

Navigating Barriers in Learning Mathematics among Grade 8 Students

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Abstract

This study examined the difficulties encountered by Grade 8 learners in Mathematics and the extent to which they navigate these barriers in relation to their academic performance. Utilizing a descriptive-correlational research design, the study determined the influence of selected socio-economic variables on students' capacity to overcome learning challenges and assessed the relationship between these experiences and their achievement in Mathematics. The respondents consisted of 354 Grade 8 students from selected public secondary schools. The findings revealed that most respondents were female, primarily firstborn, and belonged to small- to medium-sized families. Parents were generally high school graduates, with most fathers employed in private sectors and most mothers serving as homemakers. A considerable proportion of families reported a monthly income ranging from Php 10,000 to Php 14,999. Students perceived that navigating barriers in Mathematics had a high extent of positive effects across three domains: understanding and recall of basic number tools, problem-solving skills, and acquisition of fundamental mathematical concepts, with the highest mean observed in understanding and recall. Inferential analysis showed that mother's educational attainment, father's occupation, and family income significantly influenced students' ability to navigate learning barriers, whereas sex, sibling position, father's educational attainment, and mother's occupation were not significant predictors. The academic performance of the respondents was generally satisfactory, with most students achieving average to above-average grades. Furthermore, a statistically significant positive relationship was established between the extent of navigating learning barriers and academic performance, indicating that students who effectively manage learning difficulties tend to perform better in Mathematics. The study concludes that socio-economic factors significantly shape students' mathematical learning experiences. It recommends the integration of inquiry-based and problem-solving approaches, strengthened instructional support, and active parental involvement to enhance students' competencies. Future studies may focus on intervention-based strategies to further support learners facing persistent challenges in Mathematics.

Keywords: Mathematics Learning Barriers, Socio-Economic Factors, Academic Performance, Grade 8 Students, Problem-Solving Skills

Introduction

Education plays a pivotal role in human development by fostering intellectual growth, enhancing skills, and shaping individuals' overall well-being. It is widely regarded as a fundamental pathway to personal and societal progress, serving as a means for acquiring knowledge, values, and competencies necessary for lifelong success. In the Philippine context, the significance of education is underscored in the 1987 Philippine Constitution, Article XIV, Section 2, which mandates the State to establish and maintain a complete, adequate, and integrated system of education responsive to the needs of individuals and society. This provision highlights the government's responsibility to ensure accessible and quality education that develops learners into productive and responsible citizens. Aligned with this mandate, the Department of Education continues to implement reforms such as the MATATAG Curriculum (DepEd Order No. 10, s. 2024), which emphasizes foundational literacy and numeracy, 21st-century skills, and learner-centered competencies. Despite these efforts, Mathematics remains a challenging subject for many students due to its abstract nature and the cognitive demands required for problem-solving and conceptual understanding. Many learners experience difficulties in applying mathematical concepts, which may be compounded by factors such as low motivation, mathematics anxiety, and limited instructional support.

Existing literature highlights multiple dimensions of challenges in mathematics learning. Foreign studies indicate that early literacy and numeracy skills significantly influence later mathematical performance (Bar et al., 2023), while problem-solving ability has been shown to directly affect learning outcomes (Sinaga et al., 2023). Moreover, the integration of technology in mathematics instruction has demonstrated positive effects on engagement and comprehension, although gaps in implementation persist (Hidayat & Firmanti, 2024). Additionally, emotional and psychological factors, such as anxiety and learning disorders like dyscalculia, further complicate students' learning experiences (Anjum et al., 2023). Similarly, Lumbantoruan (2023) emphasized that students' difficulties are often rooted in weak conceptual understanding and limited

mastery of mathematical fundamentals. Local studies further support these findings. Interventions such as remedial instruction, tutorials, and parental involvement have been found effective in improving numeracy skills (Layug et al., 2021). Student-centered approaches, including modular cooperative learning and Realistic Mathematics Education (RME), significantly enhance engagement and problem-solving skills (Cabrera, 2022; Enriquez et al., 2024). Meanwhile, mathematical anxiety and disruptions in learning environments, particularly during the pandemic, have been shown to negatively affect students' performance and motivation (Sousa, 2023; Saga et al., 2023).

Despite the breadth of existing studies, several gaps remain evident. First, many studies focus on elementary or college-level learners, with limited emphasis on junior high school students, particularly Grade 8 learners. Second, prior research often examines isolated factors—cognitive, emotional, or instructional—without providing a comprehensive analysis of how these barriers interact. Third, there is a scarcity of studies that specifically investigate how students actively navigate and overcome these barriers in relation to their academic performance, particularly within the Philippine public school context. Lastly, the role of socio-economic variables in shaping students' ability to manage learning challenges remains underexplored. In response to these gaps, the present study aims to examine the barriers encountered by Grade 8 students in learning Mathematics and analyze how these challenges are navigated in relation to their academic performance. By integrating cognitive, emotional, instructional, and socio-economic perspectives, this study seeks to provide a more comprehensive understanding of students' learning experiences and contribute to the development of effective, learner-centered interventions in Mathematics education.

Material and methods

2.1 Research Design

The study employed the descriptive method of research utilizing a questionnaire-checklist in gathering the needed data.

2.2 Locale of the Study

This research was carried out in selected public secondary schools within the City Schools Division Office of Antipolo, including Antipolo National High School, Dela Paz National High School, and San Jose National High School. These schools provide a complete junior high school education from Grades 7 to 10 and cater to diverse learners in the area

2.3 Respondents of the Study

The study considered grade 8 students in selected public secondary schools, consisting of 354 students. They were described in terms of sex, sibling position, number of children in the family, parents' educational attainment, parents' occupation, and monthly family income

2.4 Sample and Sampling Procedure

The respondents were chosen using Slovin's formula and a simple random sampling technique

2.5 Research Instrument

The study utilized a researcher-made questionnaire-checklist as the primary instrument for data collection. It consisted of two parts: Part I gathered the respondents' profile in terms of sex, sibling position, number of children in the family, parents' educational attainment, parents' occupation, and monthly family income. Part II assessed the extent of effects of navigating barriers in learning Mathematics as perceived by Grade 8 students, covering understanding and recall of basic number tools, acquisition of basic mathematical concepts, and problem-solving skills, with 10 items per domain or a total of 30 items rated using a 5-point Likert scale. Documentary analysis was also employed to determine students' academic performance in Mathematics, specifically their first and second quarter grades, interpreted using an established grading scale ranging from "Did Not Meet Expectations" to "Outstanding." The combination of survey responses and academic records provided a comprehensive evaluation of students' learning experiences and performance. To ensure validity, the instrument underwent content validation by the research adviser, statistician, three professorial lecturers, the Dean of Graduate Studies, a master teacher, numeracy coordinator, and school principal, whose feedback and recommendations were integrated into the final version of the questionnaire.

2.6 Data Gathering Procedure

The study was conducted according to the Gantt Chart of Activities, covering all phases from the formulation of the research problem to the revision and submission of the final manuscript. The research instrument, a questionnaire-checklist, was first subjected to content validation by experts, including the research adviser, statistician, three professorial lecturers, the Dean of the Graduate Studies Program, the Master Teacher, the numeracy coordinator, and the principal of the school where the researcher works. Necessary revisions were made based on their comments, suggestions, and recommendations to ensure the instrument's clarity, accuracy, and relevance. After validation, a formal request for permission to conduct the study was secured from the Schools Division Superintendent (SDS) and the School Principal to ensure proper authorization and coordination. Upon approval, the questionnaire-checklist was administered to the respondents through Google Forms,

with adherence to the Data Privacy Act to protect the confidentiality of the participants. Upon retrieval of the completed instruments, the data were encoded and processed using the Statistical Package for the Social Sciences (SPSS). The results were interpreted to formulate the summary of findings, conclusions, and recommendations. Following the final defense, the manuscript was revised to incorporate comments and suggestions from the panel members. The completed manuscript was then subjected to an anti-plagiarism check at the Statistical Center, and hardbound copies were submitted to the Office of the Dean of the Graduate Studies Program and other concerned offices. This systematic procedure ensured the study was conducted ethically, accurately, and in compliance with academic standards.

2.7 Data Analysis Techniques

The data collected in the study were analyzed using appropriate statistical tools to answer the research problems. Frequency, percentage, and rank distribution were used to describe the profile of the respondents in terms of selected variables. To determine the extent of effects of navigating barriers in learning Mathematics among Grade 8 students as perceived by the respondents, weighted mean was employed across the identified indicators. One-way Analysis of Variance (ANOVA) was used to determine the significant differences in the extent of effects when grouped according to the respondents' profile variables. Furthermore, frequency, mean, and standard deviation were utilized to describe the level of students' performance in Mathematics based on their academic grades. Finally, Pearson correlation analysis was applied to determine the significant relationship between the extent of effects of navigating barriers in learning Mathematics and the students' level of academic performance.

2.8 Ethical Considerations

This study strictly adhered to ethical standards in the conduct of research. Prior to data collection, permission was sought from the school authorities and concerned officials to ensure proper coordination and approval. The respondents were informed about the purpose of the study, and their participation was entirely voluntary. Informed consent was obtained, assuring them that they could withdraw from the study at any time without any consequences. Confidentiality and anonymity of the respondents were strictly maintained by not disclosing their identities and ensuring that all collected data were used solely for academic purposes. Additionally, the researcher ensured that no harm, discomfort, or bias would affect the participants throughout the process. All information gathered was treated with utmost respect and integrity, and results were presented honestly and objectively.

Results and Discussion

3.1 Profile of the Respondents in Terms of the Selected Variables

As shown in the table, out of 353 respondents, 59.6% of them are male while 40.4% are female. As to the number of children in the family, 49.4% have 2-3 children in the family wherein most of them are first born with 37%. In terms of their parents' educational attainment, both parents are high school graduates with 31.1% for the fathers while 35.9% for the mothers. Meanwhile, their parents occupation shows that for the fathers occupation, most of them are private employee with 33.3% while most of the mothers are housewife with 54% with monthly family income of Php10,000-Php14,999 with 51.7%. The data show that there are more male respondents than female, and the majority of them are firstborn. As for their parents, the majority of both fathers and mothers are high school graduates. Consequently, a good number of mothers are housewives, and fathers work as private employees, so their monthly family income barely meets the poverty line of ₱13, 873 for a family of five.

Table 1.
*Frequency and Percentage Distribution of the Respondents
in Terms of the Selected Variables*

Sex	f	%	Rank
Male	143	40.4	2
Female	211	59.6	1
Total	353	100.0	
Sibling Position			
4 th and above	82	23.2	3
3 rd	58	16.4	4
2 nd	83	23.4	2
1 st	131	37.0	1
Total	353	100.0	
Number of Children in the Family			
6 and above	43	12.1	3
4-5	101	28.5	2
2-3	175	49.4	1

1	35			9.9		4
Total	353			100.0		
Parent's Educational Attainment	Father			Mother		
	F	%	Rank	f	%	Rank
College Graduate	73	20.6	2	86	24.3	2
College Level	70	19.8	3	73	20.6	3
High School Graduate	110	31.1	1	127	35.9	1
High School Level	66	18.6	4	43	12.1	4
Elementary Graduate	16	4.5	6	14	4.0	5
Elementary Level	19	5.4	5	11	3.1	6
Total	353	100.0		353	100.0	
Parent's Occupation	Father			Mother		
	F	%	F	%	f	%
Government Employee	24	6.8	5	8	2.3	6
Private Employee	118	33.3	1	79	22.3	2
Construction Worker/Housemaid	75	21.2	3	32	9.0	3
Househusband/Housewife	33	9.3	4	191	54.0	1
OFW	21	5.9	6	23	6.5	4
Others	83	23.4	2	21	5.9	5
Total	353	100.0		353	100.0	
Monthly Family Income						
Php 20,000 and above	95			26.8		2
Php 15,000 – Php 19,999	76			21.5		3
Php 10,000 – Php 14,999	183			51.7		1
below Php 10,000	-			-		
Total	353			100.0		

3.2 Extent of Effects Navigating Barriers in Learning Mathematics as Perceived by the Respondents with Respect to the Different Aspects

The table shows the extent of effects of navigating barriers, which obtained a composite weighted mean of 3.82, verbally interpreted as often (high extent). The highest-ranked dimension is understanding and recall of basic number tools with a weighted mean of 3.90, followed by problem-solving skills with 3.80, and the lowest-ranked dimension is acquisition of basic mathematical concepts with 3.76, all interpreted as often (high extent). The data reveal that navigating barriers has a significant positive effect on students' ability to understand and recall basic number tools and on their problem-solving skills, indicating that these areas are strengthened when students actively engage in overcoming learning challenges. However, the slightly lower rating in the acquisition of basic mathematical concepts suggests that students experience relatively less improvement in comprehending and applying mathematical ideas. Based on these findings, teachers are encouraged to use strategies that address learning barriers, especially in developing basic mathematical concepts. These include guided practice, visual aids and manipulatives, scaffolding, and collaborative learning. Strengthening both procedural and conceptual skills helps students gain a deeper understanding of Mathematics and build confidence in solving complex problems. These findings are supported by Layug et al. (2021), who emphasized that targeted and well-planned interventions effectively bridge the gap between students at risk of failing Mathematics and those performing satisfactorily. This underscores the importance of providing focused academic support that addresses both skill mastery and conceptual understanding, ensuring that all learners can achieve meaningful learning outcomes in Mathematics.

Table 2

Extent of Effects Navigating Barriers in Learning Mathematics as Perceived by the Respondents with Respect to the Different Aspects

Aspects	Overall $\bar{W\bar{X}}$	Verbal Interpretation	Rank
Understanding and Recall of Basic Number Tools	3.90	Often (High Extent)	1
Acquisition of Basic Mathematical Concepts	3.76	Often (High Extent)	3
Problem Solving Skills	3.80	Often (High Extent)	2
Composite $\bar{W\bar{X}}$	3.82	Often (High Extent)	

3.3 Significant Difference on the Extent of Effects of Navigating Barriers in Learning Mathematics as Perceived by the Respondents with Respect to the Different Aspects in Terms of Their Profile

The F-test results revealed that the extent of effects of navigating barriers in learning Mathematics significantly differs when grouped according to selected profile variables. Mother's educational attainment, father's occupation, and monthly family income were found to have a significant influence on students' understanding and recall of basic number tools, acquisition of mathematical concepts, and problem-solving skills, while sex, sibling position, mother's occupation, and father's educational attainment showed no significant effect. These findings indicate that socio-economic and home-related factors play a crucial role in shaping students' ability to overcome learning barriers in Mathematics, as learners from more educated and financially stable families tend to receive better academic support and resources that enhance their mathematical understanding and skills. In contrast, demographic factors such as sex and birth order do not significantly affect learning outcomes, suggesting that barriers in Mathematics are more strongly influenced by environmental conditions than personal characteristics.

Table 3

Significant Difference on the Extent of Effects of Navigating Barriers in Learning Mathematics as Perceived by the Respondents with Respect to the Different Aspects in Terms of Their Profile

Aspects/Variables	F-value	p-value	Ho	Verbal Interpretation
Sex				
Understanding and Recall of Basic Number Tools	.463	.497	Accepted	Not Significant
Acquisition of Basic Mathematical Concepts	1.454	.229	Rejected	Significant
Problem Solving Skills	.007	.932	Accepted	Not Significant
Number of Children in the family				
Understanding and Recall of Basic Number Tools	1.752	.156	Accepted	Not Significant
Acquisition of Basic Mathematical Concepts	1.962	.119	Accepted	Not Significant
Problem Solving Skills	1.143	.332	Accepted	Not Significant
Sibling Position				
Understanding and Recall of Basic Number Tools	2.865	.037	Accepted	Not Significant
Acquisition of Basic Mathematical Concepts	2.423	.066	Accepted	Not Significant
Problem Solving Skills	2.147	.094	Accepted	Not Significant
Father's Educational Attainment				
Understanding and Recall of Basic Number Tools	1.019	.406	Accepted	Not Significant
Acquisition of Basic Mathematical Concepts	.935	.458	Accepted	Not Significant
Problem Solving Skills	1.976	.082	Accepted	Not Significant
Mother's Educational Attainment				
Understanding and Recall of Basic Number Tools	4.112	.001	Rejected	Significant
Acquisition of Basic Mathematical Concepts	3.253	.007	Rejected	Significant
Problem Solving Skills	2.834	.016	Rejected	Significant
Father's Occupation				
Understanding and Recall of Basic Number Tools	.865	.505	Rejected	Significant
Acquisition of Basic Mathematical Concepts	.763	.577	Rejected	Significant
Problem Solving Skills	.851	.514	Rejected	Significant
Mother's Occupation				
Understanding and Recall of Basic Number Tools	.472	.797	Accepted	Not Significant
Acquisition of Basic Mathematical Concepts	.215	.956	Accepted	Not Significant

Concepts				
Problem Solving Skills	.617	.687	Accepted	Not Significant
Monthly Family Income				
Understanding and Recall of Basic Number Tools	1.507	.223	Rejected	Significant
Acquisition of Basic Mathematical Concepts	1.290	.277	Rejected	Significant
Problem Solving Skills	2.373	.095	Rejected	Significant

3.4 Level of Performance in Mathematics of the Grade 8 students as Revealed on their Average Grades in Mathematics in the First and Second Quarters

The results on students' academic performance in Mathematics, based on their first and second quarter average grades, show that most respondents fall under the Satisfactory (36.2%) and Very Satisfactory (24.3%) levels, with a mean grade of 82.22, indicating generally acceptable performance. However, a considerable portion of students are classified as Fairly Satisfactory (22.6%), while a small percentage (1.4%) did not meet expectations. These findings suggest that although the majority of Grade 8 learners demonstrate adequate mathematical competencies, there are still students who experience learning difficulties that hinder higher achievement. This implies that while basic skills are generally acquired, challenges remain in higher-order thinking, problem-solving, and application of mathematical concepts. Therefore, targeted interventions such as differentiated instruction, remedial programs, and student-centered teaching strategies are recommended to address diverse learning needs and improve overall performance. These results are supported by Aguhayon et al. (2023), who emphasized that differentiated instruction enhances student engagement and improves Mathematics achievement across varying ability levels.

Table 4

Level of Performance in Mathematics of the Grade 8 students as Revealed on their Average Grades in Mathematics in the First and Second Quarters

Grade	Descriptors	Average Grades	
		Frequency	Percentage
90 and above	Outstanding	55	15.5
85-89	Very Satisfactory	86	24.3
80-84	Satisfactory	128	36.2
75-79	Fairly Satisfactory	80	22.6
70-74	Did Not Meet Expectations	5	1.4
Total		354	100
Highest		99	
Lowest		75	
Mean		82.22	
Std. Deviation		7.977	

3.5 Significant Relationship Between the Perceived Extent of Effects of Navigating Barriers in Learning Mathematics Among Grade 8 Students and Their Level of Performance in Mathematics

The results revealed a significant relationship between the extent of effects of navigating barriers in learning Mathematics and students' academic performance. Specifically, a moderate positive correlation was found in understanding and recall of basic number tools ($r = .335$), acquisition of mathematical concepts ($r = .275$), and problem-solving skills ($r = .271$), all with p-values of .000, leading to the rejection of the null hypothesis. Among these, understanding and recall showed the strongest relationship with academic performance. These findings suggest that as students enhance their foundational numeracy skills, conceptual understanding, and problem-solving abilities, their Mathematics performance likewise improves. This emphasizes the importance of strengthening basic mathematical competencies as a foundation for higher-level learning. In response, instructional interventions such as guided practice, scaffolding, and problem-based learning are recommended to help students overcome learning barriers and improve academic outcomes. These results are supported by Sinaga et al. (2023), who highlighted that students' problem-solving skills and conceptual understanding significantly influence their Mathematics achievement.

Table 5

Significant Relationship Between the Perceived Extent of Effects of Navigating Barriers in Learning Mathematics Among Grade 8 Students and Their Level of Performance in Mathematics

	r-values	p-value	Ho	VI
Understanding and Recall of Basic Number Tools	.335	.000	Rejected	Significant
Acquisition of Basic Mathematical Concepts	.275	.000	Rejected	Significant

Problem Solving Skills	.271	.000	Rejected	Significant
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Conclusion & Recommendations

Based on the findings of the study, it is concluded that socio-economic factors, particularly mother's educational attainment, father's occupation, and family income, significantly influence students' ability to overcome learning barriers in Mathematics. These factors contribute to the level of support, access to learning resources, and academic guidance that students receive at home, which in turn affects their understanding, conceptual development, and problem-solving skills. Moreover, the study establishes that the extent to which students navigate learning barriers has a significant positive effect on their academic performance in Mathematics, indicating that learners who are able to effectively understand, recall, and apply mathematical concepts tend to achieve higher performance levels.

In view of these conclusions, it is recommended that curriculum planners integrate more inquiry-based and problem-solving-centered activities in the Mathematics curriculum, while school administrators strengthen professional development programs focused on innovative instructional approaches. Mathematics teachers are encouraged to consistently apply inquiry-based strategies to enhance students' analytical and problem-solving skills, while students should actively participate in learning activities that develop critical thinking and reasoning. Parents and guardians are likewise encouraged to provide academic support and learning resources at home to further assist learners in overcoming difficulties in Mathematics. Future researchers may conduct similar studies using other variables, grade levels, or research designs, and the proposed action plan may be implemented to improve the mathematical performance of Grade 8 students.

Compliance with ethical standards

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