Learning Strategies and Academic Performance in Mathematics of Senior High School Students

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ABSTRACT

This study investigated learning strategies in Mathematics among Grade 11 students in relation to their academic performance. The study involved a total of 292 Grade 11 students enrolled during the school year 2025–2026 in one of the secondary schools in a selected School Divisions in Negros Occidental. It employed a quantitative-descriptive and correlational research design. The respondents' learning strategies was assessed using the short version of the Motivated Strategies for Learning Questionnaire (MSLQ-PTS) developed by Morais et al. (2025), and their academic performance was determined through their Fourth Quarter grades in Mathematics. The results showed that the students exhibited a high level of learning strategy utilization where Help seeking recorded the highest mean score while critical thinking registered the lowest mean scores among its subconcepts. The level of academic performance in Mathematics was very satisfactory. It was also revealed that there is a significant relationship between learning strategies in Mathematics and the academic performance of the Grade 11 students.

INTRODUCTION

Mathematics education is fundamental in developing learners' critical thinking, problem-solving, and logical reasoning skills essential for academic and real-life success (Mbarawii & Amabibi, 2024), and learning strategies have been identified as significant predictors of students' academic performance (Mensah et al., 2026). International research consistently demonstrates that self-regulated learning, metacognitive techniques, collaborative learning, and cognitive learning strategies enhance students' engagement, task management, achievement, retention, and higher-order thinking in mathematics, particularly when learners focus on conceptual understanding rather than rote memorization (Andjamba, 2021; Rukshana et al., 2025; Ishak et al., 2025; Khasawneh, 2025). In the Philippine context, however, mathematics education continues to face challenges due to persistently low academic performance, with many students relying on memorization and procedural learning instead of developing a deeper conceptual understanding of mathematics (Velez et al., 2023; Nobis, 2025). Local evidence further suggests that the use of appropriate learning strategies and innovative instructional approaches can improve students' engagement and achievement in mathematics (Lee & Paul, 2023). Despite extensive international and local research on learning strategies, limited studies have examined their relationship with students' academic performance in mathematics, particularly within local contexts, creating an important research gap (Ortiz-De-Villate et al., 2021). Therefore, this study aims to determine the relationship between learning strategies and academic performance in mathematics among Grade 11 Senior High School students.

FRAMEWORK

Jean Piaget's Constructivist Theory provides the theoretical foundation for this study by emphasizing that learners actively construct knowledge through experience, interaction, and cognitive processes, acquiring understanding by assimilating new information into existing knowledge and accommodating new ideas when prior understanding is insufficient (Piaget, 2023; Cakir, 2022). The theory further explains that learners progress through stages of cognitive development that influence their ability to understand abstract mathematical concepts, making active learning, exploration, reflection, and problem-solving essential for meaningful mathematical understanding (Rabillas, 2023; Waite, 2022; Nilimaa, 2023; Madan & Singh, 2024; Irshid, 2023; Rahayu, 2025). In this context, learning strategies such as metacognitive, cognitive, and self-regulated

approaches facilitate the construction of mathematical knowledge by enabling students to plan, monitor, evaluate, and organize their thinking while identifying patterns and connecting concepts effectively (Ansari et. al., 2021; Nilima, 2023; X. He et al., 2023). The effective use of these strategies strengthens students' problem-solving abilities and promotes deeper conceptual understanding, which are essential for meaningful mathematics learning (Naz & Qayyum, 2025). Constructivist Theory also suggests that students who employ effective learning strategies are more likely to demonstrate higher academic performance because they can apply mathematical concepts accurately, manage learning tasks efficiently, and overcome learning difficulties (Korompis, 2023; Vida & Hodnik, n.d.; Chew & Cerbin, 2020; Vale & Barbosa, 2023). Therefore, Constructivist Theory provides a strong theoretical basis for examining the relationship between learning strategies and academic performance in mathematics (Almulla, 2023).

METHODS

This study employed a quantitative descriptive-correlational research design to examine the relationship between learning strategies in Mathematics and the academic performance of Grade 11 students without manipulating the variables. Descriptive research systematically describes naturally occurring phenomena, whereas correlational research determines the strength and direction of relationships between variables, making this design appropriate for the study (Deckert & Wilson, 2023; Casteel & Bridier, 2021; Bhandari, 2021). Quantitative research further supports this approach by utilizing numerical data, standardized instruments, and statistical analyses to identify patterns, test hypotheses, and establish relationships among variables (Ghanad, 2023). The respondents consisted of Grade 11 students enrolled during the School Year 2025–2026 in one of the secondary schools in a selected Schools Division in Negros Occidental, with a population of 292 students and a sample of 169 respondents determined using Yamane's Formula at a 95% confidence level and a 5% margin of error. Stratified random sampling with proportional allocation and simple random sampling through the lottery method was employed to ensure fair representation, minimize sampling bias, and enhance the reliability of the data. Data were gathered using the short version of the Motivated Strategies for Learning Questionnaire (MSLQ-PTS) developed by Morais et al. (2025) (Appendix C) to assess learning strategies, while students' Fourth Quarter Mathematics grades measured academic performance; the standardized instrument had established validity (0.73) and reliability (0.88), eliminating the need for further validation and reliability testing.

The researcher secured approval from the Schools Division Superintendent and coordinated with the school principal before conducting the study, while strictly observing ethical standards by ensuring voluntary participation, anonymity, and confidentiality of all respondents (Appendix B). Data were collected through the administration of the MSLQ-PTS using Google Forms, allowing respondents to complete the survey electronically while the researcher supervised the dissemination, monitored submissions, and retrieved the accomplished questionnaires for analysis. The gathered data were analyzed using appropriate statistical tools to address each research objective accurately. Mean and standard deviation were used to determine the level of learning strategies, with responses interpreted using a five-point Likert scale ranging from "Not at all true of me" to "Very true of me." The same descriptive statistics were applied to determine the level of academic performance, which was interpreted using the grading scale prescribed in DepEd Order No. 8, s. 2015. Finally, the Pearson Product-Moment Correlation Coefficient was utilized to determine the significant relationship between learning strategies in Mathematics and the academic performance of Grade 11 students.

RESULTS AND DISCUSSION

This chapter presents, analyzes, and explains the gathered data. To address the problem statement, the data are carefully organized using the relevant statistical tools.

Table 1 Level of Learning Strategies in Mathematics.

Statements	Mean	SD	Interpretation
Rehearsal	3.79	0.53	High
Elaboration	3.79	0.54	High

Organization	3.73	0.52	High
Metacognitive Self-regulation	3.76	0.52	High
Time and Environment	3.88	0.53	High
Effort Regulation	3.77	0.66	High
Peer Learning	3.76	0.54	High
Help Seeking	3.90	0.61	High
Learning Strategies in Mathematics Overall Mean	**3.78**	**0.38**	**High**

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

n=292

The findings revealed that Grade 11 students demonstrated a high level of learning strategy utilization in Mathematics (M = 3.78; SD = 0.38), indicating that they frequently employ cognitive, metacognitive, and resource-management strategies to support learning. Among the dimensions, help seeking obtained the highest mean score (M = 3.90; SD = 0.61), followed by time and environment management (M = 3.88; SD = 0.53), while rehearsal and elaboration (M = 3.79; SD = 0.53 and SD = 0.54), effort regulation (M = 3.77; SD = 0.66), metacognitive self-regulation (M = 3.76; SD = 0.52), peer learning (M = 3.76; SD = 0.54), organization (M = 3.73; SD = 0.52), and critical thinking (M = 3.70; SD = 0.53) were likewise rated high, with relatively low standard deviations indicating consistent responses. These results suggest that students actively regulate their learning through strategies that promote comprehension, task management, motivation, and independent learning, particularly by seeking assistance and effectively managing their study time and environment (Mariappan, 2023; Martín-Arbós et al., 2021; Doyle, 2023; Cogliano et al., 2020; Mathieu, 2025; Marantika, 2021). However, the comparatively lower ratings for organization and critical thinking imply that students engage less frequently in higher-order cognitive processes such as analyzing, evaluating, synthesizing, and systematically organizing knowledge, despite maintaining a high overall level of strategy use (Loyens et al., 2023; Zare & Al-Issa, 2024). Overall, the findings indicate that students possess favorable learning behaviors that provide a strong foundation for academic success while highlighting the need to further strengthen organizational and critical-thinking skills.

The findings underscore the importance of sustaining instructional practices that promote active learning, collaboration, self-regulation, and learner autonomy while providing greater opportunities to develop organization and higher-order thinking skills (AlAli & Wardat, 2024; Jaja & Ofubaraibim, 2025). Classroom strategies such as problem-solving, reflective learning, concept mapping, and analytical reasoning may further enhance these relatively less utilized dimensions, while curriculum developers and policymakers are encouraged to integrate balanced cognitive, metacognitive, and higher-order thinking approaches into mathematics instruction (Singh, 2026; Vu, 2025). The results also provide a valuable context for examining the relationship between learning strategies and academic performance, suggesting that learning strategies may explain variations in students' educational outcomes (Wild & Neef, 2023; Lo et al., 2022). Collectively, the evidence demonstrates that students' consistent use of diverse learning strategies supports effective mathematics learning and reinforces the importance of cultivating strategic learning behaviors in the classroom. Therefore, continued efforts by teachers, school administrators, curriculum developers, and policymakers to strengthen these competencies are likely to further improve students' academic performance and overall learning outcomes.

Table 2. Level of Academic Performance in Mathematics.

Level of Academic Performance in Mathematics	f	Mean	SD	Interpretation
Outstanding	52	85.89	6.04	Very Satisfactory
Very Satisfactory	48			

Satisfactory	35			
Fairly Satisfactory	34			
Did Not Meet Expectations	0			
Total	169			

Legend: (90-100)-Outstanding; (89-85)-Very Satisfactory; (80-84)-Satisfactory; (75-79)-Fairly Satisfactory; (Below 75)-Did Not Meet Expectations

n=292

The findings revealed that Grade 11 students achieved a very satisfactory level of academic performance in Mathematics (M = 85.89; SD = 6.04), indicating that they generally exceeded the minimum expected learning standards. In terms of grade distribution, most students attained outstanding (n = 52) and very satisfactory (n = 48) ratings, while 35 were classified as satisfactory and 34 as fairly satisfactory, suggesting that although many performed at or above the expected proficiency level, some learners remained in the lower achievement categories. These results imply that most students possess adequate mathematical competence and demonstrate acceptable understanding of mathematical concepts, procedures, and problem-solving skills, which may reflect effective instructional practices, active student engagement, and adequate academic support (Ukobizaba et al., 2021; Tao et al., 2022). However, the variation in performance indicates that some students continue to experience difficulties in mastering mathematical concepts due to differences in preparedness, learning strategies, motivation, or access to educational support, highlighting the need to address the needs of lower-performing learners (Chick et al., 2023; Kwarikunda et al., 2022; Schunk & Zimmerman, 2022). The findings further suggest that teachers should sustain effective instructional practices while implementing differentiated instruction, strategic learning approaches, and targeted interventions to improve student achievement, with school administrators supporting continuous monitoring, enrichment, and remedial programs to reduce achievement gaps (Goyibova et al., 2025; Siregar, 2025; Alsraisri & Amjad, 2025; Cabral-Gouveia et al., 2023). Likewise, parents and other stakeholders play an essential role in fostering supportive learning environments that encourage academic engagement and persistence, while the results provide a basis for examining how learning strategies are associated with academic performance and for developing evidence-based interventions to improve mathematics achievement (Ma et al., 2023; Doabler et al., 2021). Overall, the study concludes that although Grade 11 students demonstrated favorable academic performance in Mathematics, continued efforts to strengthen learning experiences and address individual learning needs remain essential for promoting higher levels of achievement.

Table 3. Relationship between Learning Strategies in Mathematics and Academic Performance.

Variable	Test Statistics (□ □)	p-value	Decision for H_o	Interpretation
Learning Strategies in Mathematics vs. Academic Performance in Mathematics	0.294	<0.001	Reject H_o	Significant

The analysis revealed a statistically significant positive relationship between learning strategies and academic performance in Mathematics among Grade 11 students (Spearman's rho, $r_s = 0.294$, $p < 0.001$), indicating that students who more frequently employ effective learning strategies tend to achieve better academic outcomes. Although the correlation was relatively weak, the significant p-value confirms that the association is meaningful and unlikely to have occurred by chance, highlighting the contribution of cognitive, metacognitive, and resource-management strategies in organizing information, regulating learning, and overcoming academic challenges (Akahsah, 2025; Mustafa et al., 2025). The modest strength of the relationship further suggests that academic performance is influenced not only by learning strategies but also by learner characteristics, instructional practices, motivation, self-efficacy, and environmental factors, while affirming the important role of strategic learning in mathematics achievement (Suleiman et al., 2024; Guo et al., 2021; Tañola & Lomibao, 2024). These

findings underscore the need for teachers to explicitly integrate self-regulation, reflective learning, problem-solving, collaboration, and strategic thinking into mathematics instruction to foster more effective and independent learners (Koskinen & Pitkäniemi, 2022; Paethrangsi et al., 2024). Likewise, school administrators should strengthen programs that promote study skills and self-regulatory capacities while providing professional development opportunities that support strategy-based instruction, and parents should reinforce productive study habits and academic responsibility at home (Dutton, 2023; Gu et al., 2025; Prihandono et al., 2024). From a research perspective, the findings provide empirical evidence that learning strategies are associated with academic success and suggest that interventions designed to strengthen strategic learning behaviors may improve mathematics achievement, while future studies should examine additional variables that may influence this relationship (Büchele, 2023; Biwer et al., 2022). Overall, the study concludes that although learning strategies exhibit only a weak positive relationship with academic performance, they remain a significant factor in mathematics achievement and should be cultivated to support improved educational outcomes.

CONCLUSION

The findings revealed that the respondents demonstrated a high level of learning strategy utilization in Mathematics, indicating that they frequently employed effective cognitive, metacognitive, and resource-management strategies to support their learning. They also exhibited a very satisfactory level of academic performance, reflecting strong achievement and mastery of the competencies expected in the subject. Furthermore, higher levels of learning strategy utilization were associated with better academic performance in Mathematics, demonstrating a statistically significant positive relationship between the two variables. These results suggest that the effective use of learning strategies contributes to improved mathematics achievement, although other factors may also influence students' academic performance. Overall, the findings highlight the importance of fostering effective learning strategies to enhance students' mathematical achievement and overall academic success.

RECOMMENDATIONS

This research, as per the investigation, recommends the following:

Based on the findings, District Supervisors may provide continuous technical assistance, monitoring, and district-based professional learning communities to ensure that schools effectively integrate learning strategy enhancement programs into classroom instruction, particularly in response to the comparatively lower ratings in Organization and Critical Thinking. School Heads may sustain and strengthen existing instructional programs and support systems by allocating resources for instructional materials, enrichment activities, and collaborative learning opportunities that reinforce high academic performance. Teachers should continue implementing instructional practices that promote higher-order thinking, organizational skills, self-regulation, and active learning to further improve students' mathematics achievement. Students are encouraged to consistently apply effective learning strategies, particularly help-seeking, time and environment management, metacognitive self-regulation, and effort regulation, while strengthening their organization and critical-thinking skills to enhance mathematical understanding and academic performance. Parents may also support these efforts by fostering positive study habits, providing encouragement, and creating conducive learning environments at home. Future researchers are encouraged to investigate additional factors influencing mathematics achievement, including mathematics anxiety, motivation, self-efficacy, parental involvement, classroom environment, and teaching practices. They may also replicate the study using larger and more diverse samples across different schools, grade levels, and geographical contexts to improve the generalizability of the findings. Furthermore, employing qualitative and mixed-methods research designs may provide deeper insights into how learning strategies influence mathematics achievement and inform the development of more effective educational interventions.

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