Level of Attitude Towards Mathematics among the Grade 11 Students in Bintawan National High School

***C. Julian**

Saint Marys University, Bayombong Nueva Vizcaya

***Correspondence Author**

DOI: https://doi.org/10.47772/IJRISS.2026.10200106

Received: 08 February 2026; Accepted: 13 February 2026; Published: 25 February 2026

ABSTRACT

The main objective of this study was to assess the level of attitude towards mathematics of grade 11 students of Bintawan National High School. This study also included determining the mean differences on the students' level of attitude towards mathematics when they were grouped according to sex and strand. Moreover, it also looked into the influence of sex and strand to the students' level of attitude towards mathematics. The research method was quantitative and utilized descriptive, comparative, and correlational design. The instrument used in this study was a 5-point Likert scale questionnaire adopted from a previous study. The statistical methods used to answer the descriptive questions included frequency, percentage, mean, and standard deviation. Meanwhile, the inferential questions were analyzed using a t-test for independence, one-way ANOVA, repeated measures ANOVA, and multiple linear regression. The result showed that the overall mean level of agreement of the respondents is neutral (mean=3.19, s = .243), this means that the students reflect a combination of positive and negative emotions toward the subject. Among the four domains, the highest mean level of agreement was on factor 2, Value of Mathematics, while the lowest was on factor 1, Self-confidence in mathematics. Both the male and the female respondents had "neutral" description on their level of attitude towards mathematics. Overall, the respondents under the STEM strand had the highest level of attitude towards mathematics (mean=3.70, s=.451) while the last was the respondents under the TVL strand (mean=2.90, s = .618), which was on the neutral level. There was no significant mean difference between the level of attitude towards mathematics of the students when grouped according to sex but a significant mean difference on the level of attitude towards mathematics was evident when grouped according to strand. STEM strand was significantly higher than the level of attitude towards mathematics of the three strands, HUMMS, ABM and TVL. Moreover, the study also revealed that there was a significant mean difference between and among the domains of attitude towards mathematics. Value of mathematics had a significantly higher mean than the other three factors. It was also revealed that between the two independent variables (sex and strand) only strand significantly influences the level of attitude towards mathematics of the respondents. As a conclusion, the level of attitude towards mathematics of the grade 11 students needs to be improved, at least to a positive level. Since the students have different skills and interests but somehow have commonality when grouped according to strand, they should be given appropriate activities and programs corresponding to their skills and interests. Among the four domains considered in this study, more activities or programs should be given along self-confidence in mathematics, enjoyment in mathematics and motivation in mathematics.

Key words: Level of attitude, confidence, value, enjoyment, motivation, strand

INTRODUCTION

Mathematics is one subject that pervades life at any age and in any circumstance. Mathematics can provide the ability to think logically in solving problems, giving high skills in critical thinking, systematic, and creatively to solve problems. The knowledge and skills of students in mathematics are essential in their daily lives in overcoming the difficulties that one may face (Mohamed & Waheed, 2011). Thus, its value goes beyond the classroom and the school, it is very significant for the growth and development of a nation. For this reason, mathematics is one of the subjects that is given a very high regard all over the world. However, recent results in

international assessment like TIMMS and PISA have shown that there are still many countries, like the Philippines, that have poor performance, lower than the average rating in mathematics.

Researchers in the field of mathematics are continuously exerting effort to explore or investigate on factors affecting or influencing the mathematics performance of the students. Various researches found out that one of the most important factors which influences mathematics success levels of students is the students' attitude towards mathematics classes. In 2011, Çanakçı & Özdemir, suggested that students with higher positive attitudes towards mathematics also have higher levels of success. The study of Vusumuzi Ndlovu in 2017, revealed some mixed results ranging from a general weak correlation between attitude in mathematics and the performance of the learners in lower grades to generally high positive correlation in the higher grades. In 2019, Capuno et.al, concluded that students' attitudes and their study habits are significant factors that affect their performance in mathematics. Moreover, in 2021, Hwang and Son discovered a positive relationship between students' attitudes toward mathematics and mathematics achievement. And another study in 2023 by Nazir Haider Shah et.al, their result showed that attitude had an impact on the mathematical achievements of the students.

McLeod (as cited in Ayob and Yasin, 2017) defined attitudes towards Mathematics as emotional responses, which can be positive or negative feelings based on specific reasons. Attitudes (as described in the study of Capuno et. al) are not inherent but the results of students' experiences, which can be changed. However, these are more stable compared to the feelings and emotions of individuals. These are flexible influences of achievement because these are responses to the stimuli provided by education.

In the study of Yasar in 2016, it was shown that the attitudes of the high school students towards mathematics are at medium level, and that there is a meaningful difference between the attitudes of the students towards mathematics classes and the education levels of their fathers and the students' high school types. Moussa and Saal (2022) considered gender and math course levels as variables that could influence students' attitudes toward learning mathematics in six different dimensions. Their data analysis demonstrated that higher education students in the UAE show a positive attitude toward math in most MAQ dimensions. Their result revealed that gender does not affect students' attitudes toward learning mathematics. Moreover, it was also revealed that mathematics course levels have a significant impact on students' attitudes toward math in the six dimensions of MAQ.

Moreover, in PISA results analyses, attitude toward mathematics , especially confidence and motivation , is linked to individual students' PISA mathematics performance and is an important non-cognitive factor. PISA 2022 found that students who reported higher mathematics self-efficacy (confidence in their math ability) tended to score higher in mathematics, even after accounting for socio-economic background (OECD, 2023).

In senior high schools across the Philippines, mathematics remains a core subject for all strands, with students, particularly those in the STEM track, taking multiple mathematics courses. However, the consistently low performance of Grade 12 learners, which includes grade 12 learners of Bintawan National High School, in recent national assessments (NAT) highlights a pressing concern about students' engagement and success in the subject. One possible factor contributing to this outcome is learners' attitude toward mathematics. In response, this study seeks to assess the attitudes of Grade 11 students toward mathematics, considering sex and academic strand as key variables. The findings are expected to provide a meaningful basis for developing targeted programs and interventions aimed at improving students' attitudes and, ultimately, enhancing their mathematical performance.

Research Questions

This study aimed to assess the level of attitude towards mathematics of grade 11 students in Bintawan National High School considering sex and strand as independent variables.

Specifically, this study sought to answer the following questions:

1. What is the level of attitude towards mathematics of the selected grade 11 students when grouped according to sex and strand?

2. Is there a significant difference in the attitude towards mathematics of the students when grouped according to sex and strand?

3. Is there a significant difference among the domains of the students' attitude towards mathematics?

4. Do sex and strand of the students influence their attitude towards mathematics?

METHODOLOGY

Research Design and Sample

This study used descriptive, descriptive-comparative, and descriptive-correlational design. This study focuses on the extent of influence of sex and strand of the selected students to their attitude towards mathematics.

The main subjects of this study were the grade 11 students of Bintawan National High School who were officially enrolled for the school year 2023-2024. The subjects come from the four different strands (STEM, HUMMS, ABM, and TVL) that the school were offering. Out of 213 grade 11 students officially enrolled for the school year 2023-2024, only 120 subjects were selected as subjects. The selection of subjects was done using a combination of the non-proportionate stratified random sampling and the simple random sampling. Non-proportionate stratified random sampling was used to make sure that each of the strand and both sexes will be well represented. Then simple random sampling was made in selecting subjects from each strand and from each sex. Table 1 on the next page shows the frequency distribution of the subjects.

Table 1. Frequency distribution of the subjects.

Strand	**Male**	**Female**
STEM	12	18
HUMMS	14	16
ABM	12	18
TVL	15	15
Total:	**53**	**67**

Data Collection and Instruments

During the scheduled date (according to the availability of the subjects) of data gathering, questionnaires were distributed to the selected subjects and the researcher gave the necessary instructions on how to accomplish the questionnaire. The subjects were given enough time (maximum of 15 minutes) to accomplish the questionnaire. The results were then recorded and organized. The Gantt chart below shows the schedule of data collection.

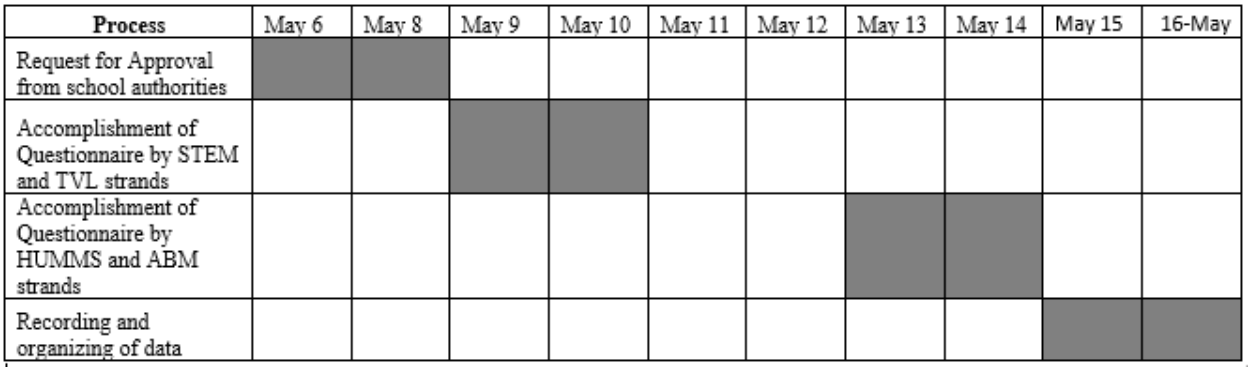

Figure 2. Gantt chart on the schedule of data collection.

This study used a questionnaire adopted from the study of Capuno et.al in 2019, which they also adopted from the ATMI by Tapia and Marsh (2004). The questionnaire consisted of two parts. Part 1 contains the profile of the respondents such as their sex and strand. Part 2 contains statements describing the attitudes of the respondents towards mathematics. This construct was measured using four variables such as Self-confidence, Value, Enjoyment, and Motivation. The Self-confidence in mathematics has 12 positively worded indicators, while the Value of Mathematics has seven positively worded items. The instrument was validated by three content experts from DepEd using the Survey Instrument Validation Rating Scale being used by DepEd-Nueva Vizcaya. The mean validity rating by the validators was 3.92, which means that the instrument was highly valid. In addition, the reliability test result of the instrument was a Cronbach apha coefficient of .945, which means that the questionnaire was very reliable.

The students were asked to indicate their rate of agreement using a 5-point Likert scale. The rates 1,2,3,4,5 means 'Strongly disagree', 'Disagree', 'Neutral', 'Agree' and 'Strongly disagree', respectively. In order to arrive at a certain interpretation of data the scale of interpretation as shown in table 2 .

Table 2. Scale of interpretation on the level of students' attitude towards mathematics.

SCALE	**DESCRIPTION**	
	Level of agreement	**Level of attitude**
4.50 – 5.00	Strongly Agree	Very Positive
3.50 - 4.49	Agree	Positive
2.50 – 3.49	Neutral	Neutral
1.50 – 2.49	Disagree	Negative
1.00 – 1.49	Strongly Disagree	Very Negative

Data Analysis

To determine the average level of attitude towards mathematics of the subjects when grouped according to sex and strand, descriptive statistics, particularly, simple frequency count and percentage were used.

The t-test for independence was used to determine if there is a significant difference between the level of students' attitude towards mathematics when grouped according to sex. While One way ANOVA was used to determine if there was a significant difference between or among the level of students' attitude towards mathematics when grouped according to strand. The level of significance that was used for both the t-test for independence and the one-way ANOVA was 0.05 and both unidirectional (2-tailed).

To determine if there was a significant difference between or among the domains of the students' attitude towards mathematics, repeated measures ANOVA was utilized.

Lastly, the multiple regression analysis was used to determine if sex and strand influences or predicts the students' attitude towards mathematics.

Ethical Consideration

Declare measures considered. Approved ethical clearance, communication, and signed informed consent might be required by the editor/reviewer assigned.

RESULTS AND DISCUSSION

Level of Attitude towards Mathematics

Level of agreement in each indicator

Along Factor 1 (Self confidence in Mathematics), the result revealed that on the average, respondents had a "neutral" level of agreement in all the indicators. However, in terms of the mean, the highest agreement (Mean=3.29, s=1.02), was on indicator 9, "*I hope to do genuinely well in any mathematics class I take"*, and the lowest (Mean=2.85, s=.913) was on indicator 3, "*Studying mathematics does not make me feel nervous"*. This result coincides with the study of Naungayan (2022) where the students lowest mean was on "*Studying mathematics does not make me feel nervous".* The pooled mean on factor 1 was 3.00 (Neutral), s=.116. This means that the self-confidence of the respondents on mathematics was on neutral level. This result coincides with the findings of Capuno (2019) that the high school respondents had neutral attitudes on their confidence in learning math. However, it is inconsistent with the findings of Simbulas et.al (2023) that the grade 10 students have a positive level of self-confidence in mathematics.

Out of seven indicators in factor 2, value of mathematics, the respondents had a level of agreement as "agree" on four indicators (2,3,4,6) and three indicators (1,5,7) under "neutral". In terms of mean, the highest (mean=3.83, s=1.087) was on indicator 2, *"I want to develop my mathematical skills"*. This result coincides with the study of Naungayan (2022), that the highest among the indicators was *"I want to develop my mathematical skills"* (mean=4.22). Meanwhile, the lowest (mean= 3.30, s=1.009) was indicator 7, *"I can consider numerous ways that I use math outside of school"*. The pooled mean of factor 2 was 3.54 (Agree), s=.168. This means that the respondents value mathematics was on the positive level. This result coincides with the findings of Capuno (2019) that high school respondents had positive attitudes in terms of the value of math. Also, it corroborates with the findings of Simbulas et.al (2023) that the grade 10 students see the importance of mathematics in a positive level.

Under factor 3, Enjoyment in mathematics, the result show that the respondents had a "neutral" level of agreement on all of the indicators. The highest in terms of the mean (mean=3.26, s=.835) was indicator 4, *"I would want to complete a task in math than to compose an exposition"*. While the lowest was indicator 6 (mean=2.98, s=1.012), *"I am happier in a mathematics class than in any other class"*. The pooled mean of factor 3 was 3.14 (Neutral), s=.089. This means that the enjoyment of the respondents in mathematics was on neutral level. This result coincides with the findings of Capuno (2019) that high school respondents had neutral attitudes when it comes to the enjoyment that math

The result also revealed that the respondents had a level of agreement of "neutral" on four of the indicators (1,2,3,4) in factor 4, Motivation in mathematics, while they have "agree" level on only one indicator (5). The highest mean was indicator 5 (mean=3.58, s=1.010), *"A strong math background could help me in my professional life"*, while the lowest was indicator 2 (mean=3.11, s=.924), "*I might want to utilize math in tertiary study"*. The pooled mean was 3.25 (Neutral), s=.190. This means that the motivation of the respondents in mathematics was on neutral level. This result coincides with the findings of Capuno (2019) that high school respondents had neutral attitudes in their motivation to learn math.

Overall, the mean level of agreement of the respondents to all the indicators was 3.19 (Neutral), s=.243. Among the four domains, the highest mean level of agreement was on factor 2, Value of Mathematics, while the lowest was on factor 1, Self-confidence in mathematics. This means that the mean level of attitude towards mathematics of the respondents was classified as "Neutral". This finding agrees with the study of Yasar (2016) Yasar in 2016, where it was shown that the attitudes of the high school students towards mathematics were at medium level and also with the study of Libradilla et.al (2023) which showed that students have medium or neutral level of attitude towards mathematics. But the finding disagrees with the study of Mazana (2019) that Tanzanian high school students have a positive level of attitude towards mathematics which was similar to the findings of Tamayo (2021) that students in 2nd year level have positive attitude towards mathematics. And also inconsistent with the study of Hwang and Son (2021) that Asian students had a negative attitude towards mathematics. Similarly, it

is also inconsistent with the study of Agah et.al (2022) which showed that the attitude of secondary students in Nigeria within the study area to Mathematics were mostly negative.

Level of attitude when grouped according to sex and strand

Table 5 shows the level of attitude towards mathematics of the male and female respondents. It can be gleaned from the table that out of 53 male respondents, only 1 (1.89%) had a very positive attitude towards mathematics, 12 (22.64%) had a positive attitude, 33 (62.26%) had a neutral attitude, 7 (13.21%) had a negative attitude, and 0 (0%) had a very negative attitude. This means that most of the male respondents had a neutral attitude towards mathematics. This was being justified by the overall level of attitude towards mathematics of the male respondents which was 3.19 (Neutral), s =.672.

Meanwhile, it can also be seen from the table that out of 67 female respondents, 0 (0.00%) had a very positive attitude towards mathematics, 28 (41.79%) had a positive attitude, 34 (50.75%) had a neutral attitude, 5 (7.46%) had a negative attitude, and 0 (0%) had a very negative attitude. This means that most of the female respondents had a neutral attitude towards mathematics. This was being justified by the overall level of attitude towards mathematics of the female respondents which was 3.27 (Neutral), s =.515.

Both the male and the female respondents had "neutral" description on their level of attitude towards mathematics. However, if we compare the means, the female respondents had a higher mean attitude towards mathematics than the male respondents. This result does not agree with the result of the study of Shah (2023) that male students had higher attitude in mathematics than the female students.

Table 5. Frequency and percent distribution of the level of attitude towards mathematics grouped according to sex.

Level of attitude	*Male*		*Female*	
	Frequency	*Percent*	*Frequency*	*Percent*
Very Positive	1	1.89	0	0.00
Positive	12	22.64	28	41.79
Neutral	33	62.26	34	50.75
Negative	7	13.21	5	7.46
Very Negative	0	0.00	0	0.00
Total	53	100.00	67	100.00

Mean(Male) = 3.19 (Neutral), s=.672

Mean (Female) = 3.27 (Neutral), s=.515

When the respondents were grouped according to strand, it can be gleaned from table 6 that those that were from the STEM strand, there was only 1 (3.33%) who had a very positive attitude towards mathematics, 19 (63.33) had positive attitude, 10 (33.33) had neutral attitude, while no one had a negative nor a very negative attitude. For the HUMMS strand, 3 (10%) had a positive attitude towards mathematics, 24 (80%) had a neutral attitude, 3 (10%) had a negative attitude and none had a very positive nor a very negative attitude towards mathematics. For the ABM strand, 13 (43.33%) had a positive attitude towards mathematics, 16 (53.33%) had a neutral attitude, 1 (3.33%) had a negative attitude and no one had a very positive nor a very negative attitude towards mathematics. Meanwhile, for the TVL, 5 (16.67%) had a positive attitude towards mathematics, 17 (56.67%)

had a neutral attitude, 8 (26.67%) had a negative attitude and no one had a very positive nor a very negative attitude towards mathematics.

Overall, the respondents under the STEM strand had the highest level of attitude towards mathematics (mean=3.70, s=.452) which was on the positive level. Second was the respondents under the ABM strand (mean=3.32, s=.528) which was on the neutral level. Third was the respondents under the HUMMS strand (mean=3.01, s = .400) which is also on the neutral level. Last was the respondents under the TVL strand (mean=2.90, s = .618), which was also on the neutral level.

Table 6. Frequency and percent distribution of the level of attitude towards mathematics grouped according to strand.

Level of attitude	***STEM***		***HUMMS***		***ABM***		***TVL***	
	F	*%*	*F*	*%*	*F*	*%*	*F*	*%*
Very positive	1	3.33	0	0.00	0	0.00	0	
Positive	19	63.33	3	10.00	13	43.33	5	16.67
Neutral	10	33.33	24	80.00	16	53.33	17	56.67
Negative	0	0.00	3	10.00	1	3.33	8	26.67
Very negative	0	0.00	0	0.00	0	0.00	0	0.00
Total	30	100.00	30	100.00	30	100.00	30	100.00

Mean(STEM) = 3.70 (Positive), s=.452

Mean (HUMMS) = 3.01 (Neutral), s=.400

Mean(ABM) = 3.32 (Neutral), s=.528

Mean (TVL) = 2.90 (Neutral), s=.618

Mean difference between the level of attitude towards mathematics.

According to sex.

Table 7 reveals the result of the independent t-test between the mean level of attitude towards mathematics of the male and the female respondents. The result shows that t(118)=-700, p>.05. This implies that the mean difference on the level of attitude towards mathematics between the male and the female respondents was not significant. This means that the male and female respondents have similar or comparable level of attitude towards mathematics. The result corroborates with the study of Agah et.al (2022) that there is no significant difference between male and female students' attitude towards mathematics. However, it does not agree with the result of the study of Shah (2023) that male students had significantly higher attitude in mathematics than the females.

Table 7. Independent t-test between the mean level of attitude towards mathematics of the male and female respondents.

	N	Mean	Std. Deviation	df	t	p-value
Male	53	3.19	.672	118	-.700	.485
Female	67	3.27	.515			

Significance level is at .05

According to strand.

Table 7 shows the result of one-way ANOVA on the mean difference on the attitude towards mathematics among the different strands. It can be seen from the table that Brown-Forsythe (3,104.71) = 14.85, p<.05. This implies that there was significant mean difference on the level of attitude towards mathematics between or among the different strands.

Table 7. Result of One-way ANOVA on the mean difference on the attitude towards mathematics among the different strands.

	N	Mean	Std. Deviation	Sig
STEM	30	3.70	.451	Brown-Forsythe(3,104.71) =14.85 p<.05
HUMMS	30	3.01	.400	
ABM	30	3.32	.528	
TVL	30	2.90	.618	

Significance level is at .05

Table 8 shows the Bonferroni post-hoc test and it reveals that the attitude towards mathematics of the respondents belonging to the STEM strand was significantly higher than the level of attitude towards mathematics of the three strands, HUMMS, ABM and TVL. Also, the ABM strand had a significantly higher level of attitude towards mathematics compared to the TVL strand. The ABM strand and the HUMMS strand had no significant difference on their mean level of attitude towards mathematics. Likewise, HUMMS strand and TVL strand had no significant difference between their mean level of attitude towards mathematics.

This result encompasses with the study of Moussa and Saali (2022) where it was revealed that mathematics course levels have a significant impact on students' attitudes toward math. Note that STEM strand has advance mathematics subjects like precalculus and calculus, which the other strands do not have.

Table 8. Result of Bonferroni post-hoc test.

(I) Strand	(J) Strand	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
STEM	HUMMS	.68700*	.13072	.000	.3361	1.0379
	ABM	.37900*	.13072	.027	.0281	.7299
	TVL	.79333*	.13072	.000	.4425	1.1442
HUMMS	STEM	-.68700*	.13072	.000	-1.0379	-.3361
	ABM	-.30800	.13072	.121	-.6589	.0429
	TVL	.10633	.13072	1.000	-.2445	.4572
ABM	STEM	-.37900*	.13072	.027	-.7299	-.0281
	HUMMS	.30800	.13072	.121	-.0429	.6589
	TVL	.41433*	.13072	.012	.0635	.7652
TVL	STEM	-.79333*	.13072	.000	-1.1442	-.4425
	HUMMS	-.10633	.13072	1.000	-.4572	.2445
	ABM	-.41433*	.13072	.012	-.7652	-.0635

*. The mean difference is significant at the 0.05 level.

Mean difference on the domain of attitude towards mathematics

As a result of the use of repeated measures ANOVA, table 10 shows that Huynh-Feldt with F(2.355)=37.896, p<.05 and eta^2=.242. This implies that there was a significant mean difference between and among the domains

of attitude towards mathematics. As seen in the table, value of mathematics had a significantly higher mean than the other three factors namely: self-confidence, enjoyment in mathematics and motivation in mathematics. Motivation in mathematics had a significantly higher mean than self-confidence. Similarly, enjoyment in mathematics had a mean which was significantly higher than self-confidence. However, there was no significant mean difference between enjoyment in mathematics and motivation in mathematics. This means that value of mathematics was the most developed domain of attitude towards mathematics among the respondents while self-confidence in mathematics was the lowest domain of attitude towards mathematics that has been developed among the respondents. Furthermore, enjoyment in mathematics and motivation in mathematics were domains that were comparable among the respondents.

Table 10. Result of the repeated measures ANOVA on the mean difference among the domains of respondents' attitude towards mathematics.

Domain	**Mean**	**SD**	**N**	**Huynh-Feldt**
Self-confidence	3.00^{a}	.569		F(2.355)=37.896
Value of Mathematics	3.54^{b}	.749	120	p<.05
Enjoyment in mathematics	3.14^{c}	.712		eta2=.242
Motivation in mathematics	3.25^{c}	.714		

Note: Different superscript means there is significant mean difference.

Influence of sex and strand to the level of attitude towards mathematics

Based on the results from the multiple linear regression analysis as shown in table 11, for the variable sex, the standardized coefficient beta is 0.046, with a corresponding t-value of -0.147 and a p>.05. This means that sex does not significantly influence the level of attitude towards mathematics of the respondents. This result encompasses with the study of Moussa and Saal (2022) that gender does not affect students' attitudes toward learning mathematics. On the other hand, along the variable strand, the standardized coefficient beta is -.0388 with a corresponding t-value of -0.294 and a p<.05. This means that strand significantly influences the level of attitude towards mathematics of the respondents. The study of Moussa and Saal (2022) revealed that mathematics course levels have a significant impact on students' attitudes toward math.

In addition, the multiple linear regression model (*Attitude toward mathematics= 3.658 + .082 Sex – 0.204 strand)* for attitudes towards mathematics yielded an R square of 0.155 and an adjusted R square of .140, suggesting a relatively weak explanatory power of the model. These findings suggest that other factors not included in the analysis may have a stronger impact on attitudes towards mathematics.

Table 11. Result of multiple linear regression on the influence of sex and strand on the respondents' attitude towards mathematics.

	Unstandardized Coefficient	**Standardize Coefficient**		
	B	**Beta**	**t**	**Sig.**
Constant	3.658		17.970	.000
Sex	.055	.046	-.147	.588
Strand	-.204	-.388	-.294	.000

Dependent Variable: Attitude Towards Mathematics

R square=0.155, Adjusted R square = .140, F=10.706

Attitude toward mathematics= 3.658 + .082 Sex – 0.204 strand

CONCLUSION AND RECOMMENDATIONS

Based from the findings of this study, the attitude toward mathematics among Grade 11 students requires improvement, ideally progressing to a consistently positive level. Students in the HUMMS, ABM, and TVL strands, regardless of sex, were found to exhibit neutral attitudes, reflecting a combination of positive and negative emotions toward the subject. Improving these attitudes has the potential to enhance mathematics performance, leading to better outcomes in national assessments such as the NAT. Moreover, implementing similar interventions at earlier grade levels could positively influence international assessments, including PISA, where research shows that students' confidence, motivation, and overall attitude toward mathematics are closely linked to their performance (OECD, 2023). Evidence from prior studies reinforces this relationship. Hwang and Son (2021) identified a positive correlation between students' attitudes toward mathematics and their achievement, while Nazir Haider Shah et al. (2023) demonstrated that attitude significantly impacts mathematical performance.

Findings of this study also further highlights the influence of academic strand on students' attitudes, suggesting that strand-specific programs and activities should be designed to align with students' skills and interests. In contrast, sex was not found to significantly affect attitude, allowing for common activities to be applied to both male and female students.

Furthermore, among the four domains assessed, targeted interventions should prioritize enhancing self-confidence, enjoyment, and motivation in mathematics. However, continued attention is also necessary even in areas where students already perceive mathematics positively, value of mathematics, to foster a very positive attitude. This perspective aligns with Capuno et al. (2019), who emphasize that attitudes are not innate but are shaped by experiences and, therefore, can be developed and strengthened through deliberate educational strategies.

By cultivating positive attitudes toward mathematics, educators not only support individual student growth and achievement but also contribute to broader educational outcomes and the development of a mathematically competent society.

Based on the foregoing conclusions, the following are recommended:

1. Provide activities or programs in mathematics that improves the level of attitude of the students and these should be appropriate depending on the strand of the students. The responses of the students from this study may be considered as basis in designing appropriate activities.

2. Teachers should provide more activities or programs along self-confidence in mathematics, enjoyment in mathematics and motivation in mathematics to improve the students' level of attitude in mathematics.

3. Similar studies shall be conducted but researchers may consider other factors, aside from strand, that may possibly significantly influence the students' level of attitude towards mathematics.

4. Researchers may consider using the questionnaire which was the product of factor analysis in this study in conducting similar study.

REFERENCES

1. Agah, M. & Thankgod, O. (2022). "Studentsâ€™ Attitude towards Mathematics and Academic Performance in Public Senior Secondary Schools Madagali Local Government Area, Adamawa State," International Journal of Research and Innovation in Social Science, International Journal of

Research and Innovation in Social Science (IJRISS), vol. 6(6), pages 587-592, June. Retrieved from: https://ideas.repec.org/a/bcp/journl/v6y2022i6p587-592.html

2. Capuno, Reylan & Necesario, Renante & Etcuban, Jonathan & Espina, Raymond & Padillo, Gengen & Manguilimotan, Ramil. (2019). Attitudes, Study Habits, and Academic Performance of Junior High School Students in Mathematics. International Electronic Journal of Mathematics Education. 14. 10.29333/iejme/5768. Retrieved from: https://www.researchgate.net/publication/333003467 Attitudes Study_Habits_and_Academic_Performance_of_Junior_High_School_Students_in_Mathematics
3. Hwang, Sunghwan & Son, Taekwon. (2021). Students' Attitude toward Mathematics and its Relationship with Mathematics Achievement. Journal of Education and e-Learning Research. 8. 272-280. 10.20448/journal.509.2021.83.272.280. Retrieved from: https://www.researchgate.net/publication/353950349_Students'_Attitude_toward_Mathematics_and_its_Relationship_with_Mathematics_Achievement
4. Libradilla, Aiziel & Bacatan, Rhea Jay & Misoles, Pedrito & Morales, Davie. (2023). Examining the Association between Attitude towards Mathematics and Student Achievement. 4. 1040-1046. Retrieved from: https://www.researchgate.net/publication/372625115 Examining_the_Association_between Attitude_towards_Mathematics_and_Student_Achievement
5. Mazana, M. Y., Montero, C. S., & Casmir, R. O. (2019). Investigating Students' Attitude towards Learning Mathematics. International Electronic Journal of Mathematics Education, 14(1), 207-231. https://doi.org/10.29333/iejme/3997. Retrieved from: https://www.iejme.com/article/investigating-students-attitude-towards-learning-mathematics-3997
6. Moussa, N. M., & Saali, T. (2022). Factors Affecting Attitude Toward Learning Mathematics: A Case of Higher Education Institutions in the Gulf Region. Sage Open, 12(3). https://doi.org/10.1177/21582440221123023. Retrieved from: https://journals.sagepub.com/doi/10.1177/21582440221123023?icid=int.sj-abstract.citing-articles.4
7. Naungayan, Regie. (2022). Attitude towards Mathematics and Mathematics Achievement of Secondary School Learners in Banayoyo- Lidlidda District. 10.13140/RG.2.2.27714.45763. Retrieved from: https://www.researchgate.net/publication/358365132_Attitude_towards_Mathematics_and_Mathematics_Achievement_of_Secondary_School_Learners_in_Banayoyo-_Lidlidda_District
8. Ndlovu, Vusumuzi (2017) Grade 10-12 learners' attitude towards mathematics and how the attitudes affect performance, University of the Witwatersrand, Johannesburg, <http://hdl.handle.net/10539/25733. Retrieved from: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://core.ac.uk/download/pdf/188776028.pdf
9. Organisation for Economic Co-operation and Development. (2023). PISA 2022 results (Volume V): Learning strategies and attitudes for life. OECD Publishing. https://doi.org/10.1787/c2e44201-en
10. Shah, Nazir Haider & Nazir, Nadia & Arshad, Mahek & Akhter, Khatiba & Shaheen, Abdul & Younas, Sidra & Ghazanfar, Faheem & Jammu, Azad & Kashmir, & Pakistan,. (2023). Paper-Effect of Students Attitude Towards Mathematics on their Mathematical Achievement at… Effect of Students Attitude Towards Mathematics on their Mathematical Achievement at Secondary School Level. International Journal of Emerging Technologies in Learning (iJET). 18. 10.3991/ijet.v18i12.38765. Retrieved from: https://www.researchgate.net/publication/371755426_Paper-Effect_of Students Attitude_Towards_Mathematics_on_their_Mathematical_Achievement_at_Effect_of_Students_Attitude_Towards_Mathematics_on_their_Mathematical_Achievement_at_Secondary_School_Level
11. Simbulas, V. G. ., Salva, E. T., & Simbulas, L. J. C. . (2023). Online Teaching Competencies, Attitude Towards Mathematics and Academic Achievement of Grade 10 Learners in Geometry: a Path Analysis. East Asian Journal of Multidisciplinary Research, 2(7), 3015–3038. https://doi.org/10.55927/eajmr.v2i7.4947. Retrieved from: https://journal.formosapublisher.org/index.php/eajmr/article/view/4947
12. Sürücü, Lütfi & Yikilmaz, İbrahim & Maslakci, Ahmet. (2022). Exploratory Factor Analysis (EFA) in Quantitative Researches and Practical Considerations. 10.31219/osf.io/fgd4e. Retrieved from: https://www.researchgate.net/publication/366149753_Exploratory_Factor_Analysis_EFA_in_Quantitative_Researches_and_Practical_Considerations
13. Tamayo, s. (2021). University students' attitudes and mathematics performance: a correlational analysis. International Journal of Arts, Sciences and Education, 2(1), 265–278. Retrieved from

https://www.ijase.org/index.php/ijase/article/view/76. Retrieved from: https://www.ijase.org/index.php/ijase/article/view/76

14. Wangdi , Karma. 2023. "Improving Students' Attitude towards Mathematics to Enhance Their Achievement in Mathematics: An Action Research". Asian Journal of Education and Social Studies 49 (3):392-402. https://doi.org/10.9734/ajess/2023/v49i31164. Retrieved from: https://journalajess.com/index.php/AJESS/article/view/1164
15. Yasar, Metin. (2016). High School Students' Attitude towards Mathematics.Eurasia Journal of Mathematics, Science and Teacnology, 2016, 12(4), 931-945. Retrieved from: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ejmste.com/download/high-school-students-attitudes-towards-mathematics-4518.pdf