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Mathematics Proficiency and Student Attitudes: A Comparative Examination of First-Year Students in A Higher Education Institution

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ABSTRACT: *This study aimed to assess first-year students' mathematics proficiency and attitudes at La Consolacion College, Liloan, Cebu, Inc., during the academic year 2024-2025 as a basis for an action plan. Specifically, it examined students' confidence, motivation, value, and enjoyment in mathematics and proficiency levels. Employing a descriptive-comparative research design, the study involved 62 respondents across three academic programs. Data were gathered using a Mathematics Proficiency Test and a Survey Questionnaire on Attitudes Toward Learning Mathematics. Statistical tools such as frequency count, percentage, weighted mean, and one-way analysis of variance (ANOVA) were utilized to analyze the data. The findings revealed that most students were at the 'Developing' proficiency level (38.71%), with only 3.23% reaching the 'Advanced' level. Attitudes toward mathematics were predominantly neutral for confidence, motivation, and enjoyment, while value was rated positively. No significant differences in attitudes or proficiency were observed across programs. The hypothesis tests confirmed that neither attitudes nor proficiency varied significantly when grouped by academic program. The study concluded that low proficiency levels and neutral attitudes toward mathematics highlight the need for targeted interventions. Recommendations include implementing tutoring programs, workshops, and mentorship to improve proficiency, fostering positive attitudes through interactive learning strategies, and enhancing resource accessibility. Regular assessments and curriculum adjustments are also proposed to ensure sustained progress. This research underscores the importance of a supportive learning environment and tailored educational strategies to improve mathematics proficiency and engagement.*

Key words*: Examination, Higher education, Proficiency, Student attitudes.*

1. Introduction

Mathematics is a fundamental component of our daily existence and has a substantial impact on a variety of industries, including finance, technology, and engineering (Abd Algani, 2022). It offers indispensable instruments for comprehending intricate systems, making decisions, and resolving issues. Mathematics is essential for the development of models, the analysis of data, and the creation of algorithms that fuel innovations in a variety of sectors, including financial modelling and healthcare advancements (Mathnasium, 2024). Despite the fact that mathematics is one of the most critical subjects, students often struggle with it and either perform inadequately or dislike it (Chand et al., 2021). This perception of insurmountable difficulty leads to apathy and low motivation among students, which further exacerbates their academic performance (McAlinden and Noyes 2018; Penazzi et al). The majority of students worldwide dislike it due to its abstract nature and difficulty in comprehension and are discouraged by early interactions, such as inadequate instruction or inadequate support for their educational pursuits (Younis et al., 2023).

In the context of higher education, the transition from secondary to tertiary mathematics presents additional challenges for first-year students. They are expected to adapt to more abstract concepts, intensified workloads, and unfamiliar instructional strategies, which can affect both their confidence and academic results (Ní Fhloinn et al., 2015; Cordova & Tan, 2018). Research has shown that math anxiety, particularly in the first year of college, is a strong predictor of both academic underperformance and avoidance of STEM-related fields (Daker et al., 2021; Samuel & Warner, 2021). As such, understanding the relationship between student

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attitudes and mathematics proficiency is vital for designing targeted interventions and support systems. Educators and institutions must consider students' experiences and perceptions to effectively promote mathematical learning and engagement (Ellington, 2003; Peteros et al., 2022). This study seeks to examine these dynamics by comparing the mathematical attitudes and proficiencies of first-year students, with the goal of providing insights that can enhance curriculum development and student support.

The persistent challenges in mathematics education suggest a more profound, systemic issue that is not only embedded in the structure of the curriculum but also in the psychology of students and the practice of pedagogy. The imperative requirement for transformative changes in both instructional methods and support systems is underscored by the low levels of proficiency in mathematics, as illustrated by national and international assessments (OECD, 2019; TIMSS, 2019). It is essential for higher education institutions to acknowledge the multifaceted nature of students' mathematics-related challenges, which frequently result from a combination of negative attitudes, inadequate foundational knowledge, and low self-efficacy (Boekaerts, 2017; Samuel & Warner, 2021). This study endeavors to identify the primary factors that impede mathematical comprehension and academic success by concentrating on the attitudes and proficiency of first-year students (Daker et al., 2021). Additionally, the results are intended to provide curriculum developers, educators, and policymakers with the necessary information to effectively address gaps in mathematical literacy by incorporating innovative teaching techniques (Ellington, 2003), technology-enhanced learning environments (Peteros et al., 2022), and psychologically supportive classroom practices (McAlinden & Noyes, 2018).

These endeavors are consistent with the broader national education reforms, such as those outlined in Republic Act No. 10533 (DepEd, 2013), which are designed to guarantee that all Filipino students are endowed with the mathematical skills and self-assurance necessary to succeed in both academic and real-world environments. There is a scarcity of comprehensive research that specifically examines the behaviors, cognitive strategies, and emotional responses of first-year students in higher education institutions in the Philippines, despite the numerous studies that emphasize the importance of mathematics in academic and career success. The transitional challenges that college freshmen encounter as they encounter more complex mathematical concepts are often overlooked in the majority of existing research, which tends to concentrate on high school learners or generalized instructional strategies (Chand et al., 2021; Cordova & Tan, 2018). This study aims to address this gap by investigating the attitudes, learning patterns, and coping mechanisms of students when they encounter mathematical challenges, in addition to their proficiency in mathematics. The research endeavors to identify critical factors that affect student outcomes and suggest targeted interventions by exploring these psychological and educational dimensions. In doing so, it aspires to make a substantial contribution to the ongoing conversation regarding educational reforms, curriculum enhancement, and the advancement of inclusive, learner-centred approaches to mathematics education at the tertiary level.

Several studies have looked at how well students do in math overall, but not many have looked at how specific attitudes, like self-confidence, perceived value, enjoyment, and motivation, affect academic performance in higher education, especially in courses like Mathematics in the Modern World (MMW). A lot of the research that's already been done looks at how students feel about math as a general concept, without looking at how these different factors interact and affect learning results. Also, most studies are done in high school or in STEM-focused college courses. This means that we don't fully understand how non-STEM students, especially first-year students, think about and do in MMW, which is a required general education topic. Also, there isn't a lot of real-world information about how students' first-quarter grades in MMW affect how they feel about math, even though math is an important subject for developing basic math thinking and reasoning at the college level. This gap needs to be closed because students' first year experiences in MMW can have a big impact on how interested they remain in math and problem-solving in the future. By looking at these attitude factors along with academic performance, this study aims to give us a better idea of the mental and academic problems that might be stopping students from doing well in math, which will help us come up with better ways to help them and teach them.

2. Literature Review

The way students feel about maths has a big impact on how well they do in school and how interested they are in the topic as a whole. Several researchers have pointed out that self-confidence, perceived worth, enjoyment, and motivation are affective factors that have a direct effect on how students approach learning

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math (Daker et al., 2021; Samuel & Warner, 2021). Low self-confidence and high worry are strongly linked to avoiding math and not doing well in it, even if you are good at it (Boekaerts, 2017). In the same way, students tend to lose interest in math when they think it has nothing to do with real life (Cordova & Tan, 2018). A big part is also played by enjoyment and intrinsic motivation. Students who enjoy handling problems are more likely to keep going until they get them solved (Capuno et al., 2019; Peteros et al., 2022). These results show that developing positive attitudes is just as important as improving teaching when it comes to helping students who are having trouble with math.

Even though these emotional aspects are important, most studies that have been done so far have been on secondary education or STEM fields. This means that there is a need for more studies that look at general education courses like Mathematics in the Modern World (MMW). First-year college students face special problems with MMW. Many of them don't come from a math background and see the subject as a challenge rather than a chance (Almerino et al., 2020). International tests, like PISA, constantly show that Filipino students are among the least skilled in math (OECD, 2019). This makes it even more important to deal with these attitudes at the college level right away. Still, there isn't a lot of research on how these attitudes especially self-efficacy and motivation affect how well students do in general education classes like MMW. This study aims to fill in that gap by looking at how first-year students feel about math and how those feelings are connected to how well they do in the first quarter of MMW.

3. Methodology

This study employed a descriptive-comparative quantitative design to examine the relationship between students' attitudes toward learning mathematics and their performance in Mathematics in the Modern World (MMW). Descriptive-comparative research is appropriate for identifying differences among groups without manipulating variables (Cantrell, 2011; Polit & Beck, 2007). The research was conducted at La Consolacion College, Liloan, Cebu, Inc., focusing on 62 first-year students from various programs, including Bachelor of Elementary Education and Bachelor of Secondary Education, who were enrolled in MMW during the 2024–2025 school year. Participants were selected using total population sampling, ensuring that the entire cohort enrolled in MMW was represented. Two validated instruments were utilized: a Mathematics Proficiency Test and a Survey Questionnaire on Attitudes Toward Learning Mathematics, adapted from Tapia and Marsh (2004). The attitude questionnaire evaluates four key dimensions: self-confidence, value, enjoyment, and motivation, using a 5-point Likert scale, while the proficiency test consists of 40 multiple-choice questions aligned with the MMW curriculum. Data collection was conducted under controlled classroom settings. Following the proficiency test, students completed the attitude survey. The responses were scored and interpreted using predetermined rating scales for both proficiency and attitude levels. To analyze the data, One-Way Analysis of Variance (ANOVA) was employed to determine significant differences in mathematical proficiency across varying levels of attitude components. Ethical considerations included informed consent, confidentiality, and the voluntary nature of participation, ensuring adherence to research standards and participant well-being.

Table 1. Age and Gender of the Respondents.

Age (in years)	Female		Male		Total	
	f	%	f	%	f	%
21 and above	7	11.29	7	11.29	14	22.58
19-20	16	25.81	9	14.52	25	40.32
17-18	19	30.65	4	6.45	23	37.10
Total	42	67.74	20	32.26	62	100.00

4. Results and Discussions

The data presented in Table 1 shows the age and gender distribution of the 62 respondents in the study. A majority of the participants were female, accounting for 67.74% (n=42) of the total population, while male respondents made up 32.26% (n=20). In terms of age, the largest group belonged to the 17–18 years age range, comprising 37.10% of the total, with 19 females and 4 males. This was followed by respondents aged 19–20 years, who represented 40.32%, with a slightly higher number of females (16) compared to males (9). The smallest group consisted of those aged 21 years and above, comprising 22.58% of the population, evenly

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split between males and females (7 each). These figures suggest that the respondent pool is predominantly young and female, which may reflect the general demographic trend in teacher education programs, particularly in Early Childhood and Elementary Education.

Table 2 presents the types of mathematics-related reading materials available at home among the respondents. The most commonly available resource is Basic Mathematics Books, with 17 respondents reporting access, placing it at Rank 1. This is followed by Online Resources, such as websites or digital learning platforms, which were available to 9 respondents, making it Rank 2. Mathematics Videos or DVD Tutorials came in at Rank 3, cited by 7 respondents, indicating a moderate level of access to multimedia learning tools. Practice Workbooks or Problem-Solving Guides were reported by 4 respondents, placing them at Rank 4, while Magazines that may contain math-related content were noted by 3 respondents (Rank 5). The least common were Advanced Mathematics Books, reported by only 2 respondents, ranked 6th. These findings suggest that while basic learning resources are somewhat accessible, there is limited exposure to more advanced or diverse math-related materials at home, potentially affecting students' ability to explore mathematics beyond the classroom.

Table 2. Math Reading Materials Available at Home

Reading Materials	**F**	**Rank**
Mathematics Videos/DVD tutorials	7	3
Practice Workbooks/Problem Solving		
Guides	4	4
Basic Mathematics Books	17	1
Online Resources	9	2
Advanced Mathematics Books	2	6
Magazines	3	5

Table 3. Time Spent Studying Math per Week.

Time Spent (in hours)	**F**	**%**
more than 6	1	1.61
5-6	2	3.23
3-4	9	14.52
1-2	50	80.65
Total	62	100.00

Table 3 displays the amount of time respondents spend studying mathematics each week. The majority of students, 80.65% (n=50), reported studying math for only 1 to 2 hours per week, indicating a relatively low level of independent study. A smaller portion, 14.52% (n=9), dedicated 3 to 4 hours weekly, while only 3.23% (n=2) spent 5 to 6 hours. Notably, just 1 respondent (1.61%) reported studying math for more than 6 hours per week. These results suggest that most students allocate minimal time to mathematics outside of class, which may contribute to challenges in comprehension and performance, especially in a subject that requires consistent practice and problem-solving engagement.

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Table 4. Level of attitudes of the respondents in learning Mathematics in terms of confidence.

S/N	Indicators	WM	SD	Verbal Description
1	Mathematics is one of my most dreaded subjects.	3.26	0.72	Neutral
2	My mind goes blank and I am unable to think clearly when working with mathematics.	3.19	0.87	Neutral
3	Studying mathematics makes me feel nervous.	3.34	0.92	Neutral
4	Mathematics makes me feel uncomfortable.	2.92	0.95	Neutral
5	I am always under a terrible strain in a math class.	3.10	0.86	Neutral
6	When I hear the word mathematics, I have a feelings of dislike	2.90	1.04	Neutral
7	It makes me nervous to even think about having to do a mathematics problem.	3.13	0.90	Neutral
8	Mathematics does not scare me at all.	2.90	0.92	Neutral
9	I expect to do fairly well in any math class I take.	3.11	0.85	Neutral
10	I am always confused in my mathematics class.	3.32	0.84	Neutral
11	I have a lot of self-confidence when it comes to mathematics.	3.02	0.97	Neutral
12	I am able to solve mathematics problems without too much difficulty.	2.92	0.91	Neutral
13	I feel a sense of insecurity when attempting mathematics.	3.29	0.96	Neutral
14	I learn mathematics easily.	2.87	0.87	Neutral
15	I believe I am good at solving math problems.	2.81	0.90	Neutral
	Aggregate Weighted Mean	3.07		
				Neutral
	Aggregate Standard Deviation		0.90	

Table 4 illustrates the respondents' level of attitudes in learning mathematics in terms of self-confidence. The data reveal that all 15 indicators received a verbal interpretation of "Neutral," with aggregate weighted mean of 3.07 and a standard deviation of 0.90, indicating consistency in responses without wide variation. The highest mean score was 3.34 for the statement "Studying mathematics makes me feel nervous," suggesting that while students don't overwhelmingly fear math, nervousness remains a common feeling. Similarly, indicators such as "Mathematics is one of my most dreaded subjects" (3.26) and "I feel a sense of insecurity when attempting mathematics" (3.29) also show a generally cautious or hesitant stance toward the subject. Positive indicators like "I believe I am good at solving math problems" (2.81) and "I learn mathematics easily" (2.87) received among the lowest mean ratings, suggesting that students generally lack confidence in their mathematical ability. Moreover, negative feelings such as nervousness, strain, and discomfort still persist, albeit moderately. Overall, the neutral rating across all items indicates that the students neither strongly fear nor feel confident in math, implying a lack of self-assurance that could hinder deeper engagement and academic success in the subject. This highlights the need for interventions to build confidence and reduce anxiety toward mathematics among students.

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Table 5. Level of attitudes of the respondents in learning Mathematics in terms of value.

S/N	Indicators	WM	SD	Verbal Description
1	Mathematics is a very worthwhile and necessary subject.	3.82	0.74	Positive
2	I want to develop my mathematical skills	4.18	0.69	Positive
3	Mathematics helps develop the mind and teachers to think.	4.03	0.70	Positive
4	Mathematics is important in everyday life.	4.21	0.81	Very Positive
5	Mathematics is one of the most important subjects for people study.	4.08	0.66	Positive
6	High school math courses would be very helpful no matter what I decide to study.	3.84	0.81	Positive
7	I can think of many ways that I use math outside of school.	3.76	0.92	Positive
8	I think studying advanced mathematics is useful.	3.98	0.90	Positive
9	I believe studying math helps me with problem solving in other areas.	3.97	0.79	Positive
10	A strong math background could help me in my professional life.	3.94	0.96	Positive
	Aggregate Weighted Mean	3.98		
	Aggregate Standard Deviation		0.80	Positive

Table 5 presents the respondents' attitudes toward mathematics in terms of its perceived value, revealing an overall positive perception, with an aggregate weighted mean of 3.98 and a standard deviation of 0.80. Among the ten indicators, the statement "Mathematics is important in everyday life" received the highest mean score of 4.21, interpreted as Very Positive, suggesting that students strongly recognize the practical relevance of math in daily activities. Likewise, statements such as "Mathematics helps develop the mind and teaches to think" (4.03) and "Mathematics is one of the most important subjects for people to study" (4.08) further underscore their appreciation for math as a critical and intellectually enriching subject. Additionally, many students agreed that math is valuable beyond the classroom, with high scores for items like "I want to develop my mathematical skills" (4.18) and "Studying math helps me with problem-solving in other areas" (3.97). Even statements concerning the long-term importance of math such as its role in professional life or the utility of high school courses received strong agreement. Overall, these findings reflect a strong recognition of the significance and applicability of mathematics, both academically and in real-life contexts, even though this positive valuation may not necessarily align with the confidence levels reported earlier. This contrast suggests that while students understand the importance of math, they may still struggle with confidence in their own mathematical abilities.

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Table 6. Level of attitudes of the respondents in learning Mathematics in terms of enjoyment.

S/N	Indicators	WM	SD	Verbal Description
1	I get a great deal of satisfaction out of solving a mathematics problem.	3.74	0.77	Positive
2	I have usually enjoyed studying mathematics in school.	3.50	0.72	Positive
3	Mathematics is dull and boring.	2.73	0.91	Neutral
4	I like to solve new problems in mathematics.	3.39	0.84	Neutral
5	I would prefer to do an assignment in math than to write an essay.	3.26	0.96	Neutral
6	I really like in mathematics.	3.23	0.73	Neutral
7	I am happier in a mathematics class than in any other class.	3.10	0.86	Neutral
8	Mathematics is a very interesting subject.	3.92	0.68	Positive
9	I am comfortable expressing my own ideas on how to look for solutions to a difficult problem in math.	3.39	0.82	Neutral
10	I am comfortable answering questions in math.	3.21	0.87	Neutral
	Aggregate Weighted Mean	3.35		Neutral

Table 6 shows the respondents' attitudes toward mathematics in terms of enjoyment, with an aggregate weighted mean of 3.35 and a standard deviation of 0.82, which falls under the "Neutral" category. Although some statements received positive responses such as "Mathematics is a very interesting subject" with the highest mean of 3.92, and "I get a great deal of satisfaction out of solving a mathematics problem" (3.74) the overall results suggest a moderate or mixed emotional response to math learning. Several indicators were rated as neutral, including "Mathematics is dull and boring" (2.73), "I really like mathematics" (3.23), and "I am happier in a mathematics class than in any other class" (3.10), implying that while students don't strongly dislike math, they don't particularly enjoy it either. The response to "I would prefer to do an assignment in math than to write an essay" (3.26) further supports this middle-ground sentiment. This pattern indicates that students may see math as tolerable or even interesting at times, but not necessarily enjoyable as a subject compared to others. The lack of strong enjoyment may impact their engagement and willingness to invest time and effort in learning mathematics. These findings point to the need for more engaging and interactive teaching strategies that could help transform neutral attitudes into more positive and enthusiastic ones.

Table 7. Level of attitudes of the respondents in learning Mathematics in terms of motivation.

S/N	Indicators	WM	SD	Verbal Description
1	I am confident that I could learn advanced mathematics.	3.60	0.86	Positive
2	I would like to avoid using mathematics in college.	2.90	1.04	Neutral
3	I am willing to take more than the required amount of mathematics.	3.44	0.84	Positive
4	I plan to take as much mathematics as I can during my education.	3.45	0.84	Positive
5	The challenge of math appeals to me.	3.53	0.88	Positive
	Aggregate Weighted Mean	3.38		
	Aggregate Standard Deviation		0.89	Neutral

Table 7 presents the respondents' attitudes toward learning mathematics in terms of motivation, with an aggregate weighted mean of 3.38 and an aggregate standard deviation of 0.89, interpreted as "Neutral." While

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the overall category leans toward neutrality, several individual indicators reflect a positive motivational outlook. For instance, the statements "I am confident that I could learn advanced mathematics" (3.60), "The challenge of math appeals to me" (3.53), and "I plan to take as much mathematics as I can during my education" (3.45) all received positive verbal descriptions, indicating that many students are open to engaging with mathematics beyond the minimum requirement. However, this positive inclination is somewhat offset by responses such as "I would like to avoid using mathematics in college," which received a mean score of 2.90, suggesting a neutral to slightly negative view among some students. Although there is a presence of motivation and willingness to embrace mathematical challenges, it is not universally strong across the cohort. The results suggest a mixed level of motivation, where some students are eager and confident, while others remain indifferent or hesitant. This emphasizes the importance of encouraging a growth mindset and integrating motivating, real-world applications of math in the curriculum to sustain and elevate students' motivation levels in mathematics.

Table 8. The level of mathematics proficiency of the respondents.

Level	Numerical Range	F	%
Advanced	33-40	2	3.23
Proficient	25-32	18	29.03
Approaching Proficiency	17-24	17	27.42
Developing	9-16	24	38.71
Beginning	0-8	1	1.61
Total		62	100.00
Mean		20.02	
St. Dev.		7.08	

Table 8 illustrates the mathematics proficiency levels of the respondents based on their scores in the proficiency test. The mean score was 20.02 with a standard deviation of 7.08, indicating a moderate spread in performance. The majority of respondents, 38.71% (n=24), fell under the "Developing" category, suggesting that many students are still in the early stages of understanding fundamental mathematical concepts. A significant portion, 27.42% (n=17), were "Approaching Proficiency," indicating that they possess basic understanding but may struggle with complex problems. Meanwhile, 29.03% (n=18) achieved the "Proficient" level, showing a solid grasp of key mathematical concepts appropriate for their academic level. Only 3.23% (n=2) of the respondents reached the "Advanced" category, while 1.61% (n=1) was classified as "Beginning," reflecting minimal understanding of math. These results suggest that although a considerable number of students are nearing proficiency, a large segment still requires support to build foundational mathematical skills. The data highlights the need for targeted instructional interventions and remedial support to help students transition from developing to proficient levels, ensuring they are better prepared for future academic challenges in mathematics.

Table 9. Test of Difference on the respondents' attitudes when grouped by the program enrolled.

Source of Variation	Sum of Squares	df	Mean Square	F-value	p-value	Remarks
Between Groups	92.313	2	46.156	0.918	0.405	Not Significant
Within Groups	2966.671	59	50.283			
	3058.984	61				

Table 9 presents the results of a one-way ANOVA test to determine whether there is a significant difference in the respondents' attitudes toward mathematics when grouped according to the program they are enrolled in. The F-value obtained is 0.918 with a corresponding p-value of 0.405. Since the p-value is greater than 0.05, the result is interpreted as not statistically significant. This indicates that there is no significant difference in the attitudes of students toward learning mathematics across different academic programs.

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Regardless of whether the respondents are enrolled in Early Childhood Education, Elementary Education, or another teacher education track, their attitudes toward mathematics covering aspects like confidence, value, enjoyment, and motivation remain relatively consistent. This suggests that students' attitudes are shaped more by shared educational experiences and possibly teaching methods, rather than by the specific program they are enrolled in.

Table 10. Test of Difference on mathematics proficiency when grouped by the program enrolled.

Source of Variation	Sum of Squares	df	Mean Square	F-value	p-value	Remarks
Between Groups	0.115	2	.058	0.377	0.688	Not Significant
Within Groups	9.034	59	.153			
	9.150	61				

Table 10 displays the results of a one-way ANOVA test assessing whether there is a significant difference in mathematics proficiency among respondents when grouped by their academic program. The analysis yields an F-value of 0.377 and a p-value of 0.688. Since the p-value is greater than the 0.05 significance level, the result is interpreted as not statistically significant. This finding suggests that there is no significant difference in mathematics proficiency across the different programs enrolled in by the respondents. Whether the students are taking up Early Childhood Education, Elementary Education, or other related courses, their level of proficiency in mathematics appears to be similar. This result implies that program affiliation does not substantially influence students' mathematical skill levels, and other factors such as prior learning experiences, study habits, or attitudes may have a greater impact on their proficiency.

5. Conclusion

Based on the findings, first-year students generally hold a neutral attitude toward learning mathematics in terms of self-confidence, enjoyment, and motivation, while showing a positive perception regarding its value and importance. Despite acknowledging the relevance of mathematics in everyday life and professional success, many students still experience anxiety, low confidence, and limited enjoyment in engaging with the subject. Furthermore, the majority of the respondents were found to be in the developing and approaching proficiency levels, indicating a need for enhanced instructional support. The study also revealed no significant differences in students' attitudes or proficiency when grouped according to their academic programs, suggesting that these aspects are commonly experienced across disciplines. Overall, the findings highlight the importance of promoting engaging, confidence-building learning environments and teaching strategies that not only improve proficiency but also foster more positive emotional and motivational attitudes toward mathematics.

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