstrated that guided inquiry learning enhances critical thinking and research-oriented skills, but students still need structured opportunities to practice exploring multiple solution paths.

All in all, grade 8 learners consistently demonstrate high levels of problem-solving skills, with particular strengths in creativity, analysis, and teamwork. However, weaker areas such as systematic planning, adaptability in decision-making, and emotional regulation highlight opportunities for improvement.

Level of Attitude towards Mathematics of Learners

Table 3. Level of Attitude towards Mathematics of Grade 8 Learners.

Statements	Mean	SD	Interpretation
I really like Mathematics	3.22	1.21	Neutral
Mathematics is very interesting to me.	3.18	1.19	Neutral
The challenge of maths appeals to me	3.22	1.11	Neutral
I like to solve new problems in Mathematics.	3.12	1.11	Neutral
I am happy in my math’s class than other classes.	3.11	1.16	Neutral
Mathematics is important in everyday life.	3.14	1.14	Neutral
I am able to solve Mathematics problems quite easily	3.08	1.14	Neutral
I would prefer to write a Math assignment than write an essay,	3.07	1.14	Neutral
Mathematics is very useful and necessary subject	2.93	1.14	Neutral

A strong Math background will help me in my professional life	3.04	1.21	Neutral
Mathematics helps develop the mind and teaches a person to think.	3.05	1.27	Neutral
Mathematics is one of the most important subjects for people to study	3.08	1.17	Neutral
I feel I am good at solving problems	3.03	1.27	Neutral
I am comfortable answering math problems in class.	3.14	1.16	Neutral
I get a great deal of satisfaction out of solving a mathematical problem.	3.19	1.19	Neutral
I have a lot of self- confidence when it comes to Mathematics.	3.02	1.19	Neutral
I plan to take as much Mathematics as I can during my education.	3.04	1.23	Neutral
I expect to do fairly well in my Math class.	2.99	1.11	Neutral
I am willing to take more than the required amount of Mathematics.	3.05	1.20	Neutral
Mathematics has always captivated me with his elegance and precision.	3.20	1.19	Neutral
Attitude towards Mathematics Overall Mean	3.10	0.59	Neutral

Legend: (4.21 – 5.00)- Very Positive; (3.41 – 4.20)-Positive; (2.61 – 3.40)- Neutral; (1.81 – 2.60)- Negative; (1.00 – 1.80)-Very Negative

Table 3 presents the level of attitude toward mathematics of Grade 8 learners. The computed overall mean score is 3.10 (SD = 0.59), which corresponds to a neutral interpretation, or a neutral attitude toward mathematics. The relatively larger standard deviation indicates that learners’ attitudes vary more widely, with some showing more positive or negative views compared to others. This implies that, on average, learners neither strongly favor nor strongly dislike mathematics, reflecting a balanced but somewhat indifferent attitude toward the subject, though individual differences are noticeable. Furthermore, instructional approaches should be differentiated, as some learners may require motivation to develop a more positive outlook, while others may need support to overcome negative perceptions.

All statement receives a neutral interpretation, but looking at the extremes, the highest mean scores are recorded for statements such as “I really like Mathematics” (M = 3.22, SD = 1.21) and “The challenge of maths appeals to me” (M = 3.22, SD = 1.11), both interpreted as neutral but leaning toward a more positive outlook. On the other hand, the lowest mean is observed in the statement “Mathematics is very useful and necessary” (M = 2.93, SD = 1.14), which also falls within the neutral range but suggests weaker agreement compared to other items.

These results imply that while learners generally acknowledge the importance and challenge of mathematics, their attitudes remain moderate rather than strongly positive. The presence of neutral responses across all items highlights the need for strategies that can foster greater enthusiasm, confidence, and appreciation for mathematics, thereby shifting learners’ attitudes toward a more positive direction.

This finding is consistent with the study of Areepattamannil and Khine (2021), who reported that middle school students often exhibit moderate attitudes toward mathematics, reflecting both interest and hesitation. Similarly, Al-Mutawah et al. (2021) found that learners' attitudes toward mathematics are generally balanced, with enthusiasm tempered by perceived difficulty. Oracion and Abina (2021) also found that Filipino learners often had average attitudes, reflecting neutrality in engagement. These students completed tasks as required but lacked strong enthusiasm, which limited achievement to satisfactory levels.

However, Ilhan and Akin (2022) reported that contextual misunderstandings in problem-solving fostered frustration and negative attitudes, while Chen (2022) highlighted that linguistic difficulties led Filipino learners to perceive mathematics as intimidating, resulting in avoidance behaviors and reduced confidence.

Level of Academic Performance of Learners

Table 4. Level of Academic Performance of Grade 8 Learners.

Level of Academic Performance	f	Mean	SD	Interpretation
Outstanding	182	19.74	3.03	Very Satisfactory
Very Satisfactory	147			
Satisfactory	17			
Poor	3			
Very Poor	0			
Total	349			

Legend: (21-25)- Outstanding; (16-20)- Very Satisfactory; (11-15)- Satisfactory; (6-10)- Poor; (0-5)-Very Poor

Table 4 above shows that out of 349 respondents, majority of Grade 8 learners ($f = 182$) fall under the outstanding category, while a large portion ($f = 147$) are rated as very satisfactory. A smaller group ($f = 17$) achieves a satisfactory level, and only a few ($f = 3$) are classified as poor. None of the learners are rated as very poor, indicating that extremely low performance is not observed in the group.

The computed mean score is 19.74 ($SD = 3.03$), which corresponds to an overall interpretation of very satisfactory. This implies that learners' academic performance is generally high, with most clustered around the satisfactory to outstanding levels. However, the relatively larger standard deviation suggests that while many learners perform well, there is noticeable variability in their scores. This indicates that although the majority achieve good results, some learners still lag behind, highlighting the need for differentiated instructional strategies. Also, targeted interventions and support programs are essential to help those at the lower end improve, while enrichment activities can sustain and challenge those already excelling.

This finding is consistent with the study of Oracion and Abina (2021), who found that Filipino learners often achieved satisfactory performance, reflecting average mastery of mathematical concepts. The same with Svane et al. (2023), who reported that many students remained at the satisfactory level in their mathematics performance despite the implementation of various interventions. Santos and Villanueva (2021) further noted that while interventions raised achievement to satisfactory levels, many students did not progress further to very satisfactory or outstanding performance.

Relationship between the Level of Problem-Solving Skills of Grade 8 Learners and their Level of Academic Performance

Table 5. Relationship between the Level of Problem-Solving Skills of Grade 8 Learners and their Level of Academic Performance.

Variable	Test Statistics (r_s)	p-value	Decision for H_0	Interpretation
Level of Problem-Solving Skills vs.	0.030	0.577	Failed to Reject H_0	Not Significant
Level of Academic Performance				

Table 5 above presents the relationship between the level of problem-solving skills of Grade 8 learners and their level of academic performance. The Spearman rank correlation test result ($r_s = 0.030$, $p = 0.577$) shows that the p-value is greater than the 0.05 level of significance. As a result, the null hypothesis (H_0) is not rejected, indicating that there is no significant relationship between the two variables. This implies that learners' problem-solving skills do not directly influence their academic performance, nor does academic performance necessarily reflect their level of problem-solving ability. Instead, other factors such as study habits, motivation, instructional strategies, and classroom environment may play a more significant role in shaping both academic achievement and problem-solving skills of learners. The results further emphasize that while both skills and performance are important indicators of student learning, they may develop independently, requiring targeted interventions to strengthen problem-solving abilities alongside academic achievement.

This result is similar with result of Aposika (2021), who found that problem-solving skills did not significantly predict students' grades, emphasizing that motivation and instructional quality may moderate its influence. In the same way, Iringan (2021) observed that even with high exposure to problem-solving strategies, learners did not consistently achieve better academic performance, pointing to teaching methods and assessment styles as possible limiting factors. Moreover, Ortega (2023) highlighted that socio-emotional dimensions such as resilience, motivation, and self-regulation outweighed cognitive skills like problem-solving in predicting academic success.

On the other hand, Sionicio and Barbacena (2021) revealed that integrating problem-solving strategies into mathematics instruction significantly enhanced both metacognitive awareness and academic achievement. Similarly, Villarta et al. (2021) reported that performance-based tasks strengthened problem-solving skills, which positively correlated with science achievement. In addition, Lee and Tan (2022) demonstrated that problem-solving ability was a significant predictor of mathematics achievement among Singaporean high school learners.

Relationship between the Level of Attitude towards Mathematics of Grade 8 learners and their Level of Academic Performance

Table 6. Relationship between the Level of Attitude towards Mathematics of Grade 8 learners and their Level of Academic Performance.

Variable	Test Statistics (r_s)	p-value	Decision for H_0	Interpretation
Level of Attitude towards Mathematics vs.	0.205**	<0.001	Reject H_0	Significant
Level of Academic Performance				

Table 6 above presents the relationship between the level of attitude towards mathematics of Grade 8 learners and their level of academic performance. The Spearman rank correlation test result ($r_s = 0.205$, $p < 0.001$) shows that the p-value is less than the 0.05 level of significance. Therefore, the null hypothesis (H_0) is rejected, indicating that there is a significant relationship between the two variables. This finding indicates that learners with a more positive attitude towards mathematics tend to achieve higher levels of academic performance. Conversely, those with less favorable attitudes may struggle to attain stronger academic outcomes. The result implies that fostering positive attitudes toward mathematics, through engaging instructional strategies, supportive classroom environments, and confidence-building activities, can play a significant role in enhancing learners' academic achievement. Thus, this highlights the importance of affective factors such as motivation and mindset in complementing cognitive skills to improve learning outcomes.

This is similar with the results of Villarta et al. (2021), who found that learners with positive dispositions demonstrated stronger confidence and better performance, highlighting the mediating role of attitude in enhancing self-efficacy. Likewise, Iringan (2021) emphasized that students with positive attitudes were more receptive to instructional strategies, resulting in improved achievement. Santos and Villanueva (2021) also showed that favorable attitudes fostered persistence and confidence led to academic success in quantitative subjects. Additionally, Hwang and Son (2021) confirmed a positive relationship between attitudes and achievement. Finally, Moroscallo Jr. and Naparota (2025) reinforced that learner with more favorable attitudes demonstrated stronger confidence and better academic performance.

On the other hand, Oracion and Abina (2021) found that while students demonstrated satisfactory achievement and average attitudes toward mathematics, the relationship between the two variables was insignificant. Instead, career aspirations and contextual factors played a stronger role in shaping performance outcomes.

CONCLUSIONS

Based on the findings of the study, the following conclusions were formulated:

The Grade 8 learners display a high level of problem-solving skills across creativity, analysis, teamwork, emotional intelligence, and research, with decision-making as the relative area needing improvement. They excel in generating and analyzing ideas but need more opportunities to refine their judgment and adaptability.

Grade 8 learners have neutral attitude toward mathematics, indicating that they neither strongly favor nor strongly dislike the subject. There is a balance but somewhat indifferent outlook, where students acknowledge mathematics without strong enthusiasm or resistance.

The Grade 8 learners are consistently achieving above-average results and demonstrating strong understanding of the subject matter. They could go beyond simply meeting expectations, and showing reliable understanding, application, and retention of knowledge.

The problem-solving skills of Grade 8 learners do not affect academic achievement, nor did academic performance directly reflect their level of problem-solving skills. This emphasized that other factors, such as study habits, motivation, teaching strategies, and classroom environment, could play a more influential role in shaping academic outcomes.

The attitude of Grade 8 learners towards Mathematics directly influenced their academic performance. The learners with more favorable attitudes toward mathematics tend to achieve higher academic outcomes, while those with less positive dispositions may struggle to perform as well.

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REFERENCES

1. Alinsunurin, J. P. (2021). Unpacking underperformance: Learning mindsets and the challenge of academic achievement among Filipino students. Social Science Research Network.
2. Al-Mutawah, M. A., Thomas, R., Eid, A., Mahmoud, E., & Fateel, M. J. (2021). Conceptual understanding, procedural fluency, and attitudes toward mathematics: A study of middle school students. *EURASIA Journal of Mathematics, Science and Technology Education*, 17(2), em1938.
3. Anggoro et al. (2021). Enhancing analytical thinking through open-ended learning in mathematics classrooms. *International Journal of Instruction*, 14(3), 567–582.
4. Aposika, F. (2021). Investigating the relationship between problem-solving skills and academic performance in STEM subjects among secondary school students. *Discover Education*.
5. Areepattamannil, S., & Khine, M. S. (2021). Attitudes toward mathematics among middle school students: A cross-cultural study. *International Journal of Science and Mathematics Education*, 19(2), 327–345.
6. Artuz, J. K. A., & Roble, D. B. (2021). Developing students' critical thinking skills in mathematics using online-process oriented guided inquiry learning (O-POGIL). *American Journal of Educational Research*, 9(7), 404–409.
7. Bautista, W., & Dones, M. Q. (2025). Numeracy skills and attitude towards mathematics of students in relation to performance: Basis for intervention program. *Psychology and Education a Multidisciplinary Journal*, 33(2), 167–185.
8. Bicer, A. (2021). A systematic literature review: Discipline-specific and general instructional practices fostering the mathematical creativity of students. *International Journal of Education in Mathematics, Science, and Technology*, 9(2), 252–281.
9. Bicer, A., Marquez, A., & Matute Colindre, K. V. (2021). Investigating creativity-directed tasks in middle school mathematics curricula. *Thinking Skills and Creativity*, 40, 100823.
10. Chen, X. (2022). Language barriers and mathematics problem-solving performance: Evidence from multilingual classrooms. *International Journal of Educational Research*, 115, 102050.
11. Cogn-IQ Educational Content Team. (2025). Academic achievement—The construct, its predictors & how it is measured. *Cogn-IQ Encyclopedia*.
12. Congressional Policy and Budget Research Department. (2024, February). Philippines' performance in the 2018 and 2022 Programme for International Student Assessment (PISA). House of Representatives of the Philippines.
13. Dayaganon, C. T. R., Carreon, M. L., Elladora, S. T., & Bustamante, J. L. A. (2022). Perceived level of competence of the university students' problem-solving skills in mathematics in the new normal. *International Journal of Educational Science and Research (IJESR)*, 12(1), 173–188.
14. Desender, K., & Sasanguie, D. (2021). Math anxiety relates positively to metacognitive insight into mathematical decision-making. *Psychological Research*, 85(6), 2102–2115.
15. Faulkner, F., Breen, C., Prendergast, M., & Carr, M. (2021). Profiling mathematical procedural and problem-solving skills of undergraduate students following a new mathematics curriculum. *International Journal of Mathematical Education in Science and Technology*.

16. Gamarra Astuhuaman, G., & Pujay Cristobal, O. E. (2021). Problem solving, skills and academic performance when teaching mathematics. *Revista Educación*, 45(1), 176–189.
17. Gillies, R. M. (2021). Cooperative learning: Review of research and practice. *Australian Journal of Teacher Education*, 46(3), 33–48.
18. Harun, H., Kartowagiran, B., & Manaf, A. (2021). Student attitude and mathematics learning success: A meta-analysis. *International Journal of Instruction*, 14(4), 209–222.
19. Hwang, S., & Son, T. (2021). Students' attitude toward mathematics and its relationship with mathematics achievement. *Journal of Education and e-Learning Research*, 8(3), 272–280.
20. Ilhan, A., & Akin, M. F. (2022). Analysis of contextual problem solutions, mathematical sentences, and misconceptions of pre-service mathematics teachers. *International Electronic Journal of Mathematics Education*, 17(1), em0666.
21. Imaludin, A. (2021). Emotional intelligence and mathematics achievement: A correlational study. *Jurnal Pendidikan Matematika*, 8(1), 61–72.
22. Iringan, E. M. (2021). Instructional exposure of senior high school students to approaches that promote critical thinking and problem-solving skills. *Journal of Asian Research*, 5(1), 1–15.
23. Joklitschke, J., Root, B., & Schindler, M. (2021). Notions of creativity in mathematics education research: A systematic literature review. *International Journal of Science and Mathematics Education*, 19(5), 1129–1152.
24. Klang, N. et al. (2021). Peer acceptance and cooperative problem-solving in mathematics classrooms. *Educational Studies in Mathematics*, 107(2), 245–263.
25. Kooloos, C., Oolbekkink-Marchand, H., van Boven, S., Kaenders, R., & Heckman, G. (2021). Building on student mathematical thinking in whole-class discourse: Exploring teachers' in-the-moment decision-making, interpretation, and underlying conceptions. *Journal of Mathematics Teacher Education*.
26. Kumar, S., Agarwal, M., & Agarwal, N. (2021). Defining and measuring academic performance of HEI students: A critical review. *Turkish Journal of Computer and Mathematics Education*, 12(6), 3091–3105.
27. Lee, C., & Tan, M. (2022). Predictive role of problem-solving in mathematics achievement. *Singapore Journal of Education*, 18(2), 33–47.
28. Lit, S., Kool, M., & Drijvers, P. (2026). Teacher knowledge and skills for mathematical problem solving: A systematic literature review. *Journal of Mathematics Teacher Education*.
29. Mahajan, R. (2021). Attitude and perception towards mathematics: A study of school students. *Industry and Academic Research Review*, 2nd International Conference on Multidisciplinary Industry and Academic Research.
30. Moroscallo Jr., T. T., & Naparota, L. C. (2025). Mathematics anxiety, attitudes towards mathematics, and academic performance of the senior high school students in Katipunan I District, Schools Division of Zamboanga del Norte. *International Journal of Applied Social Science*, 8(11), 1–25.
31. OECD. (2023). PISA 2022 results: Philippines student performance. Organisation for Economic Co-operation and Development.
32. Oracion, Q. G., & Abina, I. L. S. (2021). The mediating effect of students' attitude to student career aspiration and mathematics achievement. *Journal of Research and Advances in Mathematics Education*, 6(3), 158–173.
33. Ortega, D. (2023). Socio-emotional factors and academic success. *Philippine Education Review*, 12(3), 66–80.
34. Placigo, M. R. (2026). Mapping Philippine mathematics-education research in the PISA era: A bibliometric and content analysis of proximate and structural explanations. *International Journal of Research Publication*, 199(1), 901–911.
35. Santos, R., & Villanueva, J. (2021). Structured problem-solving interventions in mathematics. *International Journal of Multidisciplinary: Applied Business and Education Research*, 2(12), 23–36.
36. Siagian, M. D., Suwanto, S., & Siregar, R. (2021). The relationship of students' prior knowledge and emotional intelligence to mathematical connection ability. *Jurnal Riset Pendidikan Matematika*, 8(1), 61–72.
37. Sionicio, J., & Barbacena, L. (2021). Effects of teaching through problem-solving on students' metacognition and academic performance. *Journal of Mathematics Education*, 24(2), 45–60.

38. Sujatha, S., & Vinayakan, K. (2022). The role of collaborative learning in mathematics education: A review of research and practice. *Indo American Journal of Multidisciplinary Research and Review*, 6(2), 200–206.
39. Svane, R. P., Willemsen, M. M., Bleses, D., Krøjgaard, P., Verner, M., & Nielsen, H. S. (2023). A systematic literature review of math interventions across educational settings from early childhood education to high school. *Frontiers in Education*, 8, 1229849.
40. Syaiful, K., & Huda, N. (2021). Identifying emotional quotient of junior high school students in mathematics. *International Journal of Evaluation and Research in Education*, 10(1), 202–.
41. Ukobizaba, F., Nizeyimana, G., & Mukuka, A. (2021). Assessment strategies for enhancing students' mathematical problem-solving skills: A review of literature. *EURASIA Journal of Mathematics, Science and Technology Education*, 17(3), em1945.
42. Vasquez, J. M., & Garcellano, M. A. (2021). Analytical skills of Grade 8 learners: Strengths in reorganization and challenges in evaluative judgment. *Journal of Educational Research and Practice*, 11(2), 45–58.
43. Villarta, Y., Atibula, L., & Gagani, F. (2021). Performance-based assessment: Self-efficacy, decision-making, and problem-solving skills in learning science. *Journal LA Edusci*, 2(3), 1–9.