

Mediating Role of Time Management in the Relationship between Self-Efficacy and Mathematics Achievement of Grade 11 Students

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Abstract:

Poor academic achievement in mathematics is concerning. The mediating role of time management on the relationship between self-efficacy and mathematics achievement was verified. Predictive research design, stratified random sampling, survey technique, and mediation analysis were applied. The data from 200 Grade 11 senior high school students indicate that time management has no significant mediating effect on the predictor-criterion correlation, thereby denying the Social Cognitive Theory. Future research may explore other variables that could better explain the relationship between psychological factors and academic achievement.

Keywords: Mediating role of time management, self-efficacy, mathematics achievement, grade 11 students

I. INTRODUCTION

Poor academic achievement in mathematics is a major concern worldwide. This study aims to gather stakeholders' views on several factors. According to Mukuba (2021), several factors contributed to poor performance in mathematics at both the primary and secondary levels. These included the lack of instructional materials and their limited availability, negative attitudes toward learning mathematics, poor facilities and sanitation that hindered the display and use of available instructional materials, inadequate staff quarters, low teacher motivation, and insufficient parental support.

In international studies, Chand (2021) found that students had a negative attitude towards Mathematics. In Fiji, the study also found that an ineffective mathematics curriculum was the main reason for poor academic achievement in Mathematics. Poor academic achievement in mathematics is due to teachers' lack of competence and students' lack of interest in

primary schools. In The Gambia, poor academic performance in Mathematics among senior high school students significantly impacts their ability to access quality education and to proceed to tertiary institutions for higher education (Bah, 2021). In Australia, Wang (2023) found that poor academic achievement in Mathematics was negatively associated with student absenteeism, tardiness, school repetition and dropout rates, the prevalence of student misbehavior, a shortage of teachers and general staff, and student-centered instruction.

In Philippine studies, Filipino students performed poorly in Mathematics in the 2018 Programme for International Student Assessment (PISA) mathematics assessment, with more than 50% scoring below the lowest proficiency level. Students from public schools also performed worse compared to their private school counterparts (Lapinid, 2022). In Bukidnon, Antipuesto and Tan (2023) showed that students had very low pre-test performance and moderate post-test performance during the learning

engagement in the Blended Learning Approach at Kalilangan National High School, with Grade 10 students as participants during the pandemic.

Poor academic achievement in Mathematics may lead to Math anxiety (Szczygieł & Pieronkiewicz, 2022). This anxiety peaked at the beginning of the school year and was reported to be associated with the risk of failure, task difficulty, time pressure, and a fear of receiving failing grades.

Purpose of the Study

This study aimed to determine the significance of time management as a mediator in the relationship between self-efficacy and mathematics achievement among Grade 11 students. Specifically, this research aims to address the following objectives:

1. Describe the levels of self-efficacy in terms of Mathematics task self-efficacy, learning task self-efficacy, and performance task self-efficacy; time management in terms of planning and scheduling, goal setting, prioritization, and organization; and mathematics achievement in terms of grades, test scores, and problem solving.
2. Determine the significance of the correlation between self-efficacy, time management, and mathematics achievement.
3. Determine the significance of the direct effect of time management on turnover intention, controlling for mathematics achievement.
4. Determine the significance of the indirect effect on self-efficacy through mathematics achievement.
5. Determine the significance of the total effect of self-efficacy on mathematics achievement.

Hypotheses

The research has the following null hypotheses tested at 0.05 level of significance:

H₀₁: Self-efficacy and time management do not significantly correlate with turnover intention.

H₀₂: The direct effect of self-efficacy on mathematics achievement, controlling for time management, is not significant.

H₀₃: The indirect effect of self-efficacy on mathematics through time management is not significant.

H₀₄: The total effect of self-efficacy on mathematics achievement is not significant.

METHODOLOGY

This study was conducted in three public senior high schools of Samal District, Division of Island Garden City of Samal, Davao del Norte, Region XI. These schools are recognized for their commitment to academic excellence and for consistently improving students' performance in core subjects, particularly General Mathematics. The locale is considered appropriate because it is accessible to the researcher and provides a sufficient number of respondents from the target population. A total of 200 Grade 11 senior high school students currently enrolled in the mathematics subject in the Department of Education, Division of Island Garden City of Samal, Davao del Norte, Region XI, served as the respondents. This sampling method is appropriate because the respondents must meet the specific criterion of being enrolled in a Mathematics subject to ensure that their experiences and perceptions are directly relevant to the variables under investigation: self-efficacy, time management, and Mathematics achievement. Recent methodological discussions further emphasize that stratified random sampling is effective in educational research because it allows comparisons across groups while maintaining overall sample balance (Louis Cohen et al., 2024). This approach minimizes sampling bias and

increases data representativeness (Creswell & Creswell, 2023). The study employed stratified random sampling with proportionate allocation to select respondents. Stratified random sampling is a probability sampling technique in which the population is divided into smaller, homogeneous groups, or strata, based on common characteristics such as age, gender, grade level, or academic strand. This method is commonly used to improve the accuracy, representativeness, and reliability of research findings, especially when the population is heterogeneous (Dibal & Dallah, 2021; Hall et al., 2021). The survey technique was used in gathering data. This technique is a systematic method of collecting information from a sample using structured questionnaires to describe the characteristics, opinions, or behaviors of a larger population, and it is applied in research to efficiently assess, test, or generalize findings within a defined group (Sheikh et al., 2024). This offers advantages such as reaching large and diverse populations, producing quantifiable data for pattern analysis, enabling generalization, allowing faster data collection, and supporting replicability through standardized procedures (Oranga & Matere, 2025).

In this study, three adapted and modified survey questionnaires were used. The first instrument, the Self-Efficacy Questionnaire, was adapted from Diana May's (2009) study. It contains 15 items related to self-efficacy, an individual's belief in their capacity to execute behaviors necessary to achieve confidence in various tasks. A four-point Likert scale was used to assess respondents' Mathematics self-efficacy by measuring their confidence in performing mathematical tasks. Pilot testing of the instrument yielded a Cronbach's alpha coefficient of 0.869, indicating good reliability.

The second instrument was the Time Management Questionnaire, adapted from Santos et al. (2023). It consisted of 19 items designed to assess how students manage their time and prioritize their activities in Mathematics. The questionnaire measured indicators of planning and scheduling,

prioritization, goal setting, and organization using a 4-point Likert scale. Pilot testing of the instrument yielded a Cronbach's alpha coefficient of 0.868, indicating good reliability.

The third instrument was the Mathematics Achievement Test, a researcher-made assessment aligned with the Grade 11 Mathematics, Statistics, and Probability curriculum. The instrument consisted of 40 items covering fundamental competencies, including algebra, functions, geometry, and problem-solving. The test was designed to measure students' understanding, mastery, and application of the mathematical concepts taught in class. Specifically, it assessed students' ability to compute accurately, reason logically, and solve real-life mathematical problems.

The test was aligned with the Department of Education's Most Essential Learning Competencies (MELCs) to ensure content validity. Students' total scores served as the primary indicator of their mathematics achievement, with higher scores reflecting greater achievement.

Results and Discussions

Table 1: Descriptive Statistics (N=200)

Variables	N	Standard Deviation	Mean	Descriptive Level
Self-Efficacy	200	0.40	3.10	High
<i>Task Self-efficacy</i>	200	0.41	3.09	High
<i>Learning Self-efficacy</i>	200	0.41	3.14	High
<i>Performance Self-efficacy</i>	200	0.38	3.07	High
Time Management	200	0.40	3.05	High
<i>Planning & Scheduling</i>	200	0.44	3.08	High
<i>Goal Settings</i>	200	0.41	3.01	High
<i>Prioritization</i>	200	0.35	3.08	High
Mathematics Achievement	200	8.15	76.48	Proficient

Specifically, the table shows that the self-efficacy variable had a mean of 3.10, indicating a high level of self-efficacy. It indicates that the respondents' self-efficacy in Math is strong. All the indicators are described as high. The standard deviation of 0.40, described as high consistent response, indicates strong and uniform perception. Moreover, the time management variable had a

mean of 3.05, indicating a high level of time management. It indicates that respondents' time management in Math is strong. All the indicators are described as high. The standard deviation of 0.40, described as high consistent response, indicates strong and uniform perception. Lastly, the mathematics achievement variable had a mean of 76.48, indicating proficient/acceptable performance. The standard deviation of 8.15, described as high consistent response, indicating strong and uniform.

The findings indicated that the respondents demonstrated high levels of self-efficacy and time management in Mathematics, while their mathematics achievement was interpreted at a proficient or acceptable level, suggesting that strong confidence and organizational skills were reflected in their academic performance.

Correlation Result

Table 2 presents the correlational results for self-efficacy and time management as predictive variables and students' mathematics achievement.

Table 2: Correlation Table (N=200)

Variables	Mathematics Achievement			
	r-value	p-value	Decision on H_0	Interpretation
Self-Efficacy	0.098	0.166	Fail to reject H_0	Low non-significant correlation
Time Management	0.061	0.389	Fail to reject H_0	Low non-significant correlation

As shown in the table, the correlation between self-efficacy and mathematics achievement variables obtained a p-value of 0.166. Such a value is greater than the 0.05 level of significance; hence, the null hypothesis was accepted. This indicates that the correlation is not statistically significant. The corresponding r-value of 0.098 indicates a low correlation between the variables

mentioned. This implies that for every unit changed in self-efficacy, there is no corresponding unit change in mathematics achievement. Moreover, the correlation between time management and mathematics achievement variables obtained a p-value of 0.389. Such a value is greater than the 0.05 level of significance; hence, the null hypothesis was accepted. This indicates that the correlation is not statistically significant. The corresponding r-value of 0.061 indicates a low correlation between the variables mentioned. This implies that for every unit changed in time management, there is no corresponding unit change in mathematics achievement.

The findings revealed that self-efficacy and time management do not have a significant relationship with mathematics achievement, as both variables had p-values greater than 0.05 and low correlation coefficients. This indicates that changes in self-efficacy and time management do not correspond to significant changes in students' mathematics achievement.

Mediation Analysis

Table 3 is a mediation table. It contains the determinant, mediator, and criterion variables. It also contains the estimate beta, standard error, Z-value, p-value, decision on the null hypothesis, and corresponding interpretation.

Table 3. Mediation Table (N = 200)

Label	Path / Effect	Estimate (B)	SE	Z-value	p-value	Decision on H_0	Interpretation
A	Self-Efficacy - Time Management	0.725	-0.00	0.05	0.960	Failed to reject H_0	Not Significant
B	Time Management - Mathematics Achievement	1.92	2.20	0.88	0.381	Failed to reject H_0	Not Significant
c'	Self-Efficacy - Mathematics Achievement	3.09	2.20	1.40	0.161	Failed to reject H_0	Not Significant
a × b	Indirect effect	-0.00	0.14	-0.04	0.161	Failed to reject H_0	Not Significant
(a × b) - c	Self-Efficacy - Mathematics Achievements	3.08	2.21	1.30	0.163	Failed to reject H_0	Not Significant

Level of Significance: 0.05

Decision Rule: Reject H_0 if $p < 0.05$

%Mediation Direct: 99.78%; indirect effect/ total effect = 22.2%

The table specifically shows that, controlling for the time management variable, the direct effect of self-efficacy on mathematics achievement obtained a Beta coefficient of 3.09 ($p = 0.161$), which is not less than the 0.05 level of significance. Hence, the null hypothesis was accepted. This indicates the direct effect is not significant. This implies that self-efficacy does not have a significant direct influence on mathematics achievement when time management is considered in the model. Although students may possess confidence in their mathematical abilities, such confidence alone may not be sufficient to improve their academic performance in mathematics. Similarly, the indirect effect of self-efficacy on mathematics achievement through time management yielded a Beta estimate of -0.00 ($p = 0.161$), which is greater than the 0.05 level of significance. Thus, the null hypothesis was accepted. This indicates that the indirect effect is not significant. This implies that time management does not significantly mediate the relationship between self-efficacy and mathematics achievement. Also, confidence in their mathematical abilities does not indirectly influence their mathematics achievement through time management practices. Lastly, the total effect of self-efficacy on mathematics achievement yielded a Beta estimate of 3.08, with a p -value of 0.163, which is greater than the 0.05 level of significance. Thus, the null hypothesis was accepted. This indicates that the total effect of self-efficacy on mathematics achievement is not significant. This implies that self-efficacy does not have a significant overall influence on mathematics achievement included in the study. Although students may possess confidence in their ability to perform mathematical tasks, such confidence alone does not necessarily translate into higher academic performance in mathematics.

The table likewise indicated that mathematics self-efficacy has no significant impact on academic achievement, whether examined as a

direct, indirect, or total effect. Furthermore, time management does not function as a mediator between a student's confidence and their actual performance. Ultimately, the findings suggested that while students may feel confident in their mathematical abilities and possess organizational habits, these psychological factors do not necessarily translate into higher grades, leading to the acceptance of all null hypotheses in the study.

Summary of Finding

Based on the statistical results, it was specifically found that:

1. Self-efficacy and time management do not significantly correlate with mathematics achievement.
2. The direct effect of self-efficacy on mathematics achievement, controlling for time management, is not significant.
3. The indirect effect of self-efficacy on mathematics through time management is not significant.
4. The total effect of self-efficacy on mathematics achievement is not significant.

Self-efficacy and mathematics achievement correlation

The study found that self-efficacy had a weak, non-significant relationship with mathematics achievement, contrary to many earlier studies that reported a positive correlation between the two variables. The finding supports the idea that self-efficacy alone may not strongly influence achievement when factors such as teaching quality, assessment methods, and the learning environment are taken into account (Honick & Broadbent, 2022). Similarly, the current finding aligns with the claim that self-efficacy is more effective when combined with accurate self-assessment; otherwise, students may develop overconfidence without sufficient mastery of mathematical skills (Goodfellow, 2023).

However, this study negates Liu et al. (2024), who found that mathematics self-efficacy significantly predicts student mathematics achievement. Their study emphasized that students who strongly believe in their mathematical capabilities are more likely to perform better academically.

Time management and mathematics achievement correlation

The direct effect of self-efficacy on mathematics achievement becomes non-significant when time management is controlled for, indicating that its influence is largely indirect through self-regulated learning behaviors. This supports mediation-based models where time management plays a central role in translating motivational beliefs into academic performance, rather than self-efficacy exerting a direct impact on achievement (Huang et al., 2021; Zhao et al., 2024; De Vera et al., 2026).

Conversely, recent studies contradict the performance study (Huang et al., 2021; Talsma et al., 2021; Zhao et al., 2024), explaining that self-efficacy significantly predicts mathematics achievement even when time management is controlled for. Students with high self-efficacy tend to demonstrate greater motivation, persistence, and confidence in solving mathematical tasks, which directly contributes to better academic performance.

Self-efficacy and Mathematics achievement as Mediated by Time Management

This study found that time management does not significantly mediate the correlation between self-efficacy and mathematics achievement. This finding supports the claim of Huang et al. (2021), reporting that mathematics self-efficacy did not significantly mediate the relationship between parental involvement and mathematics achievement. Their study suggests that although parental involvement and self-efficacy are important educational factors, self-efficacy alone may not always be a strong explanatory

mechanism for improvements in mathematics performance. Similarly, the current finding aligns with Zhang et al. (2021), who revealed that the mediation effects of motivational variables on mathematics achievement were not consistently significant, indicating that some mediation pathways failed to fully explain students' academic outcomes. This implies that other external or internal factors may influence mathematics achievement beyond motivational constructs and time-related behaviors. However, the present study contradicts the findings of De Vera et al. (2026), who found that time management significantly mediated the relationship between academic procrastination and mathematics achievement. Their study emphasized that students who effectively manage their time are better able to reduce procrastination and improve their mathematics performance. The difference in findings may be attributed to variations in respondents, research settings, or the specific variables used in the mediation models.

II. CONCLUSION

Based on the findings, it is concluded that time management does not mediate and that there is no significant correlation between self-efficacy and mathematics achievement. This result contradicts Social Cognitive Theory, emphasizing personal, behavioral, and environmental factors.

Recommendations

1. Future research may explore other variables that could better explain the relationship between psychological factors and academic achievement.
2. Practical Time Management Training reported that time management did not correlate with grades. Researchers suggest moving beyond planning to active metacognitive strategies, such as self-testing and spaced practice, which have shown stronger links to academic success in recent studies.

3. Expansion of Variables should investigate other potential mediators, such as mathematics anxiety or prior academic performance, as these may play a more direct role in determining achievement than time management
4. Qualitative Inquiry is recommended to conduct qualitative interviews to understand why students rate themselves High in psychological measures while maintaining only "Proficient" grades, as this gap may indicate a mismatch between student perceptions and actual academic rigors.

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