

Effects of Comprehension Challenges on the Mathematical Performance of Grade Six Pupils

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Abstract

This study determined the effects of comprehension challenges on the mathematical performance of Grade Six pupils in public elementary schools in District I-C, City Schools Division Office of Antipolo during the School Year 2025–2026. Employing a descriptive survey research design and documentary analysis, the study involved 314 Grade Six pupils selected through simple random sampling from a population of 1,440 using Slovin's formula. A researcher-made questionnaire was utilized to assess the extent of comprehension challenges affecting mathematical performance in the domains of Number and Number Sense, Measurement and Geometry, Patterns and Algebra, and Statistics and Probability, while pupils' Mathematics grades were obtained through documentary analysis to determine their level of achievement. Findings revealed that most respondents were female, first-born, belonged to one-child families, came from households with monthly incomes below ₱10,000, had fathers who were college graduates and employed in various occupations, and mothers who were high school graduates and primarily homemakers. Comprehension challenges were found to have a high effect on pupils' performance in Patterns and Algebra, Measurement and Geometry, and Number and Number Sense, while only a moderate effect was observed in Statistics and Probability. No significant differences were found in the perceived effects of comprehension challenges when respondents were grouped according to sex, sibling position, family size, parents' educational attainment, parents' occupation, and monthly family income. Pupils obtained a very satisfactory level of Mathematics achievement, and no significant relationship was established between the perceived effects of comprehension challenges and their Mathematics achievement. The study concluded that demographic characteristics did not significantly influence pupils' perceptions of comprehension challenges, and that these perceived challenges were not significantly associated with their Mathematics achievement. It is recommended that school administrators strengthen professional development initiatives focusing on mathematics comprehension strategies, teachers integrate explicit mathematical language and reading comprehension instruction into Mathematics lessons, utilize diagnostic assessments to identify comprehension-related learning needs, implement the proposed action plan, and encourage future studies incorporating additional variables.

Keywords: Comprehension Challenges, Mathematical Performance, Mathematics Achievement, Grade Six Pupils, Descriptive Survey Research, Documentary Analysis

Introduction

Mathematics is recognized as one of the core disciplines that develops learners' logical reasoning, critical thinking, and problem-solving abilities necessary for academic success and lifelong learning. At the elementary level, mathematical competence serves as the foundation for higher-order learning across different subject areas. Despite continuous curriculum improvements and instructional innovations, many pupils continue to experience difficulties in Mathematics, particularly in understanding mathematical concepts and solving word problems that require strong comprehension skills. Consequently, comprehension has become an essential factor influencing learners' mathematical performance, as it enables them to interpret mathematical language, analyze problem situations, and apply appropriate solution strategies.

Several studies have emphasized that comprehension plays a vital role in mathematics learning. According to Boaler (2022), many learners struggle in Mathematics not because they lack computational skills but because they experience difficulty understanding mathematical language and interpreting problem situations. Similarly, Powell et al. (2022) asserted that explicit instruction in mathematical vocabulary and comprehension strategies significantly improves learners' performance in solving mathematical problems. Likewise, Fuchs et al. (2021) found that reading comprehension is a strong predictor of mathematics achievement since learners who effectively comprehend written information are more capable of identifying relevant mathematical concepts and selecting appropriate solution procedures.

Research has also shown that mathematical performance is influenced by learners' ability to comprehend mathematical texts and symbolic representations. Geary (2021) explained that language comprehension contributes significantly to mathematical reasoning and conceptual understanding, particularly among elementary learners. Furthermore, Peng et al. (2020) reported that reading comprehension directly affects learners' ability to solve mathematical word problems because

understanding textual information is necessary before mathematical operations can be correctly applied. In the same manner, Cai et al. (2021) emphasized that strengthening mathematical communication and comprehension enhances learners' conceptual understanding and problem-solving competence.

International educational organizations likewise recognize comprehension as an integral component of mathematics proficiency. The Organisation for Economic Co-operation and Development (OECD, 2023) emphasized that mathematical literacy involves formulating, interpreting, and applying mathematics in real-life situations, requiring learners to understand written mathematical information effectively. Similarly, the National Council of Teachers of Mathematics (NCTM, 2023) stressed that meaningful mathematics instruction should promote mathematical communication, reasoning, representation, and comprehension to improve learners' achievement.

Within the Philippine educational setting, improving learners' mathematics performance remains a significant educational priority. The Department of Education (DepEd, 2024) continues to strengthen foundational literacy and numeracy programs through learning recovery initiatives that integrate reading and mathematics instruction. Likewise, SEAMEO (2022) emphasized that improving learners' literacy skills contributes significantly to better numeracy outcomes, highlighting the interconnectedness of language comprehension and mathematics achievement.

The present study is anchored on the constructivist perspective, which posits that learners actively construct knowledge through meaningful learning experiences. Bruner (1966) explained that learners develop understanding by organizing and connecting new information with prior knowledge, while Vygotsky (1978) emphasized that language serves as a cognitive tool that supports thinking, reasoning, and problem solving. These theoretical perspectives suggest that comprehension facilitates the understanding of mathematical concepts and enhances learners' ability to perform mathematical tasks successfully.

Although several studies have examined mathematics achievement, limited local evidence exists regarding the extent to which comprehension challenges affect Grade Six pupils' mathematical performance across the learning domains of Number and Number Sense, Measurement and Geometry, Patterns and Algebra, and Statistics and Probability. Understanding these challenges is essential for designing effective instructional interventions that strengthen both literacy and numeracy competencies. Hence, this study was conducted to determine the effects of comprehension challenges on the mathematical performance of Grade Six pupils in public elementary schools in District I-C, City Schools Division Office of Antipolo during the School Year 2025–2026. The findings are expected to provide valuable inputs for school administrators, teachers, parents, and curriculum planners in developing evidence-based strategies that will improve mathematics instruction and learners' academic achievement.

Material and methods

2.1 Research Design

This study employed a descriptive survey research design complemented by documentary analysis to determine the effects of comprehension challenges on the mathematical performance of Grade Six pupils and to obtain their Mathematics achievement based on official school records.

2.2 Locale of the Study

The study was conducted in Mambugan I Elementary School, Mambugan II Elementary School, Mayamot Elementary School, and Muntindilaw Elementary School under District I-C, City Schools Division Office of Antipolo during the School Year 2025–2026.

2.3 Respondents of the Study

The respondents of the study were 314 Grade Six pupils enrolled in the selected public elementary schools who were described according to sex, sibling position, number of children in the family, monthly family income, parents' educational attainment, and parents' occupation.

2.4 Sample and Sampling Procedure

Out of the total population of 1,440 Grade Six pupils, a sample of 314 respondents was determined using Slovin's Formula and selected through simple random sampling.

2.5 Research Instrument

A researcher-made questionnaire checklist was utilized to determine the comprehension challenges experienced by the respondents and the extent of their effects on mathematical performance in Number and Number Sense, Measurement and Geometry, Patterns and Algebra, and Statistics and Probability.

2.6 Data Gathering Procedure

Upon securing the necessary permissions from the concerned authorities, the researcher personally administered the questionnaires to the respondents and obtained their Mathematics grades through documentary analysis from official school records.

2.7 Data Analysis Techniques

The data were analyzed using frequency and percentage, weighted mean, independent samples t-test, one-way analysis of variance (ANOVA), and Pearson Product-Moment Correlation Coefficient (Pearson r) at the 0.05 level of significance.

2.8 Ethical Considerations

The researcher strictly observed ethical principles throughout the conduct of the study. Prior approval was obtained from the appropriate educational authorities before data collection commenced. Participation was voluntary, and informed consent was secured from all respondents after explaining the objectives, procedures, benefits, and confidentiality of the study. The identities of the respondents and the academic records of the pupils were kept anonymous through coding, and all information gathered was treated with strict confidentiality and used solely for academic and research purposes in compliance with the provisions of the Data Privacy Act of 2012 (Republic Act No. 10173) and accepted ethical standards in educational research.

Results and Discussion

3.1 Profile of the Respondents in terms of the Selected Variables

The findings revealed that the majority of the 314 Grade Six pupil-respondents were female, first-born children, and came from one-child families. Most of their fathers were college graduates and were primarily classified under other occupations, while the majority of their mothers were high school graduates and were housewives/househusbands. In terms of socioeconomic status, most respondents belonged to families with a monthly income below ₱10,000, indicating that a large proportion of the participants came from low-income households. These results provide a demographic profile of the respondents, which served as the basis for examining differences in the perceived effects of comprehension challenges on the mathematical performance of Grade Six pupils.

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

Profile	Frequency	Percentage	Rank
Sex			
Male	111	35.4	2
Female	203	64.6	1
Total	314	100.0	
Sibling Position			
First	158	50.3	1
Second	95	30.3	2
Third	29	9.2	3
Fourth	16	5.1	4
Fifth	9	2.9	5
Sixth and above	7	2.2	6
Total	314	100.0	
Number of Children in the Family			
1	168	53.5	1
2	93	29.6	2
3	28	8.9	3
4	16	5.1	4
5 and above	9	2.9	5
Total	314	100.0	
Father's Educational Attainment			
College Graduate	101	32.2	1
College Undergraduate	35	11.1	4
High school Graduate	93	29.6	2
High School Undergraduate	49	15.6	3
Elementary Graduate	30	9.6	5
Elementary Undergraduate	6	1.9	6
Total	314	100.0	

Mother's Educational Attainment			
College Graduate	106	33.8	2
College Undergraduate	34	10.8	3
High school Graduate	125	39.8	1
High School Undergraduate	19	6.1	4
Elementary Graduate	18	5.7	5
Elementary Undergraduate	12	3.8	6
Total	314	100.0	
Father's Occupation			
Employed	63	20.1	2
OFW	26	8.3	4
Self-Employed	27	8.6	3
Entrepreneur	11	3.5	6
Housewife/Househusband	25	8.0	5
Others	162	51.6	1
Total	314	100.0	
Mother's Occupation			
Employed	6	1.9	6
OFW	29	9.2	4
Self-Employed	36	11.5	3
Entrepreneur	87	27.7	2
Housewife/Househusband	128	40.8	1
Others	28	8.9	5
Total	314	100.0	
Monthly Family Income			
P25,000 and above	66	21.0	3
P20,000 - P24, 999	6	1.9	5
P15,000 - P19, 999	25	8.0	4
P10,000 - P14, 999	78	24.8	2
below P10, 000	139	44.3	1
Total	314	100.0	

3.2 Comprehension Challenges Experienced by Respondents in Learning Mathematics

Grade six pupils experienced varied challenges in learning mathematics, caused by their poor reading comprehension, language barriers, and foundational gaps in basic arithmetic and logic. They find difficulties in translating and understand complex mathematical terminology. They often fail to identify relevant information, recognize the context, or translate narrative texts into mathematical expressions. Many of them experience difficulty recalling basic mathematical facts from memory, which makes handling multi-digit operations and algebra particularly challenging. They rely on memorizing formulas and traditional procedures rather than developing a deep, conceptual understanding. Consequently, pupils struggle to apply mathematical principles to unfamiliar or complex problems

3.3 Extent of Effects of Comprehension Challenges on the Mathematical Performance of Grade Six Pupils as Perceived by Themselves with Respect to the Different Aspects

The findings revealed that the overall extent of the effects of comprehension challenges on the mathematical performance of Grade Six pupils was high, as indicated by the composite mean of 3.74. Among the four learning domains, Patterns and Algebra ranked first with the highest perceived effect, followed by Measurement and Geometry and Number and Number Sense, all of which were interpreted as having a high effect. In contrast, Statistics and Probability registered only a moderate effect, suggesting that pupils experienced fewer comprehension-related difficulties in this domain. These findings imply that comprehension challenges are more pronounced in mathematical areas requiring abstract reasoning, symbolic interpretation, and conceptual understanding than in topics involving data interpretation and visual representations. The result supports Ulu (2021), who asserted that comprehension skills significantly influence mathematical problem-solving success, particularly in mathematical strands that require higher levels of inferential comprehension.

Table 2

Extent of Effects of Comprehension Challenges on the Mathematical Performance of Grade Six Pupils as Perceived by Themselves with Respect to the Different Aspects

Aspects	Overall Mean	Verbal Interpretation	Rank
Number and Number Sense	3.88	Often	3

		(High Effect)	
Measurement and Geometry	3.94	Often (High Effect)	2
Patterns and Algebra	3.97	Often (High Effect)	1
Statistics and Probability	3.16	Sometimes (Moderate Effect)	4
Composite Mean	3.74	Often (High Effect)	

3.4 Significant Difference on The Extent of Effects of Comprehension Challenges on the Mathematical Performance of Grade Six Pupils as Perceived by Themselves with Respect to the Different Aspects in Terms of Their Profile

The findings revealed that there were no significant differences in the perceived extent of the effects of comprehension challenges on the mathematical performance of Grade Six pupils across the domains of Number and Number Sense, Measurement and Geometry, Patterns and Algebra, and Statistics and Probability when grouped according to sex, sibling position, number of children in the family, father's educational attainment, mother's educational attainment, father's occupation, mother's occupation, and monthly family income, as all computed p-values were greater than 0.05. This indicates that pupils, regardless of their demographic and socioeconomic characteristics, shared similar perceptions regarding the effects of comprehension challenges on their mathematical performance. The findings suggest that these profile variables do not significantly influence how pupils experience comprehension-related difficulties in Mathematics. The result is consistent with Amalina and Vidákovich (2023), who likewise reported no significant differences based on gender, indicating that demographic characteristics have minimal influence on learners' mathematics-related perceptions and performance.

Table 3

Significant Difference on The Extent of Effects of Comprehension Challenges on the Mathematical Performance of Grade Six Pupils as Perceived by Themselves with Respect to the Different Aspects in Terms of Their Profile

Profile/Variables	f-value	p-value	Decision	Verbal Interpretation
Sex				
Number and Number Sense	.615	.433	Accepted	Not Significant
Measurement and Geometry	.198	.656	Accepted	Not Significant
Patterns and Algebra	1.238	.267	Accepted	Not Significant
Statistics and Probability	.016	.899	Accepted	Not Significant
Sibling Position				
Number and Number Sense	1.382	.231	Accepted	Not Significant
Measurement and Geometry	.058	.998	Accepted	Not Significant
Patterns and Algebra	.656	.658	Accepted	Not Significant
Statistics and Probability	.936	.458	Accepted	Not Significant
Number of Children in the Family				
Number and Number Sense	1.238	.291	Accepted	Not Significant
Measurement and Geometry	.072	.996	Accepted	Not Significant
Patterns and Algebra	.715	.613	Accepted	Not Significant
Statistics and Probability	.971	.436	Accepted	Not Significant
Father's Educational Attainment				
Number and Number Sense	.448	.774	Accepted	Not Significant
Measurement and Geometry	.733	.570	Accepted	Not Significant
Patterns and Algebra	1.007	.404	Accepted	Not Significant
Statistics and Probability	.696	.595	Accepted	Not Significant
Mother's Educational Attainment				
Number and Number Sense	.292	.917	Accepted	Not Significant
Measurement and Geometry	1.460	.203	Accepted	Not Significant
Patterns and Algebra	1.275	.275	Accepted	Not Significant
Statistics and Probability	.287	.920	Accepted	Not Significant
Father's Occupation				
Number and Number Sense	.756	.582	Accepted	Not Significant
Measurement and Geometry	.308	.908	Accepted	Not Significant
Patterns and Algebra	.929	.462	Accepted	Not Significant
Statistics and Probability	2.010	.077	Accepted	Not Significant

Mother's Occupation				
Number and Number Sense	.535	.750	Accepted	Not Significant
Measurement and Geometry	1.599	.160	Accepted	Not Significant
Patterns and Algebra	.478	.793	Accepted	Not Significant
Statistics and Probability	.696	.627	Accepted	Not Significant
Monthly Family Income				
Number and Number Sense	.321	.900	Accepted	Not Significant
Measurement and Geometry	.448	.814	Accepted	Not Significant
Patterns and Algebra	.671	.646	Accepted	Not Significant
Statistics and Probability	1.003	.416	Accepted	Not Significant

3.5 Level of Mathematics Achievement of the Respondents as Revealed by Their Average Grades

The findings revealed that the Grade Six pupils demonstrated a very satisfactory level of Mathematics achievement, with a mean grade of 88.93. Nearly half of the respondents (46.6%) obtained an Outstanding rating, while 42.6% achieved a Very Satisfactory rating and only 10.5% were classified as Satisfactory. No pupil received a Fairly Satisfactory or Did Not Meet Expectations rating, indicating generally high academic performance among the respondents. The relatively low standard deviation further suggests that pupils' grades were consistently clustered around the mean. These findings imply that although pupils experienced comprehension challenges in certain mathematical domains, they were still able to attain high levels of academic achievement, highlighting that average grades alone may not fully reflect learners' comprehension difficulties. The result is consistent with Parcon (2023), who found that mathematical competencies are significantly associated with learners' performance and emphasized the need to further strengthen conceptual understanding despite satisfactory academic outcomes.

Table 4

Level of Mathematics Achievement of the Respondents as Revealed by Their Average Grades

Average Grade	Verbal Interpretation	Frequency	Percent	Rank
90 and above	Outstanding	147	46.6	1
85 – 89	Very Satisfactory	134	42.6	2
80 – 84	Satisfactory	33	10.5	3
75 – 79	Fairly Satisfactory	-	-	-
Below 75	Did Not Meet Expectations	-	-	-
Total		314	100.0	
Highest Rating		98		
Lowest Rating		80		
Mean		88.93 (VS)		
Std. Deviation		3.652		

3.6 Significant Relationship Between the Perceived Extent of Effects of Comprehension Challenges on the Mathematical Performance of Grade Six Pupils and Their Level of Mathematics Achievement

The findings revealed that there was no significant relationship between the perceived extent of the effects of comprehension challenges and the Mathematics achievement of Grade Six pupils across the domains of Number and Number Sense, Measurement and Geometry, Patterns and Algebra, and Statistics and Probability, as evidenced by the very low correlation coefficients ($r = .020$ to $.043$) and p-values greater than 0.05. This indicates that pupils' perceptions of comprehension-related difficulties were not significantly associated with their actual Mathematics achievement as reflected in their average grades. The results suggest that although comprehension challenges may be experienced in specific mathematical domains, these difficulties do not necessarily translate into lower academic performance, implying that other factors such as instructional support, learning strategies, assessment practices, or learner motivation may also contribute to pupils' Mathematics achievement.

Table 5

Significant Relationship Between the Perceived Extent of Effects of Comprehension Challenges on the Mathematical Performance of Grade Six Pupils and Their Level of Mathematics Achievement

Variables		r-value	p-value	Ho	Verbal Interpretation
Level of Mathematics Achievement	Number and Number Sense	.030	.593	Accepted	Not Significant
	Measurement and Geometry	.043	.448	Accepted	Not Significant
	Patterns and Algebra	.020	.723	Accepted	Not Significant
	Statistics and Probability	.023	.681	Accepted	Not Significant

Conclusions & Recommendations

Based on the findings of the study, it was concluded that Grade Six pupils generally perceived comprehension challenges to have a high effect on their mathematical performance, particularly in Patterns and Algebra, Measurement and Geometry, and Number and Number Sense, while the effect was only moderate in Statistics and Probability. The respondents were predominantly female, first-born, from one-child families, and mostly belonged to low-income households. Despite these comprehension challenges, the pupils attained a very satisfactory level of Mathematics achievement. Furthermore, the respondents' demographic characteristics did not significantly influence their perceptions of comprehension challenges, and no significant relationship was found between the perceived effects of comprehension challenges and their Mathematics achievement, indicating that academic performance may be influenced by factors other than perceived comprehension difficulties.

Based on these conclusions, it is recommended that school administrators strengthen professional development programs that equip Mathematics teachers with effective comprehension-based instructional strategies. Teachers should integrate explicit instruction in mathematical vocabulary, reading comprehension, symbolic interpretation, and problem-solving techniques, particularly in the learning domains where comprehension challenges were found to have the greatest effect. Diagnostic assessments that measure comprehension alongside computational skills should also be utilized to identify learners requiring additional support. Moreover, the proposed action plan should be implemented, and future researchers are encouraged to conduct similar studies using other variables, larger populations, or different educational settings to further explore factors influencing pupils' mathematical performance.

Compliance with ethical standards

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