



Interplaying Factors in Mathematics Academic Performance: Attitude, Self-Confidence and Learning Strategies

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Abstract:

This study examined the interrelated factors influencing students' academic performance in mathematics in terms of attitude toward mathematics, self-confidence, and learning strategies. A descriptive-correlational research design was utilized involving forty-two Grade 12 students from a private secondary school in the Division of Misamis Occidental. Data were gathered using a researcher-made questionnaire containing indicators on attitude, self-confidence, and strategies in learning mathematics, while students' academic performance was measured through their first-quarter mathematics grades. Results revealed that students generally demonstrated a positive attitude toward mathematics, were reasonably confident in learning the subject, and commonly employed learning strategies in mathematics. Findings further showed that attitude and self-confidence had significant relationships with students' mathematics performance, suggesting that these factors contribute to enhanced academic achievement in mathematics. The study concludes that promoting positive attitudes and reinforcing students' confidence are essential in improving mathematics learning and academic performance among senior high school students.

Keywords: Mathematics performance, Attitude toward mathematics, Self-confidence, Learning strategies, Academic achievement, Senior high school students

Introduction:

Mathematics remains one of the most essential yet challenging subjects in basic education, particularly in the Philippines, where national assessments and the Programme for International Student Assessment (PISA) reveal low levels of mathematical achievement and literacy among students (OECD, 2019). These concerns highlight the need to examine not only instructional practices but also learner-related factors that influence performance. Research suggests that students' attitudes toward mathematics, self-confidence, and learning strategies significantly affect achievement. Positive attitudes encourage engagement and persistence, while negative perceptions often lead to anxiety and avoidance (Mata et al., 2012; Nguyen, 2024). Similarly, students with high mathematics self-efficacy demonstrate greater motivation and resilience in solving mathematical tasks (Bandura, 1997; Awado et al., 2024). Effective learning strategies, particularly self-regulated learning practices such as planning, monitoring, and evaluating understanding, also contribute to improved mathematics performance (Zimmerman, 2002; OECD, 2020).



These factors are interconnected and collectively shape students' success in mathematics. Bandura's Social Cognitive Theory, Expectancy-Value Theory, and Zimmerman's Self-Regulated Learning Theory provide a theoretical basis for understanding how learners' beliefs, attitudes, and strategic behaviors influence achievement. Local studies further confirm that Filipino students with positive attitudes, strong self-confidence, and effective learning strategies tend to perform better academically (Peteros et al., 2019; Villena & Villena, 2021). Despite improvements in instruction, many students in Philippine schools, including those in the Division of Misamis Occidental, continue to struggle with mathematics due to low confidence, unfavorable attitudes, and inconsistent learning strategies. This underscores the importance of understanding these learner-related factors to support improved mathematics achievement.

Literature Review:

Mathematics Performance in Education

Mathematics performance refers to students' ability to understand concepts, solve problems, and apply mathematical skills in academic tasks. In recent studies, students' achievement in mathematics has been linked not only to instructional factors but also to learner-related factors such as attitude, confidence, and learning behavior. Local research shows that Filipino students' mathematics performance is affected by how they perceive the subject and how they approach learning tasks (Villena & Villena, 2021). Recent findings further emphasize that students' beliefs and learning practices play an important role in improving mathematics achievement (Sabanal et al., 2024).

Attitude Toward Mathematics

Attitude toward mathematics influences students' interest, participation, and persistence in learning the subject. Learners with positive attitudes are more likely to view mathematics as meaningful and manageable, which helps them engage more actively in class activities and problem-solving tasks. Recent studies show that students who develop favorable perceptions of mathematics tend to perform better and show greater persistence when faced with challenging mathematical activities (Nguyen, 2024). In the Philippine setting, positive attitudes toward mathematics have also been associated with higher academic performance among students (Villena & Villena, 2021).

Self-Confidence in Learning Mathematics

Self-confidence in mathematics refers to students' belief in their ability to understand lessons, answer problems, and succeed in mathematical tasks. Students with higher confidence are more willing to participate, take risks, and continue working even when problems become difficult. Recent research indicates that mathematics self-efficacy is a strong predictor of achievement because confident learners are more likely to persist despite challenges (Awado et al., 2024). Local studies also show that Filipino learners with stronger mathematics self-confidence tend to participate more actively and achieve better academic outcomes (Sabanal et al., 2024).

Learning Strategies in Mathematics

Learning strategies refer to the techniques students use to understand, remember, and apply mathematical concepts. These include goal-setting, time management, organizing information, practicing problem-solving, monitoring understanding, and seeking help when needed. Recent local studies found that self-regulated learning strategies such as goal-setting, time management, and resource-seeking behaviors positively predict mathematics performance (Lumoto et al., 2024). Similarly, studies on Filipino students show that effective study habits and learning strategies help improve students' academic achievement in mathematics (Villena & Villena, 2021).

Relationship of Attitude, Self-Confidence, and Learning Strategies to Mathematics Performance

Attitude, self-confidence, and learning strategies are interrelated factors that contribute to students' mathematics performance. A positive attitude can strengthen students' confidence, while confidence can encourage them to use



effective learning strategies and persist in solving difficult problems. Recent studies among Filipino learners show that self-efficacy serves as an important link between attitude and mathematics achievement (Sabanal et al., 2024). Other findings also reveal that confidence, attitudes, and self-regulated learning behaviors work together in supporting better performance in mathematics (Hernández de la Hera et al., 2023; Lumoto et al., 2024).

Methodology:

Research Design

This research study employed a descriptive-correlational research design, as it seeks to determine the factors in terms of study habits and strategies associated with the mathematics performance of the students in new normal education. The descriptive aspect focused on describing the students' attitude towards mathematics, their self-confidence, the strategies used in learning mathematics, and the students' level of academic performance in mathematics, while the correlational part examines the relationship between each of the factors associated with mathematics performance and the students' academic performance in mathematics. This design was appropriate because it allowed the researchers to capture the students' prevailing attitudes and strategies used in learning mathematics while also examining variations across different factors.

Sampling Design

The study employed a non-probability sampling design, specifically quota sampling, to identify respondents based on predetermined criteria and availability. This design was appropriate because it allowed the researchers to gather data from a specific group that met the study's requirements without using random selection (McCombes, 2023; Simkus, 2023).

Research Locale

This study took place in the Division of Misamis Occidental, which governs a private secondary school that encompasses six grade levels from Grade 7 to Grade 12. Its student population was around 304 students, where 198 were on the junior high school level and 104 were on the senior high school level.

Research Participants

The participants of this study were forty-two (42) Grade 12 students from a private secondary school in the Division of Misamis Occidental who were enrolled during the School Year 2022–2023. They were selected because they had sufficient exposure to mathematics concepts and learning experiences, making them suitable respondents for assessing academic performance, attitude, self-confidence, and learning strategies in mathematics.

Research Instrument

The study utilized a researcher-made survey questionnaire. The instrument was composed of two (2) major components. The first component was on study habits with thirty-six (35) indicators, of which ten (10) indicators were on attitude, ten (10) for self-confidence, and fifteen (15) indicators for learning strategies in mathematics, which yielded Cronbach Alpha's values of 0.851, 0.966, and 0.941, respectively. These values indicate good reliability for all constructs. Accordingly, the second part was on students' mathematics performance, which was the grades they obtained during the first quarter of the school year 2022-2023. The grades were interpreted based on the grading scale set by the Department of Education as presented in the DepEd Order No. 8 s. 2015.

Data Gathering Procedure

The researchers first secured approval from the principal of the identified private secondary school before conducting the study. After permission was granted, parental consent, student assent, and data privacy forms were obtained from the respondents. Once these requirements were completed, the survey questionnaire was distributed through a Google Form link, while printed copies were also provided as an alternative. The respondents then answered the questionnaire regarding their study habits in learning mathematics. After the data were collected, the responses were tallied, tabulated, analyzed, and interpreted using appropriate statistical methods.



Results and Discussion

This part presents, analyzes, and interprets the data gathered. The presentation of the data is arranged according to the statement of the problem.

Level of Students' Attitude towards Mathematics

Table 1 presents the overall results on the level of students' attitudes towards mathematics. Based on the findings, it was found out that students showed a positive attitude in mathematics learning with a weighted mean of 3.06. This means that students hold a favorable disposition toward the subject, demonstrating a willingness to engage. These results highlight the importance of reinforcing students' positive attitude through student-centered activities that would help students have a meaningful learning experience. Enhancing the emotional aspect of mathematics can strengthen their motivation, leading to persistent engagement and improved academic performance.

Indicators	Weighted Mean	Verbal Interpretation
1. I want to develop my mathematical skills.	3.71	Highly Positive
2. Mathematics helps develop the mind and teaches a person to think.	3.67	Highly Positive
3. I get a great deal of satisfaction out of solving a mathematics problem.	3.31	Highly Positive
4. I feel a sense of insecurity when attempting mathematics.	3.14	Positive
5. I am confident that I could learn advanced mathematics.	3.00	Positive
6. I expect to do fairly well in any mathematics class I take.	2.95	Positive
7. Mathematics does not scare me at all.	2.71	Positive
8. I learn mathematics easily.	2.71	Positive
9. I am able to solve mathematics problems without too much difficulty.	2.69	Positive
10. I have a lot of self-confidence when it comes to mathematics.	2.67	Positive
Average Weighted Mean	3.06	Positive

Level of Students' Self-Confidence in Learning Mathematics

Table 2 presents the overall level of students' self-confidence in learning mathematics. The presented table shows that the students are only confident with a weighted mean of 2.88. This means that students are confident, but they are not strongly established. This reflects inconsistencies in students' prior learning experiences, particularly when students have weak foundations in the concepts. This strongly suggests that teachers must provide a thorough analysis of developing instructional designs that foster lifelong learning in students. The enhancement of students' self-confidence will increase and improve their academic performance.

Indicators	Weighted Mean	Verbal Interpretation
1. Mathematics is fun and interesting.	3.14	Confident
2. I am willing to put more effort into mathematics.	3.14	Confident
3. Mathematics is a very fascinating subject.	2.98	Confident



4. I have usually enjoyed studying mathematics in school.	2.88	Confident
5. I enjoy mathematics class more than any other class.	2.83	Confident
6. I like to answer new problems in mathematics.	2.81	Confident
7. I really love mathematics.	2.81	Confident
8. The problem activities in mathematics interest me.	2.81	Confident
9. When I hear the word "mathematics," I have a feeling of excitement.	2.69	Confident
10. I would prefer to do an assignment in mathematics than to write an essay.	2.69	Confident
Average Weighted Mean	2.88	Confident

Level of Students' Strategies in Learning Mathematics

Table 3 highlights the overall level of students' frequency in their study strategies in learning mathematics. From the presented data, findings revealed that students usually utilize study strategies in learning math, which yielded a weighted mean of 3.08. This suggests that students should engage in practicing more in reviewing the lessons, engage in work activities, and answer questions beyond what is taught in the class. Although the result only shows the usual category, consistency of their learning strategies must be developed. Some students must integrate additional strategies to understand mathematical concepts and assess whether these strategies are effective.

Indicators	Weighted Mean	Verbal Interpretation
1. I focus my attention on my teacher's discussions and questions.	3.57	Always
2. I listen and analyze my group mates' opinions.	3.40	Always
3. Reading over the lesson before we discuss it helps me understand it better.	3.36	Always
4. I ask more knowledgeable questions after the mathematics topic.	3.31	Always
5. I listen to my classmates' ideas, and I also share mine.	3.31	Always
6. I make sure that heated arguments are avoided during group sharing.	3.31	Always
7. If I have a question, I can use my textbook to help me find the answer.	3.19	Usually
8. I can adjust to any partner or group that I will be assigned with.	3.17	Usually
9. I enjoy sharing my thoughts and observations during class discussions.	3.05	Usually
10. I often participate in class-solving activities.	2.88	Usually
11. I can understand Mathematics through reading my textbook/module.	2.83	Usually
12. I can read and understand the majority of content found in my Mathematics textbook/module.	2.81	Usually
13. I contribute to class discussions in my	2.79	Usually



Mathematics class.		
14. I feel confident in my abilities in Mathematics.	2.71	Usually
15. I can reword the majority of Mathematics content in my textbook into my own words.	2.52	Usually
Average Weighted Mean	3.08	Usually

Grand Mean on the Overall Level of Factors in Learning Mathematics Table 4 presents the grand mean on the level of factors in learning mathematics. Among the different interplaying factors, strategies in learning mathematics showed the highest which yielded a weighted mean of 3.08. This result suggests that learners frequently apply different strategies such as practicing regularly, reviewing lessons or using problem-solving techniques. Though the rating is not that high, yet, there is still room to improve and diversify the strategies they used.

Grand Mean on the Overall Level of the Factors in Learning Mathematics

Variables	Mean	Verbal Interpretation
Attitude	3.06	Positive
Self-Confidence	2.88	Confident
Strategies in Learning Mathematics	3.08	Usually

Students' Level of Academic Performance in Math. Table 5 presents the overall academic performance of the students in mathematics. Based on the presented data, students obtained a mean of 88.93, which demonstrated a very satisfactory performance. This implies that most students have achieved a level of mastery on the different competencies expected at their grade level. The absence of failing grades also implies that students are meeting the standards, possibly due to the supportive learning environment, effective teaching strategies and consistent study habits. Though the performance of the students are very commendable, there is still room to help students enhance their higher order thinking skills, deepen conceptual understanding and provide enrichment activities for advanced learners.

Students' Level of Academic Performance in Math

	Frequency	Percentage	Mean	Interpretation
90-100	17	40.48%	88.93	Very Satisfactory
85-89	16	38.10%		
80-84	7	16.67%		
75-79	2	4.76%		
Below 75	0	0%		
Total	42	100.00		

Significant Relationship on the Different Factors of Students in Learning Math to their Academic Performance

Table 6 highlights the significant relationship on the different interplaying factors of students in learning mathematics to their academic performance. Based on the presented table, attitude and self confidence shows a statistical relationship which yields a p-value of 0.010 and 0.030, respectively. Both of these indicate a moderate relationship and imply that there is a direct influence of students' attitude and confidence to the academic performance of the students. In other words, students who have a more positive attitude and confidence toward Mathematics tend to achieve higher academic performance. This highlights the importance of fostering interest, motivation, and positive perceptions toward the subject. On the other hand, only the use of different strategies in learning mathematics shows no statistical relationship with a p-value of 0.578. Although students may report frequently using learning strategies, these strategies may not be effectively contributing to improved academic performance, or they may not be applied consistently or appropriately.



Significant Relationship on the Different Factors of Students in Learning Math to their Academic Performance

Variables	r	Verbal Interpretation	p-value	Remarks
Attitude	0.402	Moderate Relationship	0.010	Significant
Self-Confidence	0.335	Moderate Relationship	0.030	Significant
Strategies in Learning Mathematics	0.054	Weak Relationship	0.578	Not Significant

Conclusion:

The researchers concluded that the students generally demonstrated positive attitudes, fair self-confidence, and effective learning strategies in Mathematics which contributed to their very satisfactory academic performance. The findings revealed that attitude and self-confidence have significant relationships with students' mathematics performance, indicating that learners who possess positive perceptions and confidence in Mathematics tend to perform better academically. However, learning strategies showed no significant relationship with performance, suggesting that strategies alone may not guarantee higher achievement in the subject. Thus, the study emphasizes the importance of strengthening students' confidence, motivation, and positive attitudes toward Mathematics through supportive and engaging learning experiences.

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