

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

Cesar T. Alonsabe¹, Bless C. Gilos², Minette Pearl O. Padayhag³

¹Student, La Salle University, Ozamiz City, Misamis Occidental, Philippines

²Special Science Teacher I, Department of Education, Pagadian City, Zamboanga del Sur, Philippines

³Teacher I, Department of Education, Philippines

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Email of Corresponding Author: bless.gilos@lsu.edu.ph

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

1. 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 (Peters 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.

2. Material and methods

2.1 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.

2.2 Locale of the Study

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.

2.3 Respondents of the Study

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.

2.4 Sample and Sampling Procedure

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).

2.5 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.

2.6 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.

2.7 Data Analysis Techniques

The data were analyzed using mean and standard deviation to determine the level of factors associated with mathematics performance, such as attitude, self-confidence, and learning strategies, where the mean described the average responses and the standard deviation measured the variability of responses. Mean, frequency, and percentage distribution were also used to assess students' academic performance in mathematics by describing the average grades and the distribution of performance levels. Furthermore, the Pearson Product-Moment Correlation Coefficient was employed to determine the significant relationship between the identified factors and students' academic performance in mathematics, using a 0.05 level of significance to test the null hypothesis.

2.8 Ethical Considerations

To ensure that the data collection process was conducted ethically, the researchers gave utmost importance to obtaining informed consent from the parents and assent from the student respondents. All participants were properly informed about the purpose of the study, how their responses would be utilized, and the possible risks and benefits associated with their participation. The students were likewise informed of their right to decline participation or withdraw from the study at any point if they felt uncomfortable answering the research instrument. By observing the principles of transparency, confidentiality, and respect, the researchers ensured the protection of the participants' rights and dignity throughout the study.

3. Results and Discussion

3.1 Level of the following factors associated with mathematics performance

3.1.1. Level of Students' Attitude towards Mathematics

The result 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.

3.1.2. Level of Students' Self-Confidence in Learning Mathematics

The result presented 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.

3.1.3. Level of Students' Strategies in Learning Mathematics

The result highlighted 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.

3.2 Students' Level of Academic Performance in Math.

The result presented 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 is 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.

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

The result highlighted 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 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.

4. Conclusion & Recommendations

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.

This research study is conducted among Grade 12 students in one private secondary school in the Division of Misamis Occidental during the School Year 2022-2023. It utilized a descriptive-correlational research design, which only determined the relationship between variables and did not establish causation. The researchers gathered the data on attitude, self-confidence, and learning strategies through a researcher-made survey questionnaire. Finally, the research study focused only on selected factors associated with mathematics performance. Other variables such as teaching methods, parental support, socio-economic status, learning environment, motivation, and access to educational resources were not included in the investigation and may also influence students' performance in Mathematics.

The researchers ensured that the study complied with institutional ethical standards by securing informed consent from parents and assent from student respondents prior to data collection. Participation was voluntary, and respondents were informed of their right to withdraw at any time while confidentiality and privacy of information were strictly maintained. The researchers also declared that there was no conflict of interest among the authors. In terms of authorship responsibility, Cesar T. Alonsabe led the conceptualization and supervision of the study, Bless C. Gilos contributed to the theoretical framework and literature review, and Minette Pearl O. Padayhag assisted in instrument preparation, abstract writing, and manuscript editing. The researchers likewise acknowledge the use of artificial intelligence tools, such as ChatGPT and Scite.ai, as supplementary aids in writing and source verification; however, all analyses, interpretations, and final authorship remained the sole responsibility of the researchers, ensuring academic integrity and ethical research practices throughout the study.

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