# CHALLENGES ENCOUNTERED AND MATHEMATICS PERFORMANCE OF GRADE 11 LEARNERS



# PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

Volume: 27 Issue 1 Pages: 54-62 Document ID: 2024PEMJ2540 DOI: 10.5281/zenodo.13986318 Manuscript Accepted: 09-07-2024

# **Challenges Encountered and Mathematics Performance of Grade 11 Learners**

Marivic A. Itong,\* Roselle A. Operiano, Genalyn P. Sumaylo, Jimmy D. Bucar, Gyllevi Prylle F. Bongato For affiliations and correspondence, see the last page.

## Abstract

This research determined the challenges encountered and the mathematics performance of the Grade 11 students at San Isidro National High School in Tagbilaran City Schools Division for the school year 2023-2024 as the basis for an action plan using descriptive correlational research design. Forty-three (43) students participated in the study and were identified using random sampling. The data gathered were treated using frequency count, percentage, and Pearson's r. The results revealed that most respondents are 17 years old, followed by 16 years old, and 18 years old. The gender distribution within each age group shows that females outnumber males in the 16 and 17-year-old categories, while males are more represented in the 18-year-old group. For mothers, the most common educational attainment levels are College Graduate and High School Graduate, followed by High School and College Level. Only one mother has a Graduate Studies degree, and none have completed Post-graduate Studies. The most common educational attainment among fathers is College Graduate, followed by College Level and High School Graduate. Most respondents have a family income between 10,957 and 21,194 pesos per month. It is concluded that while most respondents demonstrate proficiency in mathematics, they still encounter significant challenges in learning the subject. The respondents' profile, including age, gender, parents' educational attainment, and family income, provides insight into the students' diverse backgrounds. Although the study did not find a statistically significant relationship between the challenges faced and mathematics performance, addressing these challenges remains crucial for fostering a positive learning environment and promoting student success. Hence, it is recommended that the action plan crafted will be utilized.

Keywords: teaching mathematics, challenges encountered, mathematics performance, descriptive-correlational

## Introduction

Mathematics education is foundational for senior high school students, not just as a subject but as a critical tool for various life skills and further education. In senior high school, students encounter at least two mathematics subjects: General Mathematics and Statistics and Probability. These subjects equip students with the analytical and problem-solving skills for crossing real-world challenges and decisions. General Mathematics fosters an understanding of concepts that underpin financial literacy, geometry, and algebra, while Statistics and Probability introduce students to data interpretation, risk assessment, and decision-making under uncertainty, crucial for informed citizenship and professional fields ranging from science to economics (Casinillo et al., 2020).

However, the mastery of mathematics among senior high school students faces notable challenges, highlighted by the recent results of the Programme for International Student Assessment (PISA) 2022. Studies indicate that students exhibit varying degrees of mathematical literacy, with a significant portion struggling with basic algebraic concepts and needing more confidence in their mathematical abilities. This is concerning as mathematical literacy is imperative for both academic and everyday life. A substantial number of students were operating below the expected level of competency, indicating a disconnect between curriculum objectives and student outcomes (Utomo et al., 2022).

Meanwhile, in the Tagbilaran City Divisions, particularly in Cogon National High School, Mansasa National High School, and San Isidro High School, there is a noted research gap in understanding the specific difficulties and barriers to effective mathematics education. To date, no studies have explored this problem in the chosen locale. Thus, there is a need to conduct the study to accurately assess and tailor the intervention to cater to the changing needs of 21st-century learners.

Along this line, this study aimed to bridge the research gap by identifying the root causes of students' challenges in learning mathematics in relation to their academic performance, focusing particularly on the selected schools in Tagbilaran City Divisions. The benefits of this research include the development of targeted instructional strategies, curriculum adjustments, and student support systems designed to enhance mathematical proficiency. The researchers believe that it will lay a foundation for a more comprehensive and holistic approach to teaching mathematics with the end goal of preparing students for the demands of their future careers and daily life.

#### **Research Questions**

This study aimed to assess the challenges encountered and mathematics performance of the Grade 11 students at the identified public high schools in Tagbilaran City Schools Division for the school year 2023-2024 as basis for a proposed action plan. Specifically, this study sought to answer the following sub-problems:

- 1. What is the respondents' level of challenges encountered in learning Mathematics?
- 2. What is the respondents' level of performance in mathematics?

3. Is there a significant relationship between the challenges encountered by the respondents and their performance in Mathematics?

# **Literature Review**

Learning mathematics in senior high school encompasses a wide range of experiences and challenges for students, significantly influenced by their attitudes, learning styles, and the instructional approaches adopted by educators. Casinillo et al. (2020) found that students' attitudes towards mathematics, including mathematics anxiety and resilience, significantly impact their learning experiences and academic performance.

Students with a positive attitude towards mathematics viewed it as interesting despite its challenges, and those who experienced mathematics anxiety, particularly females, found their learning experience negatively affected. It also found that senior high school students tend to be visual learners in mathematics, indicating a preference for visualizing numbers, equations, and concepts (Casinillo et al., 2020).

Senior high school students often face challenges in learning mathematics that can significantly impact their academic performance. These challenges can range from mathematics anxiety Ongcoy et al. (2023) to factors such as poor attitudes towards mathematics (Awoniyi & Amponsah, 2023), low academic performance due to various school-related, teacher-related, and student-related factors (Asamoah, 2020), and even issues related to online learning readiness and mathematics anxiety (Galinggan, 2021). The lack of motivation has been identified as a key factor contributing to disengagement in dealing with challenging mathematics (Ng, 2021).

Studies have also explored the impact of various interventions on students' mathematics performance. For instance, the influence of journal writing on students' attitudes towards mathematics was investigated (Guce, 2018), as well as the effects of mathematical games on academic performance (Akanmu & Adeniyi, 2021). Furthermore, research has inquired into the use of different teaching approaches, such as mathematics modeling (Riyanto et al., 2019), interactive learning videos (Wijaya et al., 2020), and the comparison between traditional face-to-face and e-learning modes of teaching geometry (Bornaa et al., 2023).

A study by Picat (2023) explored factors affecting the academic performance of Grade 11 students in General Mathematics in Tabuk City District, highlighting that age, gender, parents' educational attainment, and family income are significantly related to academic performance in Mathematics. Specifically, the performance level was found to be 'average,' with attitudes towards Mathematics, study habits, family's guidance, and the support system being crucial for better academic outcomes.

Alegre and Falle (2023) identified the challenges faced by Grade 11 students using a modular approach to learn Mathematics in Zambales, Philippines. The study found that challenges such as subject matter content, delivery and retrieval of modules, and family support rated as "challenging" by the students.

Moreover, factors like cognitive styles (Sianturi et al., 2022), mathematical resilience (Awofala, 2021), and students' attitudes towards mathematics Syamsuri & Bahtiar (2023) have been studied to understand their correlation with academic outcomes in mathematics. The importance of mathematical communication skills (Lidinillah & Cahya, 2021), mathematical reasoning abilities (Firdausy et al., 2021), and reflective thinking ability Apendi & Prabawanto (2020) has also been highlighted in enhancing students' performance in mathematics.

Davis (2021) found that Ghanaian students value connections, understanding, fluency, learning technologies, feedback, instructional materials, open-endedness, and problem-solving in their mathematics learning. Rangka (2019) emphasized the need for a constructive classroom environment to maintain academic motivation and achievement, particularly in relation to gender differences. These studies collectively underscore the multifaceted importance of mathematics learning in senior high school. Tapado (2023) also suggested that pre-recorded lessons and home tutorial sessions significantly enhance the academic performance in Mathematics of Grade 11 students, indicating a practical approach to addressing learning challenges.

Anabo (2023) of Eastern Samar showed that learners and home factors had a significant impact on Mathematics performance, while school factors did not show a significant effect. Despite factors like prior academic achievement, parental education, income, and access to learning materials (like cellphones and books), significant impacts on mathematics performance correlated with learner and home factors. School factors, however, had no significant impact. This indicates a need for increased parental involvement, improved school learning materials and facilities, and ongoing monitoring of learner progress with interventions, particularly for those struggling academically in the context of "new normal" education.

In capsule, learning mathematics in senior high school presents complex challenges and influences that shape student experiences and performance outcomes. Existing studies explores factors like student attitudes (including anxiety), learning styles, instructional approaches, and external challenges like online learning or socio-economic factors. Studies have also investigated interventions like journal writing, games, and different teaching methodologies to improve performance.

However, there is a research gap in explicitly identifying the relationship between senior high school students' diverse challenges and their direct impact on mathematics performance. Moreover, further investigation is needed to understand how these challenges might differ based on location, gender, or the specific mathematics subjects being studied.

#### **Research Design**

This research utilized descriptive correlational design via survey method in investigating the interplay between the challenges encountered in learning mathematics and academic performance among senior high school students. A descriptive-correlational design is a non-experimental research method that describes and measures the degree of association between two or more variables without manipulating them (Aggarwal & Ranganathan, 2019). It serves to answer "what is" questions, employing methods like surveys, observational studies, and case studies to provide a comprehensive understanding of the subject at hand without delving into causal relationships.

#### Respondents

The respondents of this study were the Grade 11 students from the selected schools in tTagbilaran City Division. To ensure representativeness, a stratified random sampling technique will be employed using Randomizer.org. The sample size will be determined using Cochran's formula with a 95% precision rate and a 5% margin of error. Table 1 outlines the distribution of respondents across the schools: Cogon National High School (N=156), Mansasa National High School (N=120), and San Isidro High School (N=43).

Table 1. Distribution of the Respondents				
Name of Schools	Ν	п	%	
Cogon National High School	156	90	48.90	
Mansasa National High School	120	69	37.62	
San Isidro High School	43	25	13.48	
Total	319	184	100%	

To participate in this study, respondents had to be Grade 11 students enrolled at Cogon National High School, Mansasa National High School, or San Isidro High School. They had to provide informed consent, demonstrate the ability to understand the study instruments, and have no diagnosed cognitive impairments that could significantly hinder their participation. Students who had recently transferred had excessive absences or needed more specific mathematics prerequisites were excluded.

#### Instrument

This research utilized a researcher-made survey questionnaire composed of two parts. The first part focused on capturing demographic information such as age, gender, parent's educational attainment, and family income, which helped in understanding the background of the respondents and potentially correlating these factors with their experiences in learning mathematics.

The second part was designed to assess the level of challenges students encountered in mathematics. It employed a Likert scale ranging from 4 - always, 3 - often, 2 - sometimes, to 1 - never across 30 indicators, covering various aspects of mathematical learning difficulties, including understanding complex concepts, memorization of formulas, and application of math in the real world.

To ensure the accuracy and consistency of the findings, the survey tool underwent rigorous validation and reliability testing. The validation process involved subjecting the survey tool to expert review, where specialists in mathematics education and survey design assessed the relevance and comprehensiveness of the questions, ensuring they accurately captured the intended constructs related to the challenges in learning mathematics.

In addition, a pilot study was conducted with a smaller, representative sample of the target population to identify any ambiguities or biases in the questionnaire, allowing for refinements before the full-scale deployment. Reliability testing, through methods such as Cronbach's alpha, evaluated the consistency of responses across the survey items. For example, the Cronbach's alpha for the 30-item survey was calculated to be 0.87, indicating a high level of internal consistency. This step was crucial for confirming that the survey provided stable and reliable measurements across different administrations, thereby bolstering the credibility of the study's conclusions.

#### Procedure

Preliminary Stage. The researchers initiated the formal procedure by seeking approval from the Schools Division Superintendent (SDS) of Tagbilaran City to conduct the study within the jurisdiction of the schools under his supervision. Upon securing the endorsement from the Schools Division Office (SDO), the researchers proceeded to extend formal communication to district supervisors and principals of the targeted schools through well-prepared letters. These letters aimed not only to request participation but also to orient the principals about the objectives, significance, and scope of the study, thereby establishing a transparent and collaborative relationship between the researchers and the educational institutions involved.

Data Gathering Stage. The researchers emphasized the ethical conduct of the study by administering informed consent forms to all respondents. This process ensured that participants were fully aware of the study's nature, their role in it, and the confidentiality of their responses, thus upholding the ethical principles of autonomy and respect for persons. The survey tool, designed in a checklist format, facilitated ease of response while minimizing the potential for bias, as participants selected from predetermined options. To ensure a high retrieval rate, measures such as follow-up communications, reminders, and possibly incentives for completion were implemented.

Post-Data Gathering Phase. The process of data analysis began with the careful tallying and collation of responses from both hard copy questionnaires and Google Forms. Utilizing the Statistical Package for the Social Sciences (SPSS), the researchers analyzed the data to draw meaningful conclusions. To maintain confidentiality and protect the identity of the respondents, a coding system was employed, assigning unique identifiers to each participant's data. This measure ensured that personal information was detached from the responses, thereby safeguarding the privacy of the participants while allowing for a comprehensive analysis of the collected data.

#### Data Analysis

The researchers analyzed the data using the Statistical Package for Social Sciences (SPSS) version 29. Descriptive and inferential statistics were employed in analyzing the data. To ensure the assumptions of normality were met, the researchers used normality testing methods such as the Shapiro-Wilk or Smirnov-Kolmogorov tests, which were crucial for validating the applicability of many parametric statistical tests (e.g., Pearson r). The following specific statistical tools were utilized:

Frequency Count. This tool was used for quantifying how often specific responses occurred within each category. This helped identify common challenges and prevailing student characteristics.

Percentage. This tool was used to express proportions of student responses relative to the whole sample. Percentages clarified the distribution of demographic factors and how widespread certain challenges were.

Weighted Mean. This tool was used to calculate average levels of challenges encountered and student performance, considering potential variations in how 'strongly' respondents experienced different challenges.

Pearson's r. This tool was utilized to test the significance of the linear relationship between the challenges encountered by the respondents and their academic performance in Mathematics. This revealed if there was a positive or negative association, as well as its strength.

## **Results and Discussion**

This section sequentially presents the results and findings of the study which aimed to assess the challenges encountered and mathematic performs of the Grade 11 students at San Isidro National High School, Tagbilaran City Schools Division for the school year 2023-2024 as basis for a proposed action plan.

#### **Challenges Encountered in Learning Mathematics**

Table 2 presents the level of challenges encountered by the respondents in learning mathematics across 30 indicators. The aggregate weighted mean of 2.69 indicates that, overall, the respondents are "Challenged" in learning mathematics.

 Table 2. Level of Challenges Encountered by the Respondents in Learning Mathematics

Tuon	Tuble 2. Level of Chantenges Encountered by the Respondents in Dearning Inducements						
S/N	Indicators	WM	Verbal Description				
1	I am struggling to understand complex mathematical concepts	2.72	Challenged				
2	I find it difficult to memorize formulas and procedures	2.72	Challenged				
3	I have trouble grasping abstract ideas and theories	2.65	Challenged				
4	I am struggling with word problems and applying math concepts to real world situations	2.70	Challenged				
5	I find it challenging to follow along during lessons on general mathematics	2.79	Challenged				
6	I get confused by mathematical notation and terminology in statistics	2.79	Challenged				
7	I am struggling to understand the logic behind mathematical reasoning	2.72	Challenged				
8	I have difficulties comprehending lectures and classroom explanations of probability	2.63	Challenged				
9	I feel intimidated by the pace at which new general math topics are introduced	2.77	Challenged				
10	I find it difficult to complete statistics homework assignments independently	2.74	Challenged				
11	I am struggling to prepare sufficiently for exams and quizzes on probability	2.81	Challenged				
12	I feel anxious when asked to answer questions or solve problems in class about general mathematics	2.79	Challenged				
13	I have difficulties retaining information from previous lessons and chapters on statistics	2.79	Challenged				
14	I find it hard to concentrate during long periods of math instruction on probability	2.77	Challenged				
15	I am struggling to understand the connections between various mathematical concepts covered in	2.67	Challenged				
	general mathematics						
16	I have trouble visualizing and manipulating mathematical operations mentally in statistics	2.60	Challenged				
17	I find it difficult to identify areas where remedial work is needed in probability	2.70	Challenged				
18	I am struggling with multi-step mathematical calculations and procedures in general math	2.60	Challenged				
19	I have difficulties understanding and interpreting mathematical language and symbols used in statistics	2.51	Challenged				
20	I feel overwhelmed by the amount of material covered in lessons and homework on probability	2.84	Challenged				
21	I lack self-confidence when tackling new mathematical operations and concepts in general	2.67	Challenged				
	mathematics		-				
22	I am struggling to connect classroom math concepts in statistics with practical applications	2.74	Challenged				
23	I have difficulties asking for help when needed with probability topics	2.49	Less Challenged				
24	I find general mathematics homework time-consuming and demanding	2.51	Challenged				
25	I lack effective study techniques specific to learning statistics	2.51	Challenged				
			-				

Psych Educ, 2024, 27(1): 54-62, Document ID:2024PEMJ2540, doi:10.5281/zenodo.13986318, ISSN 2822-4353	
Research Article	



26	I find mathematical symbols and graphs difficult to interpret in probability	2.60	Challenged
27	I am struggling to use formulas correctly when solving general mathematics problems	2.72	Challenged
28	I have difficulties analyzing and explaining mathematical reasoning in statistics	2.67	Challenged
29	I find it hard to stay focused when working independently on probability problems	2.77	Challenged
30	I get confused by complex terminology used in general mathematics	2.81	Challenged
	Aggregate Weighted Mean	2.69	Challenged

Legend: 3.25-4.00-Extremely Challenged; 2:50-3.24- Challenged; 1.75-2.49- Less Challenged; 1.00-1.74-Not Challenged

Looking at the individual indicators, the majority of the items have a verbal description of "Challenged," with weighted means ranging from 2.51 to 2.84. The top three challenges faced by the respondents are: feeling overwhelmed by the amount of material covered in lessons and homework on probability (WM=2.84), struggling to prepare sufficiently for exams and quizzes on probability (WM=2.81), and getting confused by complex terminology used in general mathematics (WM=2.81). Only one indicator, "I have difficulties asking for help when needed with probability topics," has a verbal description of "Less Challenged" (WM=2.49).

The results suggest that the respondents face significant challenges in various aspects of learning mathematics, including understanding complex concepts, applying math to real-world situations, comprehending lectures, and preparing for assessments. The challenges span across different branches of mathematics, such as general mathematics, statistics, and probability.

To address these challenges, educators and administrators may consider implementing targeted interventions and support systems. These could include providing additional resources and learning materials, offering remedial classes or tutoring services, and adopting teaching strategies that cater to different learning styles. Encouraging a positive learning environment, promoting active student engagement, and fostering a growth mindset towards mathematics can also help students overcome the challenges they face. Regular feedback and assessment of students' progress can help identify areas where further support is needed. Collaboration among teachers, parents, and school administrators is crucial in developing comprehensive strategies to support students in their mathematics learning journey.

Interestingly, the study of Lumbantoruan (2023), Widiati and Sthephani (2018 and Serin (2023) shed light on the significant challenges students face in learning mathematics, such as mastering complex variable materials, understanding theorems in real analysis, and grappling with the abstract nature of mathematics itself. These challenges lead to difficulties in mastering facts and concepts, with high rates of difficulty reported for both.

#### **Academic Performance in Mathematics**

Table 5. Level of Mathematics Performance of the Respon				
	Level	Numerical Range	f	%
	Advanced	90-100	7	16.28
	Proficient	85-89	22	51.16
	Approaching Proficiency	80-84	14	32.56
	Developing	75-79	0	0.00
	Beginning	Below 75	0	0.00
Total			43	100.00
Mean		86.21		
St. Dev.			3	.72

Table 2 I and of Mathematics Doutoman as of the Desman dants

Table 3 presents the level of mathematics performance of the respondents.

The data shows that most of the respondents (51.16%) are in the Proficient level, followed by Approaching Proficiency (32.56%) and Advanced (16.28%). No respondents fall under the Developing or Beginning levels. The mean score of 86.21 indicates that, on average, the respondents' mathematics performance is within the Proficient range. The standard deviation of 3.72 suggests a relatively low dispersion of scores around the mean.

The results indicate that the respondents generally perform well in mathematics, with most of them demonstrating proficiency or nearproficiency in the subject. The absence of respondents in the Developing and Beginning levels suggests that the sample group has a solid foundation in mathematics and can meet the expected standards.

However, it is important to consider the challenges faced by the respondents in learning mathematics, as presented in Table 5. Despite their overall proficiency, the respondents still encounter significant difficulties in various aspects of mathematics learning. This highlights the need for continuous support and intervention to help students overcome these challenges and maintain or improve their mathematics performance.

Analyzing the relationship between the level of challenges faced and the level of mathematics performance can provide insights into how these challenges may impact student achievement. Also, examining the factors that contribute to the respondents' success in mathematics, such as effective teaching strategies, learning resources, and student motivation, can inform best practices for promoting mathematics proficiency.

The findings contravened with recent studies showing poor proficiency of Filipino learners in Mathematics. According to Bernardo et

al (2022), more than half of Filipino students scored below the lowest proficiency level in the 2018 Programme for International Student Assessment (PISA) mathematics assessment, with students from public schools performing worse than those from private schools.

Moreover, the study of Etcuban et al (2019) suggest that factors such as socio-economic background, teacher and parent involvement, and teaching methodologies significantly impact students' mathematical abilities and attitudes towards the subject, contributing to the challenges in mathematics performance among students in the Philippines.

#### Relationship between Challenges Encountered and Academic Performance in Mathematics

Table 4 presents the results of a statistical test examining the relationship between the challenges encountered by the respondents in learning mathematics and their mathematics performance. The test uses the Pearson correlation coefficient (r) to measure the strength and direction of the relationship, and the p-value to determine the statistical significance of the correlation.

Table 4. Test of significant relationship between the challenges encountered by the respondents and their Mathematics performance

performance					
Variables	r-value	Strength of	p - value	Decision	Result
		Correlation			
Challenges and Mathematics	-0.266	Negligible Negative	0.085	Do not reject	Not
Performance				Ho	Significant
*significant at p<0.05 (two-tailed)					

The results show a negligible negative correlation (r = -0.266) between the challenges faced and mathematics performance, suggesting that as the level of challenges increases, there is a slight tendency for mathematics performance to decrease. However, since the p-value of 0.085 is greater than the significance level of 0.05, the correlation is not statistically significant. Therefore, the null hypothesis (Ho) of no significant relationship between the challenges encountered and mathematics performance cannot be rejected.

The lack of a statistically significant relationship between the challenges faced and mathematics performance may be due to various factors. It is possible that the respondents have developed coping mechanisms or received support that helps them overcome the challenges and maintain their performance.

Notably, research studies have shed light on the relationship between challenges faced by students in learning mathematics and their mathematics performance, aligning well with the results. Recent literature suggests that while challenges may influence performance slightly, they do not substantially hinder it. A study by Cóndor-Herrera & Ramos-Galarza (2020) on the impact of technological interventions on mathematical skills found that such challenges did not significantly deter performance, indicating that students might develop coping strategies or benefit from external support mechanisms.

Furthermore, another study highlighted that the perceived difficulty of tasks could modulate the relationship between self-efficacy and mathematics performance, suggesting that students might effectively manage challenges by adjusting their engagement according to the difficulty level of tasks (Street, Stylianides, & Malmberg, 2022). These findings imply the complexity of factors influencing mathematics performance and highlight the importance of contextualized teaching strategies to mitigate the impact of learning challenges.

# Conclusions

The study conducted on Grade 11 students at San Isidro National High School, Tagbilaran City Schools Division for the school year 2023-2024 reveals that while the majority of the respondents demonstrate proficiency in mathematics, they still encounter significant challenges in learning the subject. The respondents' profile, including age, gender, parents' educational attainment, and family income, provides insight into the diverse backgrounds of the students. Although the study did not find a statistically significant relationship between the challenges faced and mathematics performance, addressing these challenges remains crucial for fostering a positive learning environment and promoting student success.

Based on the salient findings of the study, the following recommendations are given:

Implement differentiated teaching strategies. Teachers should adopt teaching methods that cater to the diverse learning needs and styles of the students. This can include using visual aids, hands-on activities, and collaborative learning approaches to make mathematics more engaging and accessible to all learners.

Provide additional learning resources and support. Schools should invest in high-quality learning materials, such as textbooks, educational software, and online resources, to supplement classroom instruction. Additionally, offering remedial classes, tutoring services, or peer mentoring programs can help students who are struggling with specific mathematics concepts or skills.

Foster a positive learning environment. Educators should create a supportive and inclusive classroom atmosphere that encourages student participation, promotes a growth mindset, and celebrates effort and progress. Regular feedback, praise, and recognition of students' achievements can boost their confidence and motivation in learning mathematics.

Enhance teacher professional development. Schools should provide ongoing professional development opportunities for mathematics



teachers to stay updated with the latest teaching strategies, technologies, and best practices in mathematics education. This can include workshops, seminars, or collaborations with educational experts to enhance teachers' skills and knowledge in addressing students' learning challenges.

Strengthen home-school partnerships. Engaging parents and guardians in their children's mathematics education can significantly contribute to student success. Schools should establish regular communication channels with parents, provide them with resources and guidance on how to support their children's learning at home, and involve them in school activities and events related to mathematics. Collaborating with parents can help create a consistent and supportive learning environment for students both at school and at home.

## References

Akanmu, M. and Adeniyi, C. (2021). Effects of mathematical games on senior secondary students' academic performance in mathematics in ejigbo, osun state, nigeria. Attarbawiy Malaysian Online Journal of Education, 5(1), 1-9. https://doi.org/10.53840/attarbawiy.v5i1.1

Aggarwal, R., & Ranganathan, P. (2019). Study designs: Part 2 – Descriptive studies. Perspectives in Clinical Research, 10, 34 - 36. https://doi.org/10.4103/picr.PICR\_154\_18.

Alegre, K., & Falle, T. (2023). Challenges in Using Modular Approach in Mathematics to Senior Students in Zambales Philippines. East Asian Journal of Multidisciplinary Research. https://doi.org/10.55927/eajmr.v2i7.5376.

Anabo, R. (2023). CORRELATES OF MATHEMATICS PERFORMANCE OF GRADE 9 LEARNERS IN SECONDARY SCHOOLS DIVISION OF EASTERN SAMAR AMIDST PANDEMIC. EPRA International Journal of Multidisciplinary Research (IJMR). https://doi.org/10.36713/epra13649.

Apendi, F. and Prabawanto, S. (2020). Analysis of student's mathematical reflective thinking ability in number pattern.. https://doi.org/10.4108/eai.12-10-2019.2296421

Asamoah, D., Sundeme, B., Quainoo, E. A., Adom-Fynn, D., Yalley, C. E., & Afrane, R. (2020). Schoolenvironment, Teacher-related and Student Related Factors: Critical Causes of Low Academic Performance of Senior High School Students in Core Mathematics in the Kumasi Metropolis of Ghana. Journal of Educational and Psychological Research, 2(1), 3-15.

Awofala, A. (2021). A validation of the mathematical resilience scale for twelfth graders through confirmatory factor analysis and its relationship with achievement in mathematics in nigeria. Sn Social Sciences, 1(8). https://doi.org/10.1007/s43545-021-00212-8

Awoniyi, F. and Amponsah, K. (2023). Positive attitudes toward mathematics among senior high school students in cape coast metropolis. Journal of Education and Learning (Edulearn), 17(2), 183-194. https://doi.org/10.11591/edulearn.v17i2.20531

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84(2), 191-215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice-Hall.

Bandura, A. (1988). Self-efficacy conception of anxiety. Anxiety Research, 1(2), 77-98. https://doi.org/10.1080/10615808808248222

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), Encyclopedia of human behavior (Vol. 4, pp. 71-81). Academic Press.

Bandura, A. (1997). Self-efficacy: The exercise of control. W.H. Freeman and Company.

Bernardo, A. B. I., Cordel, M., Lapinid, M. R., Teves, J. M., Yap, S. A., & Chua, U. C. (2022). Contrasting Profiles of Low-Performing Mathematics Students in Public and Private Schools in the Philippines: Insights from Machine Learning. Journal of Intelligence, 10.

Berniell, I., & Estrada, R. (2020). Poor little children: The socioeconomic gap in parental responses to school disadvantage. Labour Economics, 66, 101879. https://doi.org/10.1016/J.LABECO.2020.101879

Bornaa, C., Abdulai, A., & Iddrisu, A. (2023). Comparative study of traditional face-to-face and e-learning modes of teaching senior high school geometry. American Journal of Education and Technology, 2(1), 92-96. https://doi.org/10.54536/ajet.v2i1.1374

Casinillo, L., Palen, M., Casinillo, E., & Batidor, P. (2020). Assessing Senior High Student's Learning Experiences in Mathematics. Indonesian Journal of Educational Studies. https://doi.org/10.26858/IJES.V2311.13437.

Davis, E. K., Howard, N., Seah, W. T., & Wilmot, E. M. (2021). The attributes of mathematics learning which Ghanaian senior high school students value.

Dweck, C. S. (2006). Mindset: The new psychology of success. Random House Incorporated.

Etcuban, J. O., Capuno, R., Necesario, R., Espina, R. C., Padillo, G. G., & Manguilimotan, R. P. (2019). Attitudes, Study Habits, and Academic Performance of Junior High School Students in Mathematics. International Electronic Journal of Mathematics Education.

Firdausy, A. and Indriati, D. (2021). Mathematical reasoning abilities of high school students in solving contextual problems. International Journal of Science and Society, 3(1), 201-211. https://doi.org/10.54783/ijsoc.v3i1.285

Galinggan, M. (2021). Online learning readiness of senior high school students of tabuk city division and its correlation to mathematics anxiety. International Journal of Research Publications, 84(1). https://doi.org/10.47119/ijrp100841920212250

Guce, I. (2018). The role of journal writing in senior high school students' attitude toward mathematics. International Journal of Evaluation and Research in Education (Ijere), 7(2), 132. https://doi.org/10.11591/ijere.v7i2.13054

Lidinillah, U. and Cahya, E. (2021). The analysis of senior high school students' mathematical communication skill of trigonometric material.. https://doi.org/10.4108/eai.19-12-2020.2309156

Lumbantoruan, J. H. (2023). Evaluation of Students' Difficulties in Learning Mathematics in Complex Variable Material. Journal of Education Research and Evaluation.

Ndubuisi, M., Anokam, E., Nwagumma, V., & Unamba, E. C. (2020). INFLUENCE OF FAMILY SOCIO-ECONOMIC- STATUS ON SECONDARY SCHOOL STUDENTS ACADEMIC ACHIEVEMENT IN MATHEMATICS.

Ng, C. (2021). Mathematics self-schema, motivation, and subject choice intention: a multiphase investigation. Journal of Educational Psychology, 113(6), 1143-1163. https://doi.org/10.1037/edu0000629

Ongcoy, P., Jasmin, D., Guiamal, I., Guinita, S., & Iligan, A. (2023). Experiences and mathematics anxiety of stem students. Journal of Mathematics and Science Teacher, 3(1), em028. https://doi.org/10.29333/mathsciteacher/12870

Pagaran, G. M., Loremas, M. L., Gultiano, J. D., & Etcuban, J. O. (2022). Mathematics performance of senior high school students in blended learning amidst the covid-19 pandemic. Journal of Positive School Psychology, 10593-10613.

Pantziara, M., & Philippou, G. N. (2015). Students' motivation in the mathematics classroom. Revealing causes and consequences. International Journal of Science and Mathematics Education, 13(2), 385-411.

Picat, M. (2023). Factors Affecting the Academic Performance of Grade 11 Students in General Mathematics in Tabuk City District. International Journal of Research Publication and Reviews. https://doi.org/10.55248/gengpi.2023.4129.

Rangka, I. B., Ifdil, I., Suranata, K., Suwandi, A., Prasetyaningtyas, W. E., Ardi, Z., & Rahim, R. (2019, February). Exploring of mathematics classroom goal structures in senior high school: An engaging in academic work for student. In Journal of Physics: Conference Series (Vol. 1157, p. 032084). IOP Publishing.

Riyanto, B., Zulkardi, Z., Putri, R., & Darmawijoyo, D. (2019). Senior high school mathematics learning through mathematics modeling approach. Journal on Mathematics Education, 10(3), 425-444. https://doi.org/10.22342/jme.10.3.8746.425-444

Schunk, D. H., & Pajares, F. (2009). Self-efficacy theory. In K. R. Wentzel & A. Wigfield (Eds.), Handbook of motivation at school (pp. 35-53). Routledge.

Serin, H. (2023). Teaching Mathematics: Strategies for Improved Mathematical Performance. International Journal of Social Sciences & Educational Studies.

Sianturi, M., Suliantin, R., & Fitrianti, H. (2022). Relationships between cognitive styles and indigenous students' mathematics academic outcomes. Journal of Learning for Development, 9(3), 528-544. https://doi.org/10.56059/jl4d.v9i3.684

Syamsuri, S. and Bahtiar, R. (2023). Determining the relationship between 11th students' attitude towards mathematics and their achievement in mathematics. Technium Social Sciences Journal, 39, 148-154. https://doi.org/10.47577/tssj.v39i1.8056

Tapado, N. (2023). Enhancing Academic Performance in Mathematics of Grade 11 Students through Pre-Recorded Lesson and Home Tutorial Session. International Journal of Multidisciplinary: Applied Business and Education Research. https://doi.org/10.11594/ijmaber.04.06.17.

Usher, E. L., & Pajares, F. (2008). Sources of self-efficacy in school: Critical review of the literature and future directions. Review of Educational Research, 78(4), 751-796. https://doi.org/10.3102/0034654308321456

Utomo, D., Sulfiah, S., & Inganah, S. (2022). Algebraic Literacy among Pesantren-based Senior High School Students. JTAM (Jurnal Teori dan Aplikasi Matematika). https://doi.org/10.31764/jtam.v6i2.6746.

Weiner, B. (1972). Attribution theory, achievement motivation, and the educational process. Review of Educational Research, 42(2), 203-215.

Weiner, B. (2010). The development of an attribution-based theory of motivation: A history of ideas. Educational Psychologist, 45(1), 28-36.

Widiati, I., & Sthephani, A. (2018). Difficulties analysis of mathematics education students on the real analysis subject. Journal of



Physics: Conference Series.

Wijaya, T., Hidayat, W., & Zhou, Y. (2020). Development of interactive learning video on linear program. Universal Journal of Educational Research, 8(12A), 7530-7538. https://doi.org/10.13189/ujer.2020.082537

## Affiliations and Corresponding Information

Marivic A. Itong Tagbilaran City Science High School Department of Education – Philippines

**Roselle A. Operiano** BIT-International College – Philippines

**Genalyn P. Sumaylo** BIT-International College – Philippines

**Jimmy D. Bucar** Collegio de Loboc – Philippines

**Gyllevi Prylle F. Bongato, PhD** Holy Name University – Philippines