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Perspectives on Mathematics Proficiency and Attitudes among First-Year Students in Higher Education

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ABSTRACT: *This study explored the students' attitudes toward mathematics and their proficiency levels, with a focus on variations across academic programs. Using a descriptive research design, data were gathered from 278 college students through a researcher-developed Mathematics Proficiency Test and the Attitudes Toward Mathematics Inventory (ATMI). Results revealed that while students hold a generally positive view of mathematics' value, their self-confidence, enjoyment, and motivation remain neutral. Most students spent only 1–2 hours per week studying math, and over half were categorized under the "Developing" proficiency level. ANOVA tests showed no significant differences in attitude or performance across programs. These findings underscore the importance of fostering supportive, engaging learning environments to enhance both skill and mindset in mathematics*.

Key words*: Enjoyment, mathematics attitudes, proficiency, self-confidence, value.*

1. Introduction

Mathematics plays a central role in shaping university students' capacity for analytical thinking and problem-solving skills that are especially vital in fields like science, engineering, and business. These disciplines rely heavily on mathematical proficiency, which not only predicts academic achievement but also future employability prospects (Duma et al., 2024). Yet, many students enter higher education without solid mathematical foundations, lacking both confidence and basic competencies necessary for success (McConnell, 2019). This preparedness gap often becomes more than just an academic obstacle it can derail progress toward graduation and hinder readiness for real-world challenges (Yusof & Tall, 1998). Moreover, traditional teaching that emphasizes memorization over understanding exacerbates the disconnect between students and math (Yuan-zong, 2004). Contrast, active problem-solving courses have been shown to significantly improve both skill and confidence among university learners.

How students feel about math, whether they find it intimidating or exciting can be just as impactful as their prior knowledge. Attitude includes motivation, perceived usefulness, anxiety, and confidence (Hoshino, 2018). Students with high anxiety and low tend to avoid math or give up early, while those who perceive it as valuable and believe in their ability to succeed generally perform better (Yusof & Tall, 1998). Reflective, student-centered learning approaches like collaborative problem-solving can boost these positive attitudes and reduce anxiety (Binte et al., 1994). Importantly, fostering a sense of meaning and connection to real-world problems helps students overcome fears and deepen understanding (Liljedahl et al., 2016). Teachers can also play a critical role by being empathetic and responsive to students' emotional responses to math (Schoenfeld & Sloane, 2016).

A consistent pattern has emerged in the research, for instance students who approach math with confidence and interest tend to achieve higher scores. These affective dimensions belief in oneself,

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perseverance, and enthusiasm are strongly tied to academic outcomes (Qolfathiriyus et al., 2019). Conversely, students with a negative outlook on math often fall short, not because of intellectual limitations, but because of emotional barriers and lack of resilience (Setyana et al., 2019). Even within the same academic programs, performance can vary widely based on attitude alone (Risnanosanti, 2017). Courses that intentionally foster study habits and mathematical identity can significantly raise students' GPA and academic engagement (Dixon, 2004). Ultimately, empowering students to see themselves as capable math learners is foundational to their academic success.

Math becomes increasingly abstract and challenging in college, and this transition can fuel student detachment especially if instruction remains rigid or impersonal. Research shows that shifting from rote teaching toward exploratory methods can have profound effects on both comprehension and mindset (Mulyana et al., 2018). When students are allowed to explore, reflect, and engage in open-ended problem solving, their grasp of math deepens alongside their confidence (Duma et al., 2024). Math performance is also shaped by personal factors such as gender, high school performance, socioeconomic background, and family support (Muniri & Choirudin, 2022). For example, studies have found that students from better-resourced educational backgrounds often show stronger analytical skills in solving problems (Pambudi et al., 2020). These insights suggest that to truly improve math outcomes, we must adopt a holistic approach one that not only teaches content, but also nurtures belief, motivation, and a sense of belonging.

While global research can offer valuable frameworks, local contexts matter deeply. At Madridejos Community College, understanding how students perceive and perform in math can inform targeted support. These learners may face distinct challenges that global studies don't capture, such as limited resources, cultural attitudes toward math, or varied educational histories. Exploring both their academic struggles and emotional experiences, educators can design interventions that foster resilience, relevance, and growth. Ultimately, the goal isn't just to teach math it's to cultivate confident thinkers who see math as a tool for success in both education and life.

2. Review of Related Literature

The way students feel about mathematics deeply affects how well they perform in it a connection that has been consistently highlighted in educational research. Positive emotions like enjoyment, confidence, and motivation are closely tied to higher achievement. For example, a recent study found that students who viewed math as enjoyable and useful performed better in standardized tests, regardless of gender or school background (Khaiwal & Gupta, 2025). Similarly, pre-university students who held favorable attitudes toward math reported better grades, particularly those in science and engineering tracks (Abdullah et al., 2019). A broader analysis confirmed that even at the elementary level, students with strong confidence and value placed on math consistently outperformed peers with weaker attitudes (Shakya & Maharjan, 2023). In the Philippines, researchers observed that high school students with poor attitudes often marked by low self-esteem and motivation scored significantly lower in assessments, a pattern also seen among students in government support programs (Peteros et al., 2019). Furthermore, teacher attitudes themselves can influence students those taught by encouraging and engaged teachers were more likely to feel confident and succeed academically (Mensah et al., 2013).

However, when students enter university, their math attitudes often shift, sometimes for the worse. The jump in content difficulty, combined with pressure-filled lecture environments, can dampen enthusiasm even in previously motivated learners. Studies show that traditional, content-heavy instruction can lead to increased anxiety and disengagement, especially when there's limited space for exploration and discussion (Fordjour et al., 2024). Yet, when learners engage in active problem-solving or collaborative learning, their attitudes often rebound. In one example, university students enrolled in a problem-solving-based course reported lower anxiety and greater enjoyment of math (Yusof & Tall, 1998). Another study found that those who sought deeper understanding rather than memorization developed more persistent and curious mindsets ultimately achieving higher grades (Hwang & Son, 2021). In classrooms where teacher encouragement and relevance were emphasized, students not only enjoyed math more but also saw it as a meaningful skill for future careers (Comahig & Abuzo, 2024). Importantly, even blended learning environments that focused on satisfaction and interactivity yielded better outcomes when paired with a positive classroom culture (Manatad & Baluyos, 2023). These results strongly suggest that how math is taught and how students feel while learning can be just as important as the material itself.

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3. Methodology

This study adopted a descriptive research design to explore the students' attitudes and their mathematics proficiency, with an additional focus on identifying variations across different academic programs. This approach was chosen for its strength in examining real-world conditions without manipulating variables, making it ideal for analyzing naturally occurring groups, such as students enrolled in distinct disciplines (Cantrell, 2011; Polit & Beck, 2007). Observing students within their existing learning environments, the study aimed to generate results that mirror genuine academic experiences and attitudinal differences. Descriptive research is commonly employed in educational studies to capture group trends and support evidence-based pedagogical decisions. It also provided an equitable sampling framework, reducing bias by ensuring every student had an equal chance of inclusion (Cochran, 1977). All participants were current students who had completed the required prerequisites, making them suitable candidates for evaluating both attitude and mathematical performance.

Data collection relied on two primary instruments: a researcher-designed Mathematics Proficiency Test aligned with the Commission on Higher Education (CHED) General Education Curriculum, and the validated Attitudes Toward Mathematics Inventory (ATMI) by Tapia and Marsh (2004). The proficiency test consisted of 40 multiple-choice items covering key concepts such as mathematical patterns in nature, the Fibonacci sequence, symbolic logic, and basic set theory. The ATMI, on the other hand, assessed four core attitudinal domains: self-confidence, motivation, enjoyment, and the perceived value of mathematics. Using a five-point Likert scale from strongly disagree to strongly agree, the inventory captured the psychological and emotional dimensions of students' engagement with math. A total of 278 students participated in the study, completing both instruments in a structured, in-person setting via the Blackboard Learning Management System. Each session was allocated 90 minutes and followed a three-stage implementation process, preparation and informed consent, administration of the test and inventory, and post-assessment processing. During the preparation phase, researchers coordinated with instructors, provided participant briefings, and secured signed consent forms to ensure ethical standards were met. Proctors were present throughout the sessions to maintain consistency and resolve any technical issues, guaranteeing a standardized testing environment across all academic programs. To analyze the collected data, both descriptive and inferential statistical methods were employed. Weighted means and standard deviations were calculated to summarize student performance and attitude levels, providing insight into central tendencies and variability. To assess differences among academic groups, a one-way Analysis of Variance (ANOVA) was conducted. This statistical procedure allowed the researchers to determine whether the observed differences in proficiency and attitudes across programs were statistically significant. Altogether, the design and analysis offered a comprehensive look at students' mathematical capabilities and affective responses, yielding insights that can inform curriculum development and instructional strategies in higher education mathematics.

4. Results and Discussion

Table 1. Reading Materials Available at Home.

Reading Materials	f	Rank
Mathematics Videos/DVD tutorials	32	6
Practice Workbooks/Problem Solving Guides	38	4
Basic Mathematics Books	108	2
Online Resources	134	1
Advanced Mathematics Books	34	5
Magazines	18	7
None	60	3

Table 1 shows the types of reading materials students have access to at home. The most common resource is online materials, such as websites and educational platforms, with 134 students reporting access to these making it the top-ranked resource. Basic mathematics books come in second, available to 108 students, showing that many households still rely on traditional printed materials. Interestingly, 60 students reported having no math-related resources at all, placing "None" in the third spot, which highlights a concerning gap in

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access. Practice workbooks and problem-solving guides are available to 38 students, ranking fourth, while advanced math books and math video tutorials follow closely behind. Magazines are the least common, with only 18 students having them at home. Overall, while digital resources are widely used, a significant number of students still lack access to basic learning tools, which could affect their ability to practice and improve their math skills outside of the classroom.

Table 2 presents how much time students spend studying math each week. The vast majority (227) students, or 81.65%, report spending only 1 to 2 hours on math, suggesting that most students dedicate limited time to reviewing or practicing the subject outside class. A smaller group, 40 students (14.39%), study for 3 to 4 hours weekly, which may reflect more consistent or motivated learners. Only 6 students (2.16%) spend between 5 and 6 hours, and just 5 students (1.80%) study for more than 6 hours a week.

Table 2. Time Spent Studying Math Per Week

Time Spent (In Hours)	f	%
More than 6	5	1.80
5-6	6	2.16
3-4	40	14.39
1-2	227	81.65
Total	278	100.00

These results show that extended study time is rare among the group. This could point to challenges like lack of time, resources, or even motivation, and may help explain struggles with math performance if classroom instruction isn't sufficiently reinforced at home.

Table 3. Level of attitudes of the respondents in learning Mathematics in terms of self-confidence

S/N	Indicators	WM	SD	Verbal Description
1	Mathematics is one of my most dreaded subjects.	3.15	0.92	Neutral
2	My mind goes blank and I am unable to think	3.06	0.97	Neutral
3	Studying mathematics makes me feel nervous.	3.03	1.00	Neutral
4	Mathematics makes me feel uncomfortable.	2.80	1.05	Neutral
5	I am always under a terrible strain in a math	2.96	0.96	Neutral
6	When I hear the word mathematics, I have a	2.83	1.04	Neutral
7	It makes me nervous to even think about	3.02	1.03	Neutral
8	Mathematics does not scare me at all.	2.94	0.99	Neutral
9	I expect to do fairly well in any math class I take.	3.22	0.87	Neutral
10	I am always confused in my mathematics class.	3.19	0.91	Neutral
11	I have a lot of self-confidence when it comes to	2.91	1.01	Neutral
12	I am able to solve mathematics problems	2.82	0.96	Neutral
13	I feel a sense of insecurity when attempting	3.04	0.95	Neutral
14	I learn mathematics easily.	2.90	0.95	Neutral
15	I believe I am good at solving math problems.	2.85	1.01	Neutral
Aggregate Weighted Mean 2.98			0.97	

Table 3 shows students' attitudes toward learning mathematics, specifically focusing on their self-confidence. Overall, the responses suggest a neutral stance, with an aggregate weighted mean of 2.98 and a standard deviation of 0.97. This indicates that most students neither strongly agree nor disagree with the statements about their confidence in math. While a few indicators like "I expect to do fairly well in any math class I take" (WM = 3.22) and "I am always confused in my mathematics class" (WM = 3.19) hint at slightly more defined attitudes, the general pattern shows hesitation or mixed feelings. Statements expressing anxiety or discomfort, such as feeling nervous or going blank during math, also received neutral ratings, suggesting

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that students experience these feelings occasionally but not overwhelmingly. Notably, even positive statements like "I believe I am good at solving math problems" and "I learn mathematics easily" received modest agreement.

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

S/N	Indicators	WM	SD	Verbal Desc.
1	Mathematics is very worthwhile and necessary	3.67	0.98	Positive
2	I want to develop my mathematical skills	4.01	1.04	Positive
3	Mathematics helps develop the mind and teachers to think.	3.83	0.99	Positive
4	Mathematics is important in everyday life.	4.06	1.11	Positive
5	Mathematics is one of the most important subjects for people to study.	3.94	1.06	Positive
6	High school math courses would be very helpful	3.81	0.98	Positive
7	I can think of many ways that I use math outside	3.60	1.00	Positive
8	I think studying advanced mathematics is useful	3.83	1.06	Positive
9	I believe studying math helps me with problem solving in other areas.	3.81	1.05	Positive
10	A strong math background could help me in my professional life.	3.72	1.02	Positive
	Aggregate Weighted Mean	3.83	1.03	Positive

Table 4 highlights students' attitudes toward the value of learning mathematics, and the results are notably positive. With an aggregate weighted mean of 3.83 and a standard deviation of 1.03, it's clear that most respondents recognize the importance and usefulness of math in both academic and real-life contexts. Statements like "Mathematics is important in everyday life" (WM = 4.06) and "I want to develop my mathematical skills" (WM = 4.01) received the highest ratings, showing strong appreciation for math's role in personal growth and daily tasks. Students also agreed that math helps with thinking skills and problem-solving beyond the subject itself, indicating an awareness of its broader value. Even more technical or career-oriented views like believing that a strong math background can benefit their professional life were positively rated. Overall, these responses suggest that while students may feel uncertain about their math abilities, they do understand and appreciate its value, which is a great foundation for building stronger engagement and motivation in learning the subject.

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

S/N	Indicators	WM	SD	Verbal Desc.
1	I get a great deal of satisfaction out of solving a mathematical problem.	3.24	0.93	Neutral
2	I have usually enjoyed studying mathematics in school.	3.24	1.01	Neutral
3	Mathematics is dull and boring.	3.41	1.06	Positive
4	I like to solve new problems in mathematics	3.22	0.95	Neutral
5	I would prefer to do an assignment in Math than to write an essay.	3.13	1.07	Neutral
6	I really like in mathematics.	3.12	1.03	Neutral
7	I am happier in a mathematics class that in any other classes.	2.89	0.95	Neutral
8	Mathematics is a very interesting subject.	3.40	1.03	Neutral
9	I am comfortable expressing my own ideas on how to look for solutions to a difficult problem in Math,	3.17	0.97	Neutral
10	I am comfortable answering questions in Math.	3.09	0.90	Neutral
	Aggregate Weighted Mean	3.19	0.99	Neutral

Table 5 presents students' attitudes toward mathematics in terms of enjoyment, and the results suggest a generally neutral stance. With an aggregate weighted mean of 3.19 and a standard deviation of 0.99, most students neither strongly enjoy nor strongly dislike learning math. While some responses hint at mild

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enjoyment such as finding satisfaction in solving problems (WM = 3.24) or describing math as interesting (WM = 3.40) these views are not strongly held across the board. Interestingly, even the statement "Mathematics is dull and boring" was rated at 3.41, which surprisingly received a positive description due to reverse scoring, implying some students disagree with the idea that math is boring. However, many students seem uncertain or lukewarm about their emotional engagement with math. Statements like "I really like mathematics" and "I am happier in a mathematics class than in any other classes" received some of the lowest means (WM = 3.12 and 2.89 respectively), indicating that few students find math truly enjoyable or prefer it over other subjects. Comfort in expressing ideas or answering questions also leaned neutral, suggesting a need for more confidence-building and positive reinforcement. Overall, while students do not appear to dislike math, they are not fully enthusiastic about it either. These results point to an opportunity for educators to create more engaging, interactive learning experiences that could increase students' enjoyment and make math feel more personally rewarding.

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

S/N	Indicators	WM	SD	Verbal Desc.
1	I am confident that I could learn advanced mathematics	3.32	1.06	Neutral
2	I would like to avoid using mathematics in college.	2.90	1.05	Neutral
3	I am willing to take more than the required amount of mathematics.	3.17	0.88	Neutral
4	I plan to take as much mathematics as I can during my education.	3.21	0.87	Neutral
5	The challenge of math appeals to me.	3.31	0.93	Neutral
	Aggregate Weighted Mean	3.18	0.96	Neutral

Table 6 explores students' motivation toward learning mathematics, and the results reflect a generally neutral attitude. With an aggregate weighted mean of 3.18 and a standard deviation of 0.96, most respondents showed moderate motivation neither particularly eager nor resistant to engaging more deeply with math. Statements such as "I am confident that I could learn advanced mathematics" (WM = 3.32) and "The challenge of math appeals to me" (WM = 3.31) suggest that some students are open to the idea of challenging themselves with higher-level math, but their confidence is not overwhelmingly strong. Similarly, while a few students expressed interest in going beyond the required coursework (WM = 3.21), many others remained undecided, as reflected in the average scores. Notably, the statement "I would like to avoid using mathematics in college" (WM = 2.90) reveals that a portion of students may feel hesitant or unmotivated when thinking about future math involvement. However, because this too falls in the neutral range, it suggests that most students are not actively avoiding math they may simply need more encouragement or a clearer sense of its relevance. Overall, these findings show that students are on the fence when it comes to math motivation. They aren't strongly driven to pursue more, but they aren't completely turned off either. With the right support, engaging instruction, and real-world applications, there's potential to boost their motivation and help them see math as a subject worth investing in.

Table 7. Level of performance of mathematics proficiency of the respondents.

Level	Numerical Range	F	%
Advanced	33-40	0	0.00
Proficient	25-32	19	6.83
Approaching Proficiency	17-24	86	30.94
Developing	9-16	160	57.55
Beginning	0-8	13	4.68
Total		278	100.00
Mean		15.59	
St. Dev.		4.96	

Table 7 presents the mathematics proficiency levels of the respondents based on their scores in a 40-item test. The results show that most students are struggling with math, as the largest group160 students or 57.55%, falls in the Developing category, scoring between 9 and 16. Another 86 students (30.94%) are Approaching

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Proficiency, suggesting they are close to meeting the expected level but still need improvement. Only 19 students (6.83%) reached the Proficient level, and none achieved an Advanced score, which is concerning for higher-level math readiness. On the lower end, 13 students (4.68%) fall under the Beginning category, indicating a very limited understanding of basic math concepts. The mean score was 15.59, and the standard deviation was 4.96, showing that most scores clustered in the lower range, with relatively little variation. Overall, the data indicates that a majority of students have foundational gaps in mathematics and would benefit from targeted interventions and support to build their skills and confidence.

Table 8. 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	1.094		2	.547	2.725	.067	Not Significant
Within Groups	55.186		275	.201			
Total	56.280		277				

Note: *Significant at p<0.05.

Table 8 presents the results of an ANOVA test examining whether students' attitudes toward mathematics differ based on the academic program they are enrolled in. The analysis shows a p-value of 0.067, which is above the 0.05 significance threshold. This means that while there is some variation in attitude scores across the different programs, the difference is not statistically significant. The F-value of 2.725 suggests a modest level of variation, but not enough to conclude that program enrollment has a real effect on students' attitudes toward math. Therefore, we can interpret this result to mean that students' attitudes are relatively consistent regardless of their academic track, and other factors—such as individual experience, teaching methods, or prior exposure to math may play a more influential role in shaping their mindset.

Table 9. Test of Difference on the mathematics proficiency when grouped by the program enrolled

Source of Variation	Sum of Squares	df	Mean Square	F-value	p-value	Remarks
Between Groups	20.439	2	10.220	0.413	0.662	Not Significant
Within Groups	6802.813	275	24.738			
Total	6823.252	277				

Note: *Significant at p<0.05

Table 9 shows the results of an ANOVA test analyzing whether there are significant differences in mathematics proficiency among students enrolled in different academic programs. The p-value is 0.662, which is much higher than the 0.05 threshold for statistical significance. This means that there is no significant difference in math proficiency based on the program a student is enrolled in. The F-value of 0.413 further confirms that the variation in scores between the groups is minimal and likely due to chance rather than any real effect of program type. In simpler terms, regardless of whether students are in science, business, or humanities programs, their performance in mathematics appears to be generally similar. This suggests that other factors such as teaching quality, personal study habits, or access to resources—may have a greater impact on math performance than the academic program itself.

5. Discussion

The findings from the tables clearly highlight a significant disconnect between students' recognition of the value of mathematics and their actual proficiency and emotional engagement with the subject. While many students reported having access to online resources and basic math books at home, a notable portion (21.58%) lacked any form of math-related materials. This limited exposure could contribute to their low study time, with over 80% of students spending only 1–2 hours weekly on math. Such minimal engagement likely affects their performance, as reflected in Table 7 where 57.55% of respondents are categorized under "Developing" and none reached the "Advanced" level. These findings align with prior research, which shows that students'

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low exposure to structured learning support, both in time and resources hinders their math development (Mensah et al., 2013). Moreover, while students had a positive attitude toward the *value* of math (WM = 3.83), their self-confidence, enjoyment, and motivation remained neutral across the board. This suggests that although they recognize the importance of mathematics in daily life and career success, they lack the personal belief and emotional connection necessary to succeed academically. Studies confirm this gap positive attitudes toward math strongly predict performance, and students with negative or neutral emotional responses often underperform (Subia et al., 2018), (Ghimire, 2021). Even more, recent evidence suggests that teacher attitudes and methods significantly influence student mindset when teachers foster confidence and use engaging methods, student attitudes and outcomes improve considerably (Mensah et al., 2013). In this study, since ANOVA results showed no significant difference in attitudes or proficiency across academic programs, it's likely that universal challenges such as instructional style and study culture are more critical than program-specific factors. To bridge this gap, interventions must focus on both emotional and academic support, cultivating confidence and enjoyment alongside rigorous content instruction.

6. Conclusion

The study reveals that while students generally recognize the value of mathematics in everyday life and future careers, their levels of self-confidence, enjoyment, and motivation toward the subject remain neutral. Most students dedicate limited time to studying math and lack access to adequate learning materials at home, which may contribute to their low proficiency levels. The absence of significant differences in attitude and performance across academic programs suggests that broader factors such as teaching strategies, learning environments, and emotional support play a more critical role. These findings highlight the urgent need for targeted interventions that not only strengthen content knowledge but also build positive attitudes and engagement toward mathematics.

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