INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND ANALYSIS

ISSN(print): 2643-9840, ISSN(online): 2643-9875

Volume 09 Issue 05 May 2026

DOI: 10.47191/ijmra/v9-i5-88, Impact Factor: 8.685

Page No. 2929-2940

Study Habits and Problem-Solving Competence in Mathematics

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ABSTRACT: This study aimed to determine the relationship between study habits and problem-solving competence in Mathematics, specifically examining study habits in terms of time management, technique preference, and resource utilization, and problem-solving competence in terms of problem analysis, solution creativity, and decision accuracy. The study employed both correlational and causal research designs. The respondents consisted of 106 Grade 10 students selected through stratified random sampling from selected public junior high schools in the Division of Cagayan de Oro City. The research instrument was an adapted questionnaire using a five-point Likert scale. Data were analyzed using Mean, Standard Deviation, Spearman Rho Correlation, Simple and Multiple Linear Regression. Results reveal that the level of study habits in Mathematics in terms of time management, technique preference, and resource utilization is Moderate. The level of problem-solving competence in Mathematics in terms of problem analysis, solution creativity, and decision accuracy is Moderate. There is a weak but significant positive relationship between study habits and problem-solving competence in Mathematics. Study habits significantly predict problem-solving competence in Mathematics. Hence, effective study habits contribute to improved mathematical problem-solving competence. It is recommended that teachers and school administrators may strengthen students' study techniques and time management skills to enhance their problem-solving competence in Mathematics.

KEYWORDS: Mathematics, problem-solving competence, study habits

I. INTRODUCTION

Within today's learning environment, Mathematics remains a challenging subject for many students, particularly when dealing with complex or advanced problems. This challenge is reflected in students' performance in national and international assessments. The ability to think critically, apply logical reasoning, and demonstrate confidence is closely linked to students' problem-solving competence, which may be influenced by their study habits. Practices such as maintaining structured study schedules, using effective learning strategies, and ensuring a conducive study environment may support the development of problem-solving skills. In contrast, ineffective study habits may contribute to frustration, anxiety, and difficulties in solving mathematical problems.

In the global education landscape, students' ability to solve mathematical problems is widely recognized as a key outcome of schooling; however, many learners still struggle to apply classroom learning to real-life situations. According to Ali and Das (2024), study habits such as regular study routines, varied practice, effective time management, and proper use of learning resources play a significant role in developing students' analytical thinking, persistence, and confidence when dealing with complex mathematical tasks. With proper guidance from teachers and parents, these habits may strengthen students' problem-solving competence. Conversely, ineffective study habits may increase anxiety and hinder the application of mathematical skills. This concern is reflected in the Trends in International Mathematics and Science Study (TIMSS), which highlights continuing challenges in Mathematics achievement and emphasizes the need to examine factors affecting students' learning.

National and international assessments from 2021 to 2024 revealed these challenges in the Philippines. In the most recent Programme for International Student Assessment (PISA), Filipino learners ranked at or near the bottom in Mathematics among participating countries. The National Achievement Test (NAT) results during these years also showed mean percentage scores consistently below the required mastery level. These findings demonstrate sustained low performance nationwide. They highlight the urgent need to address study habits to improve mathematical competence (OECD, 2023). Similarly, data from the Planning Office of the Division of Cagayan de Oro City showed that the National Achievement Test (NAT) results in Mathematics

performance remains low. Specifically, the Mean Percentage Score (MPS) in Mathematics is 33.46 in problem solving, 35.39 in information literacy, and 35.83 in critical thinking, all of which fall under the Low Proficient level (25–49). Compared to the national results, which are also within the low proficient range, this indicates that students continue to experience difficulties in developing essential mathematical skills. These results highlight persistent challenges in learners' ability to analyze, interpret, and solve mathematical problems effectively.

Study habits refer to the patterns and strategies students use to prepare for their lessons. These include not only the amount of time spent studying but also how effectively students manage their time and approach learning tasks. Establishing a clear schedule, avoiding procrastination, and reviewing lessons regularly make learning more meaningful and productive. Learners who summarize notes, practice solving problems step by step, or engage in collaborative learning are more likely to understand concepts and retain knowledge. Effective study habits also promote discipline, consistency, and deeper engagement with the subject matter. Systematic planning, organized note-taking, and deliberate practice enhance comprehension, retention, and academic success (Habibi et al., 2024).

Problem-solving competence in Mathematics goes beyond obtaining correct answers, as it requires students to identify problems, analyze given information, select appropriate strategies, and evaluate their solutions using logical reasoning and critical thinking. Students with strong analytical thinking and strategic approaches tend to perform better than those who rely mainly on memorization. This competence also serves as an essential life skill, supporting both academic success and practical decision-making in everyday situations (Enerosa & Abuzo, 2024; Oco & Comahig, 2023).

Although many studies have examined the relationship between study habits and academic performance, few have focused specifically on how study habits influence problem-solving competence in Mathematics, as most emphasize general outcomes rather than the processes involved in solving mathematical problems. This limitation creates a gap in understanding how students develop mathematical reasoning skills and which study habits most effectively enhance problem-solving competence. Addressing this gap can provide clearer insights for improving students' mathematical performance (Rahmah & Soro, 2024).

Thus, this study aimed to examine study habits and problem-solving competence in Mathematics. It explored how students manage their study time, apply preferred learning techniques, and utilize resources, while also measuring their problem-solving competence. The findings provide guidance in promoting effective study habits in Mathematics. Overall, this study contributes to improving educational strategies aimed at enhancing students' mathematical proficiency.

This study was anchored on the Action Process Object Schema (APOS) Theory by Rahayu et al. (2022), which explains how students build mathematical understanding and develop problem-solving competence through four progressive stages: action, process, object, and schema. According to this theory, learning begins when students perform specific actions to solve mathematical problems, which are later internalized as mental processes. As these processes become more refined, students form abstract objects and eventually organize them into comprehensive cognitive schemas that enable flexible and effective problem-solving. Applying this theory to the present study emphasizes how positive study habits, such as regular practice, reflection, and the use of effective learning strategies, help students progress through these stages, thereby improving their problem analysis, solution creativity, and decision accuracy in Mathematics.

Moreover, Khalid and Idris (2024) highlighted that the APOS Theory aligns with constructivist learning theory, which views learning as an active process in which students construct knowledge through experience and reflection. As students engage with mathematical problems, they move through stages of understanding that deepen their conceptual grasp of mathematical structures. This progression allows them not only to solve problems but also to explain their reasoning and apply their understanding to novel contexts. When students adopt positive study habits, such as goal setting, strategic review, and collaborative learning, they strengthen these cognitive transitions and enhance their overall problem-solving competence in Mathematics.

In addition, Lopez and Tan (2025) noted that applying APOS Theory in Mathematics education helps educators design instructional strategies that promote deeper cognitive engagement and autonomy among students. Teachers can guide learners from performing procedural tasks toward developing abstract reasoning and schema formation by encouraging independent problem analysis and solution exploration. This theoretical lens therefore supports the idea that students' study habits play a pivotal role in how they acquire and apply mathematical knowledge effectively.

Furthermore, Nguyen and Parker (2023) emphasized that integrating metacognitive awareness with APOS-based learning further enhances students' problem-solving competence in Mathematics. When students are encouraged to plan, monitor, and evaluate their learning processes, they become more aware of how they construct and connect mathematical concepts. This metacognitive regulation, when combined with disciplined study habits, leads to higher levels of comprehension and decision

accuracy in mathematical reasoning tasks. Such integration promotes deeper learning and supports sustained growth in students' problem-solving competence in Mathematics.

II. METHODOLOGY

The researcher used correlational and causal research designs to assess the students' study habits and problem-solving competence in Mathematics. This study employed a correlational design because it aimed to determine the relationship between students' study habits and their problem-solving competence without manipulating any variables. A correlational design was appropriate for identifying the degree and direction of association between two or more variables, allowing the researcher to understand how one variable is related to another. According to Creswell and Creswell (2023), correlational research is suitable when the goal is to describe and measure the strength of relationships among naturally occurring variables in an educational setting.

Moreover, causal research design was utilized through regression techniques to determine whether study habits can predict students' problem-solving competence in Mathematics. This approach allows the researcher to examine how independent variables such as time management, technique preference, and resource utilization contribute to variations in the dependent variable. As explained by Saunders et al. (2023), it is used to estimate the extent to which one variable can explain or forecast changes in another variable without implying direct causation.

III. RESULTS AND DISCUSSION

Problem 1. How do the respondents assess their study habits in terms of:

1.1 time management;
1.2 technique preference; and
1.3 resource utilization?

Table 1. Summary Table of Study Habits

Dimension	Mean	SD	Qualitative Description
Time Management	2.74	1.15	Moderate
Technique Preference	3.04	1.17	Moderate
Resource Utilization	2.93	1.19	Moderate
Overall	**2.90**	**1.17**	**Moderate**

Note: 4.21-5.0 Very Good 3.41-4.20 Good; 2.61-3.40 Moderate; 1.81-2.60 Poor; 1.0-1.80 Very Poor

Table 1 presents the summary of the respondents' assessment of their study habits across the dimensions of time management, technique preference, and resource utilization. The overall Mean of 2.90 with SD=1.17, qualitatively described as Moderate. The findings indicate that the Grade 10 learners demonstrate a moderate level of study habits in Mathematics. This suggests that while the respondents exhibit generally acceptable study behaviors, these habits may not yet be consistently practiced to achieve optimal academic outcomes. The high standard deviation further indicates differences in the study habits of the learners, suggesting that while some students demonstrate effective study practices, others may still need support in developing more consistent learning routines.

This finding aligns with the study of Umar and Salami (2024), which emphasized that study habits are strong predictors of academic achievement across different educational levels. The study explained that students who engage in structured learning behaviors such as effective time management, appropriate study techniques, and proper use of learning resources tend to develop stronger cognitive skills and improved academic performance. It further noted that the combination of these study habits enhances students' ability to manage academic tasks and solve problems efficiently. When learners consistently apply these habits, they become more disciplined and focused in their academic work. Therefore, strengthening study habits collectively can significantly improve students' learning outcomes in Mathematics.

Among the dimensions, Technique Preference obtained the highest Mean of 3.04 with SD=1.17; followed by Resource Utilization with a Mean of 2.93 with SD=1.19, both qualitatively described as Moderate. This suggests that learners tend to demonstrate relatively better study habits in terms of the strategies they use when learning and the resources they access to support their understanding. This may imply that students are somewhat aware of appropriate learning strategies but may still need guidance in applying these techniques more consistently and effectively.

This finding aligns with the study of Habibi et al. (2024), which emphasized that the use of effective study techniques significantly improves students' understanding and retention of mathematical concepts. The study explained that strategies such as active problem-solving, self-testing, and explaining solutions help learners engage more deeply with the learning material. It further noted that students who apply varied and appropriate techniques develop stronger cognitive skills and improved academic performance. These strategies encourage learners to become active participants in their own learning rather than relying on passive methods. Therefore, strengthening students' use of effective study techniques plays a crucial role in enhancing their academic performance in Mathematics.

On the other hand, Time Management obtained the lowest Mean of 2.74 with SD=1.15, although still described as Moderate. This suggests that among the three dimensions, managing study time may be the area where students experience the most difficulty. This may indicate that learners may need more support in developing structured study schedules, advance preparation habits, and organized study routines, which are essential components of effective study habits. These findings highlight the need to strengthen students' time management skills to support more consistent study behaviors. Teachers may provide structured study plans, scheduling techniques, and guided routines to help learners manage their study time more effectively.

This finding aligns with the study of Bedi and Sass (2025), which emphasized that students often experience difficulties in managing their study time due to lack of planning, prioritization, and structured routines. The study explained that learners who do not develop organized schedules tend to struggle in balancing academic tasks and maintaining consistent study habits. It further noted that ineffective time management can lead to poor preparation and reduced academic performance. Students who are guided in planning and organizing their study time demonstrate better learning outcomes. Therefore, developing structured time management skills is essential in improving students' study habits and academic success.

Problem 2. What is the level of problem-solving competence in Mathematics in terms of:

2.1 problem analysis;
2.2 solution creativity; and
2.3 decision accuracy?

Table 2. Summary Table of Problem-Solving Competence in Mathematics

Dimension	Mean	SD	Description
Problem Analysis	3.18	1.12	Moderate
Solution Creativity	3.00	1.11	Moderate
Decision Accuracy	3.34	1.16	Moderate
Overall	**3.17**	**1.14**	**Moderate**

Note: 4.21-5.0 Very Good 3.41-4.20 Good; 2.61-3.40 Moderate; 1.81-2.60 Poor; 1.0-1.80 Very Poor

Table 2 presents the summary of the respondents' assessment of their problem-solving competence in Mathematics across the dimensions of problem analysis, solution creativity, and decision accuracy. The overall Mean is 3.17 with SD=1.14, qualitatively described as Moderate. The findings indicate that the Grade 10 learners demonstrate a moderate level of problem-solving competence in Mathematics. This suggests that while the respondents possess acceptable skills in understanding, solving, and verifying mathematical problems, these competencies may not yet be consistently demonstrated at a level that ensures strong mathematical proficiency. The high standard deviation further indicates differences in the problem-solving abilities of the learners, suggesting that while some students demonstrate stronger competencies, others may still require further development of these essential skills.

This finding aligns with the study of Reyes et al. (2025), which emphasized that problem-solving competence in Mathematics is developed through the integration of structured learning strategies, analytical thinking, and consistent practice of mathematical tasks. The study explained that students who engage in guided problem-solving approaches demonstrate better performance in analyzing problems, generating solutions, and verifying answers. It further noted that exposure to structured instructional methods enhances learners' ability to handle complex mathematical problems systematically. However, when these competencies are not consistently practiced, students may experience difficulty in applying appropriate strategies and producing accurate solutions. Therefore, strengthening all dimensions of problem-solving competence is essential in enhancing students' overall mathematical performance.

Among the dimensions, Decision Accuracy obtained the highest Mean of 3.34 with SD= 1.16, followed by Problem Analysis having a Mean of 3.18 with SD=1.12, both described as Moderate. This suggests that learners tend to perform relatively better in

verifying their answers and understanding the requirements of mathematical problems. This may imply that students are able to demonstrate basic analytical and verification skills, which are necessary components of effective mathematical problem-solving. These findings indicate that strengthening students' verification habits and analytical thinking can further improve their problem-solving competence. Teachers may reinforce reflective practices, step-by-step checking procedures, and activities that require justification of answers to enhance students' accuracy in solving mathematical problems.

This finding aligns with the study of Nguyen et al. (2022), which emphasized that decision accuracy is influenced by students' ability to remain focused, evaluate their solutions carefully, and avoid impulsive judgments. The study explained that students who maintain control and apply careful reasoning demonstrate more accurate problem-solving performance. It further noted that consistent evaluation of answers improves reliability and reduces errors. These findings imply that strengthening students' focus and reflective thinking enhances their decision-making accuracy. Therefore, promoting careful evaluation and verification strategies is essential in improving students' mathematical competence.

On the other hand, Solution Creativity obtained the lowest Mean of 3.00 with SD=1.11, although still described as Moderate. This suggests that among the three dimensions, generating flexible and varied solution strategies may be the area where students need the most improvement. This may indicate that learners may benefit from more opportunities to explore multiple solution pathways and develop flexibility in their mathematical thinking. These findings highlight the need to strengthen students' creative thinking and their ability to generate alternative solutions in Mathematics. Teachers may provide open-ended problems, exploratory activities, and tasks that encourage students to apply different strategies and think beyond routine procedures.

This finding aligns with the study of Gonzales and Ramos (2025), which emphasized that the use of digital tools and interactive learning environments enhances students' creativity in problem-solving. The study explained that when students are given opportunities to explore different approaches through simulations and varied tasks, they develop more flexible and innovative thinking skills. It further noted that exposure to diverse problem-solving experiences encourages students to experiment with multiple solution strategies. These findings imply that promoting exploratory and technology-supported learning strengthens students' creative problem-solving abilities. Therefore, enhancing solution creativity is essential in improving students' overall problem-solving competence in Mathematics.

Problem 3. Is there a significant relationship between study habits and problem-solving competence in Mathematics?

Table 3. Test for Correlation Between Study Habits and Problem-Solving Competence in Mathematics

Study Habits	Correlation Coefficient	p-value	Decision	Interpretation
Time Management	0.302	0.002	---	Significant
Technique Preference	0.468	<0.001	---	Significant
Resource Utilization	0.439	<0.001	---	Significant
Overall	**0.439***	**<0.001**	**Reject H_{01}**	**Significant**

Note: *Significant at 0.05 level of significance

**0.71-0.99 (Very Strong) 0.51-0.70 (Strong) 0.31-0.50 (Weak) 0.01-0.30 (Very Weak)

Table 3 presents the results of the test of significant relationships between study habits and problem-solving competence in Mathematics. It has an overall coefficient of 0.439, considered as weak correlation according to Cano et al. (2026). The overall p-value is below 0.001 which is less than the 0.05 level of significance. This led to the rejection of the null hypothesis (H01). This implies that there is a weak but significant positive relationship between the study habits and problem-solving competence in Mathematics. This implies that better study habits are associated with better problem-solving competence among the Grade 10 learners. Although the relationship is weak, the significant result suggests that improvements in students' study habits may still contribute to enhancements in their mathematical problem-solving abilities.

This finding aligns with the study of Ezeugwu and Okolo (2023), which revealed that study habits have a significant relationship with students' Mathematics performance. The study explained that students who practice consistent study routines such as time planning, note-taking, and regular review tend to perform better in mathematical tasks. It further noted that these habits enhance students' ability to understand concepts and apply appropriate strategies in solving problems. However, the strength of the relationship may vary depending on the consistency and effectiveness of these study behaviors. Therefore, improving students' study habits can contribute to enhancing their problem-solving competence in Mathematics.

Study Habits and Problem-Solving Competence in Mathematics

Among the dimensions of study habits, Technique Preference showed the highest correlation (r = 0.468), followed by Resource Utilization (r = 0.439), both showing significant relationships with problem-solving competence. This suggests that the study techniques students use and the resources they utilize may play an important role in supporting their ability to solve mathematical problems. This may imply that learners who apply effective study strategies and maximize available learning resources tend to demonstrate better analytical and problem-solving skills. These findings indicate that strengthening students' use of effective study techniques and learning resources can further enhance their problem-solving competence. Teachers may incorporate self-testing strategies, guided problem practice, and the use of varied learning materials to help students become more strategic and effective learners.

This finding aligns with the study of Cabigas and Cabalquinto (2025), which emphasized that students' study habits, particularly their use of effective learning strategies and engagement with academic tasks, significantly influence their Mathematics performance and problem-solving competence. The study explained that learners who actively use structured study techniques and learning resources develop deeper understanding and better analytical skills. It further noted that student engagement in organized and purposeful learning activities enhances their ability to apply knowledge in solving mathematical problems. These findings imply that active and strategic study behaviors strengthen students' ability to solve mathematical problems. Therefore, promoting effective study techniques and resource utilization is essential in enhancing problem-solving competence in Mathematics.

On the other hand, Time Management showed the lowest correlation (r = 0.302), although still significant. This suggests that while managing study time is important, it may have a comparatively smaller association with problem-solving competence than the actual strategies and resources used by learners. This may indicate that how the students study may be more important than how much time they allocate for studying when developing problem-solving skills. These findings highlight the need to strengthen not only students' time management but also the quality of their study practices. Teachers may guide learners in developing structured study schedules while integrating effective learning strategies to improve both time use and problem-solving competence.

This finding aligns with the study of Wilson (2021), which emphasized that time management improves students' organization and academic performance when supported by proper study strategies. The study explained that structured scheduling alone is not sufficient unless combined with effective learning behaviors. It further noted that students who receive guidance in planning and prioritizing tasks demonstrate better academic outcomes. These findings imply that time management must be integrated with effective study techniques to produce meaningful learning results. Therefore, combining structured time planning with appropriate study strategies is essential in improving students' mathematical problem-solving competence.

Problem 4. Do study habits significantly predict problem-solving competence in Mathematics?

Table 4. Simple Linear Regression Between Study Habits and Problem-Solving Competence in Mathematics

Predictor	Unstandardized Coefficients (B)	Standardized Coefficients (β)	t-value	p-value	Decision	Interpretation
(Constant)	0.909	-----	3.133	0.002	----	-----
Study Habits	0.780	0.626	7.948	<0.001	Reject H_{02}	Significant
Model Summary:						
$\boldsymbol{R^2 = 0.392}$; *F-value* $= \mathbf{63.172}$; *p-value* $< \mathbf{0.001}$; *Interpretation* = Significant						

Table 4 presents the simple linear regression analysis if the independent variable significantly predicts the problem-solving competence in Mathematics. The model summary results show that study habits significantly predict problem-solving competence in Mathematics. The coefficient of determination (R^2) is 0.392, which indicates that 39.2% of the variance in students' problem-solving competence can be explained by their study habits. This level of explanatory power can be considered strong (Hinayas et al., 2026), suggesting that study habits play an important role in understanding differences in the problem-solving competence in Mathematics. Furthermore, the F-value of 63.172 with a corresponding p-value of less than 0.001 indicates that the regression model is statistically significant. This means that study habits, as a predictor, significantly explain variations in problem-solving competence.

This finding aligns with the study of Surya and Syahputra (2023), which emphasized that students' mathematical performance is strongly influenced by their ability to apply structured learning behaviors and problem-solving strategies. The study explained that learners who develop consistent study habits are more capable of analyzing problems, applying appropriate

methods, and arriving at accurate solutions. It further noted that these habits support the development of higher-order thinking skills necessary for solving complex mathematical tasks. Moreover, the study highlighted that academic behaviors such as regular practice, organized learning, and strategic thinking contribute significantly to variations in students' problem-solving competence. Therefore, study habits can serve as a significant predictor of students' problem-solving competence in Mathematics.

The regression results further show that study habits significantly predict problem-solving competence in Mathematics (B = 0.780, β = 0.626, t = 7.948, p < 0.001), leading to the rejection of the null hypothesis (H02). The positive unstandardized coefficient (B = 0.780) indicates that for every one-unit increase in study habits, problem-solving competence increases by 0.780 units. Moreover, the standardized coefficient (β = 0.626) indicates a strong positive relationship between study habits and problem-solving competence, suggesting that study habits make a substantial contribution to explaining students' mathematical competence. This suggests that students who demonstrate better study habits also tend to exhibit higher levels of mathematical problem-solving competence.

This finding aligns with the study of Nwanekezi and Ugorji (2024), which emphasized that consistent study practices such as regular review, effective use of learning materials, and disciplined study routines significantly improve students' performance in Mathematics. The study explained that students who develop strong study habits gain better understanding of concepts and demonstrate higher confidence in solving mathematical problems. It further noted that these habits enhance students' ability to apply knowledge, leading to improved problem-solving competence. Moreover, the findings highlighted that well-established study behaviors contribute to both cognitive development and academic achievement. Therefore, the strong predictive effect of study habits on problem-solving competence supports the idea that improving students' study habits can lead to better mathematical performance.

Table 5 presents the multiple regression analysis if the dimensions of the independent variable significantly predict the problem-solving competence in Mathematics. The model summary results show that the adjusted coefficient of determination (Adjusted R^2) is 0.393, which indicates that 39.3% of the variance in students' problem-solving competence can be explained by the combined influence of time management, technique preference, and resource utilization. This level of explanatory power can be considered strong (Hinayas et al., 2026), suggesting that the dimensions of study habits together play an important role in explaining differences in the problem-solving competence of the Grade 10 learners. Furthermore, the computed F-value of 22.333 with a corresponding p-value of less than 0.001 indicates that the regression model is statistically significant. This means that when considered collectively, the dimensions of study habits significantly explain variations in students' problem-solving competence in Mathematics.

Table 5. Multiple Linear Regression Between Study Habits and Problem-Solving Competence in Mathematics

Predictors	Unstandardized Coefficients (B)	Standardized Coefficients (β)	t-value	p-value	Interpretation
(Constant)	0.828	-----	2.807	0.006	-----
Time Management	0.202	0.212	2.205	0.030	Significant
Technique Preference	0.476	0.414	3.693	<0.001	Significant
Resource Utilization	0.118	0.113	1.098	0.275	Not Significant
Model Summary:					
Adjusted $\boldsymbol{R^2 = 0.393}$*; F-value* $= \mathbf{22.333}$*; p-value* $< \mathbf{0.001}$*; Interpretation* = Significant					

This finding aligns with the study of Zainuddin et al. (2025), which emphasized that multiple learning behaviors collectively contribute to students' academic performance and cognitive development. The study explained that when students effectively combine time management, appropriate study techniques, and strategic use of learning resources, they develop stronger adaptability and problem-solving skills. It further noted that the interaction of these learning habits enhances students' ability to process information, apply knowledge, and respond to complex academic tasks. Moreover, the findings highlighted that no single study habit operates in isolation, but rather, their combined effect produces more meaningful learning outcomes. Therefore, the significant predictive power of the combined study habit dimensions supports the idea that integrating multiple effective learning behaviors is essential in improving students' problem-solving competence in Mathematics.

The multiple regression results further show that not all dimensions of study habits significantly predict problem-solving competence in Mathematics. Among the predictors, technique preference (B = 0.476, β = 0.414, t = 3.693, p < 0.001) and time management (B = 0.202, β = 0.212, t = 2.205, p = 0.030) were found to be significant predictors of problem-solving competence.

The positive coefficients indicate that improvements in these study habit dimensions are associated with corresponding increases in students' mathematical problem-solving competence. Since their p-values are lower than the 0.05 level of significance, these predictors significantly contribute to the model.

This finding aligns with the study of Cabigas and Cabalquinto (2025), which emphasized that structured study habits, including effective time management and appropriate learning strategies, significantly influence students' academic performance and problem-solving ability in Mathematics. The study explained that learners who manage their study time efficiently and apply effective study techniques develop stronger cognitive and analytical skills. It further noted that these learning behaviors help students organize information, maintain focus, and apply appropriate strategies when solving mathematical problems. Moreover, disciplined study habits support consistency in learning, leading to improved academic outcomes. Therefore, the significance of technique preference and time management as predictors suggests that these study habit dimensions play a crucial role in improving students' mathematical problem-solving competence.

Comparing the standardized coefficients, technique preference (β = 0.414) shows the strongest contribution among the predictors, suggesting that the study strategies students use have the greatest contribution to their problem-solving competence. This implies that learners who apply effective study techniques such as practicing problems, asking questions, and connecting concepts tend to demonstrate better mathematical problem-solving skills. Meanwhile, time management (β = 0.212) also significantly contributes, although to a lesser extent, suggesting that students who demonstrate better control of their study time also tend to perform better in mathematical problem-solving. These findings imply that strengthening students' problem-solving competence may require greater emphasis on developing effective study techniques and improving time management practices rather than focusing solely on increasing access to learning resources. Mathematics teachers may therefore prioritize instructional strategies that develop students' problem-solving approaches, study routines, and strategic learning behaviors.

This finding aligns with the study of Jacobson et al. (2022), which emphasized that effective study techniques significantly enhance students' understanding and problem-solving performance. The study explained that students who engage in active strategies such as practice, questioning, and connecting concepts develop stronger analytical and cognitive skills. It further noted that these strategies help learners process information more deeply and apply knowledge effectively in solving mathematical problems. Moreover, structured time management supports the consistent application of these techniques, leading to improved academic outcomes. Therefore, the strong contribution of technique preference and time management supports the importance of strategic and disciplined learning behaviors in enhancing mathematical problem-solving competence.

On the other hand, resource utilization (B = 0.118, β = 0.113, t = 1.098, p = 0.275) was found to be not significant. This indicates that the use of learning resources alone may not necessarily translate into better problem-solving competence unless accompanied by effective study strategies and time management practices. This may suggest that simply having access to learning materials is not sufficient unless students also know how to effectively use these resources as part of their study process. From a practical perspective, the results suggest that schools may improve students' mathematical competence by implementing programs that develop effective study strategies and time management skills. Providing structured learning activities, strategy-based instruction, and guided practice opportunities may help learners strengthen these competencies.

This finding aligns with the study of Manalo et al. (2024), which emphasized that learning resources become effective only when students are guided on how to use them properly. The study explained that without appropriate strategies, students may rely on materials passively without achieving deeper understanding. It further noted that guided instruction helps learners integrate resources with effective study behaviors and critical thinking processes. Moreover, students who receive support in using resources strategically demonstrate better academic performance and problem-solving skills. Therefore, the non-significance of resource utilization suggests that its effectiveness depends on how well it is combined with appropriate study techniques and structured learning practices.

Based on the regression results in Table 11, the regression equation model is expressed as:

$$Y = 0.828 + 0.202X_1 + 0.476X_2 + \varepsilon$$

where Y is the problem-solving competence in Mathematics, X_1 is the time management, X_2 is the technique preference, and ε is the error term. The constant value of 0.828 represents the estimated level of problem-solving competence when the predictors are held constant. This suggests that even in the absence of the measured study habit dimensions, a baseline level of problem-solving competence may still exist due to other factors not included in the model. The coefficient for time management (0.202) indicates that for every one-unit increase in students' time management, problem-solving competence is expected to increase by 0.202 units, assuming other variables remain constant. This suggests that students who demonstrate better scheduling, preparation, and management of study time tend to show improvements in their mathematical problem-solving competence. Similarly, the coefficient for technique preference (0.476) indicates that for every one-unit increase in the use of effective study

techniques, problem-solving competence is expected to increase by 0.476 units, holding other factors constant. This further suggests that the study strategies students employ, such as practicing problems, asking questions, and connecting concepts, have a stronger contribution to improving their mathematical problem-solving competence compared to time management.

Notably, resource utilization was not included in the final regression equation because it was found to be not statistically significant. This indicates that while learning resources are important supports for learning, their presence alone may not directly contribute to improved problem-solving competence unless accompanied by effective study strategies and proper time management.

Overall, the regression model suggests that improving students' study habits, particularly in terms of using effective study techniques and managing study time, may help strengthen their mathematical problem-solving competence. This highlights the importance of not only providing learning resources but also ensuring that students develop strategic and disciplined study behaviors to maximize their academic performance.

This finding aligns with the study of Surya and Syahputra (2023), which emphasized that mathematical problem-solving competence is influenced by students' ability to integrate effective strategies and structured learning behaviors. The study explained that students who apply appropriate problem-solving techniques and regulate their learning processes demonstrate higher levels of accuracy and understanding. It further noted that these skills contribute significantly to students' ability to approach problems systematically and produce correct solutions. Moreover, the study highlighted that while external supports such as learning resources are beneficial, their effectiveness depends on how they are utilized within strategic learning practices. Therefore, the regression model supports the idea that technique preference and time management are key predictors of problem-solving competence, while resource utilization alone may not significantly contribute without proper strategy use.

IV. CONCLUSIONS

Based on the findings of the study, the following conclusions are drawn:

1. There is an evidence of learning behaviors but students do not consistently practice.
2. Students' ability to analyze, solve, and verify mathematical problems required further improvement.
3. Study habits are significantly related to problem-solving competence.
4. Technique preference and time management play important roles in improving students' mathematical problem-solving competence.

V. RECOMMENDATIONS

In view of the conclusions, the following recommendations are proposed:

1. Teachers may strengthen students' study habits by emphasizing effective study techniques such as problem practice, self-testing, and concept integration during Mathematics instruction.
2. Teachers may provide assistance to students to improve their ability to solve, analyze, and verify mathematical problems.
3. Teachers may encourage students to develop good study habits in Mathematics.
4. Teachers may guide students in using learning resources effectively integrating them with appropriate study strategies and structured learning activities.

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