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Student - Related Factors Affecting Students' Performance in General Mathematics

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ABSTRACT

The study determined the student- related factors perceived to affect the academic performance of students in General Mathematics at the Grade 11 level at Claveria School of Arts and Trades. The study employed a descriptive-correlational approach, utilizing questionnaires as the primary data collection method. The participants in this study comprised 171 randomly selected Grade 11 students enrolled during the school year 2023-2024 in Claveria School of Arts and Trades. The gathered data were coded, tabulated, and analyzed using the Statistical Package for the Social Sciences (SPSS). Mean and percentage distributions were utilized to identify the student-related factors perceived to influence their performance in General Mathematics. Data interpretation was conducted using the five-point Likert scale, respectively. The correlation between student-related factors and performance in General Mathematics were tested by Multiple linear regression. The Grade 11 students in Claveria School of Arts and Trades exhibit a "very Satisfactory" performance, as evaluated through the Grading Sheet. Specifically, attitude towards General Mathematics, and self - efficacy as perceived by the student-respondents is 'agreeable' or 'favorable.' Study habits as perceived by the respondents are 'often' towards the academic performance of Grade 11 students. The exploration of relationships between perceived student-related factors and performance highlights significant connections between attitude and performance, as well as self-efficacy and performance. However, the absence of a statistically significant relationship with study habits prompts further investigation in this area.

Keywords: *Student-related factors; performance; general mathematics; attitude; study habit; self-efficacy*

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INTRODUCTION

Education is significantly one of the key factors in creating a human resource essential for a country's development in every aspect. In a broad sense, education refers to any activity that significantly impacts the development of an individual's cognitive abilities, skills, and attitudes. It encompasses various disciplines that need to be taught and learned. Mathematics, as one of the most established disciplines, is part of curricula worldwide.

Globally, Mathematics holds recognition as one of the most vital subjects within the school curriculum, serving as the cornerstone of scientific and technological knowledge that plays a vital role in a nation's socioeconomic development.

Mathematics has an important role in the daily life of every individual. It impacts all aspects of human life at various levels. As a key subject in schools, colleges, and universities in both developed and developing countries, mathematics serves as a bridge for all knowledge. There is a widespread belief that basic mathematical knowledge is essential for progress in any field. Mathematics stands as a core subject within the secondary school curriculum. As stated by Karakolidis A. et. In 2016, a country cannot develop and become economically independent if science and technology are not its foundation. In today's competitive environment, lacking mathematical knowledge and expertise can greatly impede an individual's ability to thrive.

The K-12 program integrated into the Philippine Basic Education Curriculum represents a significant change and is considered key for the nation's advancement. Despite encountering numerous challenges during its implementation over the years, this development is significant as enhancing the quality of education is necessary for the country's success. It has been seven years since the Philippines adopted this new basic education system, which includes an additional two years compared to the previous system. However, critics persist in their assertion that the country is not adequately prepared for this transition, citing widespread public opposition encountered during the planning stage. Specifically, issues in Mathematics instruction have been encountered by school administrators and teachers across different grade levels.

Understanding Mathematics is a vital skill that students must acquire. It constitutes an integral part of the K–12 curriculum and holds significant importance across various educational domains. Among the subjects within this discipline is General Mathematics, a foundational course for Grade 11 students and a prerequisite for Statistics and Probability. Beyond academic qualifications, General Mathematics equips students with essential skills for their future endeavors, regardless of their chosen career paths.

Despite its significance, Mathematics remains a subject that many students struggle to grasp. Poor understanding of Mathematics is a prevalent issue in many countries globally, including the Philippines in Asia. The Philippines is encountering similar trends, pressures, and concerns. Previous research has extensively examined student academic achievement as a primary focus.

The seventh year of SHS implementation continues to indicate students' difficulty learning General Mathematics ideas, as documented in many educational contexts. The prerequisite nature of mathematics for many subjects, coupled with low academic achievement and lack of interest, particularly in STEM fields, poses a significant concern The findings from the Trends in International Mathematics and Science Study (TIMSS) 2019 underscore this, indicating that the Philippines was positioned lowest among the 58 countries included, with a score of only 297 in mathematics. Moreover, the latest result of 2022 Program for International Student Assessment (PISA) is also alarming since the country ranked second lowest in mathematics out of the 79 participating countries, going from 353 in 2018 to 355 in 2022. Indications suggest that there wasn't a notable

difference in the Philippines' performance in PISA 2022 when compared to 2018.

Moreover, according to the 2018 National Achievement Test (NAT) Result among Grade 6, Grade 10, and Grade 12 in the whole Region 2, the region's proficiency and accuracy in all subject areas, as demonstrated in the results of 21st Century Skills and tested learning areas, did not exceed the 75% level. Among the result of Grade 10 and Grade 12, mathematics has the lowest Mean Percentage Score (MPS) that result to low mastery level on that particular subject.

Mathematics is often perceived as one of the most challenging subjects in school, despite its importance. Mathematics encompasses the exploration of assumptions, characteristics, and their practical applications in the real world. When teaching Mathematics, it is imperative to maintain the sequence of assumptions, properties, and applications. This structured approach is vital for achieving the intended teaching objectives in Mathematics (Yadav, 2017). Given the significance of Mathematics, it is essential for students to build a solid mathematical base to skillfully utilize its concepts in everyday situations.

Therefore, as aspiring Mathematics educators, the researchers undertake a study aimed at identifying student-related factors that impact academic performance. This study will serves as a valuable resource for teachers, providing insights to develop innovative instructional materials and employ diverse, effective teaching strategies.

The identified factor is student-related factors which are attitude, study habit, and self- efficacy. This research was focused on the Claveria School of Arts and Trades in Claveria, Cagayan.

MATERIALS AND METHODS

Research Design

The research employed quantitative approach. This approach allows the researcher to collect numerical data to be analyze using statistical methods. The research utilized a descriptive-correlational research design, aimed at identifying the correlation between two or more variables. In this investigation, the independent variables comprised perceived student-related variables influencing students' performance in General Mathematics, while the dependent variable was the students' performance in General Mathematics.

Sampling Technique

Table 1. Population and Sample Size of Grade 11 Students Enrolled in General Mathematics.

Strand	Population	Sample
ABM	22	12
STEM	72	**40**
HUMSS	69	**38**
Automotive	72	40
Carpentry	24	14
Hardressing	14	8
ICT	16	**9**
Cookery	18	10
Total	**307**	**171**

The study used a stratified random sampling technique to choose the participants. The participants are the Grade 11 students particularly those who are taking the general mathematics course. This provides a more specific and targeted sample for the research, allowing for a more in-depth analysis of the student-related factors that affects their performance in the subject. Specifically, it used Raosoft Online Calculator to calculate the sample size that was shown in table 1.

Locale of the Study

The research was carried out at Claveria School of Arts and Trades, situated in Centro 1, Claveria Cagayan. The school offers both Academic Track options including Science Technology Engineering and Mathematics (STEM), Accountancy and Business Management (ABM), and Humanities and Social Sciences (HUMSS), as well as Technical Vocational Livelihood (TVL) Track options such as Information Computer Technology (ICT), Automotive, Carpentry, Cookery, and Hairdressing.

Claveria is a municipality located in the northeastern part of the province of Cagayan in the Philippines. It is situated on the eastern coast of Luzon Island, facing the Pacific Ocean. Claveria School of Arts and Trades is located in the town proper, in Barangay Centro Uno, which is one of the 42 barangays of the municipality. The school is located along the National Highway and is easily accessible by public transportation.

Research Instruments

The study used two data collection techniques: questionnaires and data of their quarterly grade. The questionnaires are used to gather data regarding the factors influencing students' performance in General Mathematics. A structured questionnaire of Laranang, J. and Bondoc J. (2020) who revealed that the identified factor, student-related factor who had a substantial impact on student performance. The quarterly grade is collected through the record of their subject teacher in the Claveria School of Arts and Trades in General Mathematics.

Data Gathering Procedure

Permission to administer the questionnaire to the Grade 11 students of Claveria School of Arts and Trades is obtained from the office of the principal through a request letter. Then upon approval, the researchers personally meet their participants, then explain and distribute the purpose of the questionnaire. The questionnaire comprised student-related factors that impact students' performance in General Mathematics which are study habit, attitude, and self- efficacy.

Analysis of the Data/ Statistical treatment

The collected data were recorded, tabulated, summarized, analyzed, and then interpreted according to the objectives of this study. The following statistical treatments were employed.

The weighted mean was employed to ascertain the SHS students' perceptions of the degree to which the factors that were identified impact their performance in mathematics. This was delineated using the Likert scale as depicted below.

The following scale was employed to describe the evaluation of the respondents' attitude towards General Mathematics:

Point	Range	Descriptive Value	Description Equivalent
5	4.21–5.00	Always	Highly Favorable
4	3.41–4.20	Often	Favorable
3	2.61–3.40	Sometimes	Moderately Favorable
2	1.81–2.60	Seldom	Slightly Favorable
1	1.00–1.80	Never	Not Favorable

The following scale was employed to describe the assessment of the respondents' study habit towards General Mathematics:

Point	Range	Descriptive Value	Description Equivalent
5	4.21–5.00	Strongly Agree	Highly Favorable
4	3.41–4.20	Agree	Favorable
3	2.61–3.40	Uncertain	Moderately Favorable
2	1.81–2.60	Disagree	Slightly Favorable
1	1.00–1.80	Strongly Disagree	Not Favorable

The following scale was employed to describe the assessment of the respondents' self-efficacy towards General Mathematics:

Point	Range	Descriptive Value	Description Equivalent
5	4.21–5.00	Strongly Agree	Highly Favorable
4	3.41–4.20	Agree	Favorable
3	2.61–3.40	Uncertain	Moderately Favorable
2	1.81–2.60	Disagree	Slightly Favorable
1	1.00–1.80	Strongly Disagree	Not Favorable

Multiple linear regression was used to determine cause-and-effect relationship of the student-related factors and performance in General Mathematics.

RESULTS AND DISCUSSION

This chapter provides an overview of the data collected, organized, summarized, analyzed, and interpreted to tackle the research questions posed. The data were sourced from the responses given by the participants through the survey questionnaire. Finally, the chapter presents the study's findings, upon which conclusions and recommendations are drawn.

Student- Related Factors Perceived Affecting Students' Performance in General Mathematics

In this study, student-related factors refer to factors perceived to impact the performance of Grade 11 students in General Mathematics. These factors are further categorized into

Attitude on the Subject

Table 1. Attitude of the respondents towards General Mathematics subject

No.	Indicators	Mean	Descriptive Value	Description Equivalent
1	I used to come early in attending my mathematics class.	4.22	Always	Highly Favorable
2	Most of the topics in the subject are new to me.	3.84	Often	Favorable
3	My mind is kept inactive in this subject. *	2.71	Sometimes	Moderately Favorable
4	I ask for further explanation and example of the topics which are not clear to me.	3.77	Often	Favorable
5	I actively participate in class discussion.	3.86	Often	Favorable
6	I locate other materials for reference in the subject topics.	3.59	Often	Favorable
7	I feel uneasy going to the board in my math class. *	2.45	Seldom	Slightly Favorable
8	The lesson is clear to me when I am in my math class, but when I am at home, I tend to forget the lesson.	3.63	Often	Favorable
9	Mathematics is a challenging subject but is neither too easy nor too hard for me.	3.84	Often	Favorable
10	As I learn more about the subject, I am confident that I could learn the content.	3.85	Often	Favorable
11	I am confident in my ability to successfully complete all class assignments and requirements in the subject.	3.80	Often	Favorable
12	The variety of materials, exercises, illustrations, and so on helps me keep my attention in the subject.	3.89	Often	Favorable
13	It is clear to me how mathematics subject is related to things I already know and what is happening in real-life scenarios.	3.73	Often	Favorable
14	I am lazy to read and analyze problems or situations to be solved. *	3.12	Sometimes	Moderately Favorable
15	I feel hesitant to do my assignments at home. *	3.40	Seldom	Slightly Favorable
Composite Mean		**3.69**	**Often**	**Favorable**

**-for negative statements, the scale was reverted.*

Table 1 provides an overview of the respondents' outlook on the General Mathematics subject. The statement "I used to come early in attending my mathematics class" received the highest weighted mean of 4.22, indicating a 'Highly favorable' perception. Conversely, the statement "I feel uneasy going to the board in my math class" garnered the lowest mean of 2.45 verbally interpreted as 'Slightly favorable'.

The overall weighted mean of attitude towards the subject is 3.69 that is verbally interpreted as 'often' or 'favorable'. The findings showed that most students have agreeable attitude towards mathematics, particularly the

enthusiasm or readiness to enhance their mathematical abilities, is essential for students in their everyday lives. According to Getahun et al. (2016), the significant regard for mathematics might stem from students' recognition of the emphasis placed on scientific disciplines within the learning structure and the vital role mathematics plays in these fields. Similarly, participants in the current study exhibited a high regard for mathematics in terms on their attitude. Furthermore, the study of Haw and King (2023) revealed positive convictions indicating that Filipino students highly esteem effort in improving one's mathematical proficiency and view mathematics as beneficial in their everyday activities.

Study Habit

Table 2. Perceived study habits of students in the General Mathematics subject.

No.	Indicators	Mean	Descriptive Value	Description Equivalent
1	I do my assignments regularly.	4.13	Agree	Favorable
2	I exert more effort when I do difficult assignments.	3.89	Agree	Favorable
3	I spend my vacant time in doing assignments or studying my lessons.	3.60	Agree	Favorable
4	I study the lessons I missed if I was absent from the class.	3.79	Agree	Favorable
5	I study and prepare for quizzes and tests.	3.75	Agree	Favorable
6	I study harder to improve my performance when I get low grades.	4.18	Agree	Favorable
7	I spend less time with my friends during school days to concentrate more on my studies.	3.55	Agree	Favorable
8	I prefer finishing my studying and my assignments first before watching any television program.	3.87	Agree	Favorable
9	I see to it that extracurricular activities do not hamper my studies.	3.64	Agree	Favorable
10	I have a specific place of study at home which I keep clean and orderly.	3.92	Agree	Favorable
11	I enjoy solving problems even if it is late in the morning or late in the afternoon.	3.47	Agree	Favorable
12	I used to review previous topics before I proceed to the new lesson.	3.71	Agree	Favorable
13	I devote more time studying math than other subjects.	3.47	Agree	Favorable
14	I do an advance reading and learning in the subject.	3.50	Agree	Favorable
15	I used to review previous topics before I proceed to the new lesson.	3.61	Agree	Favorable
Composite Mean		**3.74**	**Agree**	**Favorable**

Table 2 illustrates the students' study habits in the General Mathematics subject. The statement "I study harder to improve my performance when I get low grades" attained the highest weighted mean of 4.18, categorized as 'favorable', while the statement "I enjoy solving problems even if it is late in the morning or late in the afternoon" received the lowest mean of 3.47, also described as 'favorable'.

The total weighted mean of study habit is 3.47 with a descriptive value ‘favorable’ means that the students are studying often in General Mathematics. This finding is reinforced by Sakirudeen and Sanni (2017) found that study habits like note-taking, utilizing the library, and

allocating study time influenced students' academic performance. They also recommended the establishment of group counseling sessions in schools facilitated by professional counselors to promote awareness of effective study habits and the provision of well-equipped libraries in secondary schools, which could potentially enhance students' performance in mathematics.

Self-efficacy

Table 3. Perceived self-efficacy of students in General Mathematics subject

No.	Indicators	Mean	Descriptive Value	Description Equivalent
1	I feel confident enough to ask questions in my mathematics class	3.64	Agree	Favorable
2	I believe I can do well on a mathematics test	3.64	Agree	Favorable
3	I believe I can complete all the assignments in a mathematics course	3.74	Agree	Favorable
4	I believe I am the kind of person who is good at mathematics	3.45	Agree	Favorable
5	I believe I will be able to use mathematics in my future career when needed	4.05	Agree	Favorable
6	I believe I can understand the content in a mathematics course	3.68	Agree	Favorable
7	I believe I can get an "A" when I am in a mathematics course	3.51	Agree	Favorable
8	I believe I can learn well in a mathematics course	3.77	Agree	Favorable
9	I feel confident when taking a mathematics test	3.52	Agree	Favorable
10	I believe I am the type of person who can do mathematics	3.53	Agree	Favorable
11	I feel that I will be able to do well in future mathematics courses	3.58	Agree	Favorable
12	I believe I can do the mathematics in a mathematics course	3.51	Agree	Favorable
13	I can think like a mathematician	3.21	Agree	Favorable
14	I feel confident when using mathematics outside of school	3.58	Agree	Favorable
15	I feel confident while solving math problems	3.54	Agree	Favorable
Composite Mean		3.60	Agree	Favorable

Table 3 presents the self-efficacy of students in the General Mathematics subject. The statement "I believe I will be able to use mathematics in my future career when needed" achieved the highest weighted mean of 4.05, categorized as 'favorable', while the statement "I believe I can think like a mathematician" received the lowest mean of 3.21, also described as 'favorable'.

The overall weighted mean of self-efficacy is 3.60, with a descriptive value of 'favorable', indicating that students demonstrate favorable self-efficacy in General Mathematics. This suggests that the majority of respondents agree that their self-efficacy in mathematics can be advantageous in their future careers. They also believe that maintaining a positive self-confidence in mathematics will assist them in their future endeavors. Additionally, respondents expressed confidence in asking questions during mathematics classes, indicating their interest and willingness to learn topics they may not fully grasp. This suggests that students actively engage in both the teaching and learning process alongside their peers and educators.

Level of Performance of the Grade 11 Students in Claveria School of Arts and Trades

Table 4. Respondents' level of performance in General Mathematics.

Range	Frequency	Descriptive Value
90 and above	37	Outstanding
85 – 89	92	Very Satisfactory
80 – 84	39	Satisfactory
75 – 79	3	Fairly Satisfactory
74 and below	0	Did not meet expectation
Mean - 86.75		**Very Satisfactory**

Table 4 presents the Grade 11 students' performance which has a mean of 86.75 which was verbally interpreted as 'very satisfactory'. This was assessed based on their 1st quarter grade in General Mathematics, which was documented in the Grading Sheet and the Form 138 (Report Card).

The evaluation results show that among the 171 Grade 11 student-respondents, 37 or 22% were rated as "Outstanding", 92 or 54% were rated as "Very Satisfactory", 39 or 23% were rated as "Satisfactory", and 3 or 18% were rated as "Fairly Satisfactory". No one was rated as "Did not meet expectation". One possible reason for this outcome could be the implementation of DepEd Order No. 8, Series of 2018, which mandates that Grade 11 and 12 learners who fail a unit/set of competencies must immediately undergo remedial classes. They must pass summative examinations during remediation to avoid failing a learning area subject. This measure aims to prevent students from having back subjects in Senior High School (SHS). However, if a learner still fails remedial classes, they must retake the subject they failed during the summer or as a back subject. This policy was further clarified by DepEd Order No. 13, s. 2018. Guidance teachers and career advocates are tasked with providing support to SHS students in their track choices. As a result of this policy, students who undergo remediation strive to avoid failure or having back subjects.

Relationship Student-Related Factors Perceived Affecting Students' Performance in General Mathematics

Table 5. Correlates between the perceived factors to influence the performance of the respondents and their performance in general mathematics.

Factors	Coefficients	Standard Error	t Stat	P-value	Remarks
Intercept	69.6164	2.04195	34.0944	3.89E-77	–
Attitude	0.1219	0.5688	2.1436	0.033514*	Significant
Study Habits	0.7199	0.4966	1.4498	0.148985	Not Significant
Self-Efficacy	0.2683	0.4518	5.9384	1.62E-08**	Significant

Y=mx+b

Y=Attitude (0.1219) + Efficacy (0.2683) + 69.62

*** - Significant @0.01* ** - Significant @ 0.05*

Table 5 reveals the relationship between the student-related factors influencing students' performance in General Mathematics. Through regression analysis, three variables have been identified as determinants of performance in General Mathematics among Grade 11 students at Claveria School of Arts and Trades. These are the attitude with the coefficient 0.1219, and self-efficacy with the coefficient 0.2683. The regression model is Y = Attitude (0.1219) + Efficacy (0.2683) + 69.62. This means that the attitude of the students towards General Mathematics contributes 12.19% of their performance General Mathematics, and, 26.83% students' level of self-efficacy towards their performance in General Mathematics. The other portion of the performance in General Mathematics might be contributed by the other factors not included in this study.

The outcome of the regression analysis confirms the findings of Mensah & Okyere (2019) study, who concluded that students' performance in mathematics is tightly correlated to their attitudes and it plays an important role to their academic performance. Further said that students' academic performance will be higher if they have a highly positive attitude in mathematics This aligns with the findings of Prakash (2011), as cited by

Bondoc (2020), which suggest that our drives, motives, and emotions, primarily our instincts, influence our interests. Additionally, in another study titled "Creating an Interest in Learning Science" by Paris and Turner (as cited by Laranang, 2020), it is emphasized that interest plays a crucial role in motivating students to study. When a learner is interested in a subject area, they are more likely to develop healthy study habits that facilitate the expansion of knowledge. Recognizing the importance of mathematics in their lives would further motivate respondents to engage with mathematics concepts.

CONCLUSION

The study found a positive attitude among students, indicating attitude among students, indicating enthusiasm for mathematics. It also found significant connections between attitude and performance, self-efficacy, and performance, but no significant relationship with study habits.

RECOMMENDATIONS

Drawing from the aforementioned findings and conclusions, the researcher respectfully proposes the following recommendations:

1. Students should develop a positive study habit, and self-efficacy towards the subject by actively engaging in group tutorial sessions.
2. Students might dedicate more effort to improving their attitudes towards mathematics by bolstering their self-confidence, thereby increasing their motivation to learn the subject.
3. Parents can support and assist their children when facing challenges in their studies.
4. Innovative teaching techniques can help educators enhance students' attitudes, study habits, and self-efficacy in mathematics by capturing their curiosity about mathematical concepts.
5. Further research studies could be conducted to identify additional factors influencing students' performance in General Mathematics.

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