**READING COMPREHENSION AS A PREDICTOR OF** **MATHEMATICAL WORD PROBLEM-SOLVING ABILITY AMONG GRADE 7 STUDENTS**

**Abstract**

Reading comprehension is a foundational skill that significantly influences students' ability to solve mathematical word problems. This study investigated the predictive relationship between reading comprehension and mathematical word problem-solving ability among 100 selected Grade 7 students at Matiao National High School in Mati City, Davao Oriental, Philippines, using a predictive-correlational design. Using Pearson’s correlation analysis on data from 100 Grade 7 students, the study assessed performance across three reading comprehension levels—literal, inferential, and critical—and four basic mathematical operations. Results showed strong performance in literal comprehension (83.6%) and addition (86%), but substantial difficulty in critical comprehension (37.2%) and division (26.6%), indicating challenges in higher-order thinking and complex operations. A statistically significant positive relationship was found between reading comprehension and math problem-solving ability. Guided by Cognitive Load Theory, the study underscores how reading skills support cognitive processing in mathematics. Findings suggest that integrating reading strategies into math instruction may improve students’ understanding of word problems. Educational stakeholders are encouraged to implement interdisciplinary approaches that enhance both literacy and numeracy. Future research may focus on intervention programs aimed at improving reading comprehension to support mathematical achievement.

*Keywords: reading comprehension; mathematical word problems; secondary education; predictive research; Philippines*

**Introduction**

Reading comprehension is an important skill that influences learning across different subjects worldwide. Studies show that students who are good at reading are more likely to succeed in other areas, including mathematics (Oakhill, Cain, & Bryant, 2003). In particular, solving mathematical word problems requires students not only to perform calculations but also to understand the situation described in the problem (Vilenius-Tuohimaa, Aunola, & Nurmi, 2008). When students have difficulty understanding what they read, they also tend to struggle in figuring out what the math problem is asking them to do. This connection between reading and math problem-solving has been the focus of many researchers internationally (Fuchs et al., 2015).

In the Philippines, reading comprehension continues to be a major challenge among students. The results of international assessments like PISA (Programme for International Student Assessment) have shown that Filipino students perform below average in reading literacy compared to other countries (Organisation for Economic Co-operation and Development [OECD], 2019). Other studies reveals that there is a significant and moderate correlation between reading comprehension and problem-solving skills, indicating that as reading comprehension improves, so does problem-solving ability. There was also a strong correlation between reading comprehension skills, problem-solving skills towards the academic achievement, suggesting that better reading comprehension and problem-solving is linked to higher academic achievement. (Augis et al., 2024). These issues highlight the need for more studies focusing on how reading comprehension affects students' performance in solving mathematical problems, especially in developing-country contexts where students face compounded academic challenges (Wangmo, 2021). In Davao City, Students’ reading comprehension skill was a factor in problem-solving skills and it may affect the result of problem-solving skills. A student with good background on reading comprehension can easily solve problems. (Timario, R. R. (2020). This difficulty in reading and understanding math problems affects not only their academic grades but also their confidence in mathematics.

Given the strong connection between reading and problem-solving skills, it is important to investigate how reading comprehension predicts students' ability to solve mathematical word problems. This study aims to explore this relationship among high school students in Davao City. The findings may help teachers and school administrators design strategies that strengthen both reading and math instruction, leading to better learning outcomes for students.

**Statement of the Problem**

This study aimed to determine the relationship between reading comprehension and mathematical word problem-solving ability among Grade 7 students at Matiao National High School.

1. What are the levels of problem-solving skills and reading comprehension of Grade 7 students in terms of the following components: Literal, Inferential, Critical and mathematical word-problem in terms of:Addition, Subtraction, Multiplication, Division?
2. Is there a significant relationship between reading comprehension and mathematical word problem-solving ability?

**Hypothesis**

H₀: There is no significant relationship between reading comprehension and mathematical word problem-solving ability among Grade 7 students.

**Theoretical/Conceptual Framework**

This study is anchored on Cognitive Load Theory, which explains the relationship between reading comprehension and mathematical word problem-solving. The concept of cognitive load was first presented by Sweller (1988) about the effectiveness of conventional problem-solving methods for acquiring domain-specific knowledge and skills. Indicated that working memory has a limited capacity and stressed the importance of minimizing extraneous cognitive load to maximize learning. Specifically, he noted, “human short-term memory is severely limited, and any problem that requires a large number of items to be stored in short-term memory may contribute to an excessive cognitive load.

This study adopts a conceptual framework in which reading comprehension, divided into literal, inferential, and critical comprehension, is the independent variable, while mathematical word problem-solving ability, including operations such as addition, subtraction, multiplication, and division, is the dependent variable. The framework proposes that the various levels of reading comprehension influence how well students understand and solve word problems, thereby affecting their performance in mathematics.

Reading Comprehension

* Critical Comprehension
* Inferential Comprehension
* Literal Comprehension

Mathematical Word Problem-Solving Ability

* Addition
* Division
* Multiplication
* Subtraction

*Figure 1: Conceptual Framework of the Reading Comprehension as a Predictor of Mathematical Word Problem Solving Ability Among Grade 7 Students*

**Method**

This study employed a non-experimental, quantitative research design using a predictive-correlational approach. This design was chosen to examine whether reading comprehension can predict mathematical word problem-solving ability among Grade 7 students. The predictive-correlational method is appropriate for exploring the relationship between two naturally occurring variables without manipulating them (Creswell, 2014).

The study was conducted at Matiao National High School, located in Mati City, Davao Oriental, Philippines. This government-funded institution offers both junior and senior high school education and serves a diverse student population across various academic strands. Mati City was selected as the research site due to its ongoing initiatives to enhance students’ academic literacy and numeracy, in response to the results of recent national assessments (Department of Education, 2020). The accessibility of the location and the cooperation of the school administration also contributed to its selection as an ideal setting for the study.

The respondents consisted of 100 Grade 7 students from Matiao National High School, selected through simple random sampling to ensure fairness and equal opportunity for selection (Fraenkel, Wallen, & Hyun, 2019). Grade 7 students were specifically chosen because they are at a pivotal stage in developing foundational reading comprehension and mathematical problem-solving skills. The sample size was deemed sufficient for statistical analysis and feasible for data collection, contributing to the study's reliability and validity (Fetters,2023).

The main research instrument used in this study consisted of two parts: the Reading Comprehension Test and the Mathematical Word Problem-Solving Test. The Reading Comprehension Test was adapted from Tri Daryanti’s (n.d.) study titled *"The Contribution of Vocabulary Toward Reading Comprehension."* It included 15 multiple-choice items designed to assess students’ ability to understand written texts at the literal, inferential, and critical levels. The content and format were adjusted to suit the comprehension level of Grade 7 students. The Mathematical Word Problem-Solving Test was adopted and modified from the instrument used by Melalyn M. Parales (2019) in her study *"Assessment of Reading Comprehension and Problem Solving Skills of Grade VI Pupils."* It comprised 20 items based on Grade 7 mathematics topics such as integers, ratios, percentages, and linear equations. This section assessed students' ability to analyze and solve mathematical word problems using logical reasoning and accurate computations. The research instruments were administered via Google Forms, with clear instructions provided to guide participants through the assessment. The link was distributed through official school communication channels, and students were given one day to complete the test independently. Upon completion, raw scores were systematically converted into percentage scores and interpreted using a Likert-type verbal scale adapted from Pellegrino, Chudowsky, and Glaser (2001), which classified performance levels as Very High, High, Moderate, Low, or Very Low based on percent accuracy. Before data collection, the researchers secured approval from the school principal and the Division Office and coordinated with class advisers to facilitate the process. Informed consent forms were distributed online via Google Forms, ensuring that participation was voluntary and responses would remain confidential.

The best statistical tools for analyzing the data in this study were descriptive statistics and inferential statistics. Descriptive statistics helped summarize basic details of the data, such as the average, standard deviation, and the spread of students' reading comprehension and math problem-solving scores. Pearson’s correlation coefficient was used to investigate the relationship between reading comprehension and math problem-solving ability, to see if there was a significant connection between them.

In conducting this research, the researchers carefully observed the key ethical considerations. Respondents were fully informed about the study’s objectives, procedures, potential risks, and anticipated benefits before voluntarily providing their consent. Informed consent was obtained through a Google Form, and the study posed minimal risk while offering potential educational benefits. All data were anonymized and securely stored in compliance with the Data Privacy Act of 2012. The research upheld principles of justice, transparency, and respect for cultural values, with equal treatment of all participants. The study respects the cultural and traditional beliefs of the respondents and ensures that all questions are fair and unbiased. The researcher fosters trust through respectful communication and encourages honest participation.

**Results**

Table 1: *Descriptive Table*

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables with their Indicators** | **SD** | **Mean** | **Verbal Description** |
| **Reading Comprehension** | **12.34** | **57.93%** | **Low** |
| Critical Comprehension | 17.52 | 37.20% | Very Low |
| Inferential Comprehension | 18.29 | 53.00% | Low |
| Literal Comprehension | 16.42 | 83.60% | High |
| **Mathematical Word Problem-Solving Ability** | **9.36** | **53.9%** | **Low** |
| Addition | 16.21 | 86.00% | High |
| Division | 17.77 | 26.60% | Very Low |
| Multiplication | 15.17 | 40.20% | Low |
| Subtraction | 16.82 | 62.80% | Moderate |

Table 1 presents the results of the students' performance in Reading Comprehension and Mathematical Word Problem-Solving Ability. For Reading Comprehension, the highest performance was observed in Literal Comprehension, with a percent correct of 83.60%, interpreted as High. This suggests that students are fairly capable of understanding directly stated information in texts. However, scores in Critical Comprehension (37.20%) and Inferential Comprehension (53.00%) were interpreted as Very Low and Low, respectively. These results reveal that students struggle with analyzing, evaluating, and drawing conclusions from reading material.

In Mathematical Word Problem-Solving Ability, students performed best in Addition, with a percent correct of 86.00%, interpreted as High. This indicates that most students were able to solve addition word problems confidently. In contrast, their performance in Division (26.60%) was Very Low, showing significant difficulty in this area. Multiplication (40.20%) was rated as Low, and Subtraction (62.80%) as Moderate, indicating that students had varying levels of difficulty depending on the operation, with division being the most challenging.

Overall, the findings indicate that while students demonstrate satisfactory skills in basic addition and literal reading comprehension, they require further support and instruction in more complex mathematical operations (especially division and multiplication) and in developing higher-order reading skills such as critical and inferential thinking.

Table 2: Test of *Relationship*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor Variable** | **Mathematical Word Problem-Solving Ability** | | | |
| **r-value** | **p-value** | **Decision on Ho** | **Interpretation** |
| Reading Comprehension | .432 | .000 | Rejected | Significant |

The table presents the results of the test of the relationship between reading comprehension and mathematical word problem-solving ability among Grade 7 students. Using Pearson’s correlation coefficient, the analysis revealed an r-value of .432 and a p-value of .000. Since the p-value is less than the significance level of 0.05, the null hypothesis stating that there is no significant relationship between reading comprehension and mathematical word problem-solving is rejected. This indicates that as reading comprehension increases, mathematical word problem-solving ability tends to increase.

**Discussion**

The descriptive statistics provide deeper insight into students’ performance in reading comprehension and mathematical word problem-solving. In reading comprehension, students demonstrated high performance in Literal Comprehension (83.6%), but their scores declined to Low (53.0%) in Inferential Comprehension and Very Low (37.2%) in Critical Comprehension. This trend highlights a particular struggle with higher-order comprehension skills, which are essential for interpreting and analyzing complex texts. Studies have shown that inferential and evaluative reading skills play a crucial role in solving mathematical word problems (Vilenius-Tuohimaa et al., 2015; O'Reilly & Sabatini, 2019; Bayazit & Öztürk, 2021).

In mathematical word problem-solving, students demonstrated the highest performance in Addition (86%), followed by Subtraction (62.8%), which was classified as Moderate. In contrast, they exhibited significant difficulty with more complex operations, obtaining Low performance in Multiplication (40.2%) and Very Low performance in Division (26.6%). This suggests that as the operations become more abstract, students face greater challenges. The pattern across both domains reinforces the idea that limited comprehension, particularly at inferential and critical levels, may hinder students’ ability to process and solve complex mathematical problems. Therefore, interventions should focus not only on improving computational skills but also on strengthening students’ inferential and critical reading abilities to support better problem-solving outcomes.

The Pearson correlation coefficient (r = 0.432, p = .001) reveals a moderate positive and statistically significant relationship between students’ reading comprehension skills and their mathematical word problem-solving ability. This suggests that students who excel in reading comprehension, particularly in making inferences and understanding context, are more likely to perform well in solving math word problems. The result supports the idea that word problems require more than just computational ability; they demand strong language processing and comprehension skills (Fuchs et al., 2016). This finding is consistent with recent studies emphasizing the interdependence of literacy and numeracy. For example, Van Rinsveld et al. (2016) reported that linguistic skills significantly influence mathematical performance, especially in tasks that involve verbal reasoning. From a cognitive perspective, students with higher reading proficiency may experience reduced cognitive load when interpreting mathematical texts, enabling more efficient problem-solving (Sweller et al., 2019). These results suggest that strengthening reading comprehension could be a practical and strategic approach to improving performance in mathematics..

**Conclusions**

Based on the findings of this study, many Grade 7 students had difficulty understanding written texts, which may have affected their ability to solve mathematical word problems that require reading comprehension. While they showed strength in basic tasks like literal understanding and addition, they struggled with higher-level skills such as making inferences, analyzing information, and solving more complex operations like division and multiplication. These results suggest challenges in using effective strategies for both reading and problem-solving. The statistical analysis showed a moderate but significant relationship between reading comprehension and mathematical word problem-solving ability. This indicates that students with stronger reading skills were more likely to perform well in solving word problems. However, the relationship was not absolute, which means that other factors such as logical thinking, prior knowledge, and mathematical understanding may also affect students’ performance.

Therefore, the theory that reading comprehension serves as a predictor of mathematical word problem-solving ability is affirmed based on the results. However, the data also suggest that strong reading skills alone are not always enough to ensure success in math. While there is an observable link between the two, each area still requires focused attention and instruction. It is important to build students’ comprehension and problem-solving skills together to improve their performance across both academic domains.

**Recommendation**

To improve students’ reading and mathematical problem-solving skills, the researchers recommend a more integrated instructional approach that strengthens reading comprehension within both English and Mathematics classes. Specifically, teachers may implement reading-integrated math modules that include guided reading tasks directly related to mathematical word problems. In mathematics classes, short reading passages followed by comprehension questions may help students extract relevant information and develop problem-solving strategies. English teachers may design activities that foster critical thinking and inferential comprehension, such as interpreting real-life scenarios, analyzing texts, or justifying conclusions. Math journaling may also be introduced to encourage students to explain their solutions and reflect on their thinking, reinforcing metacognitive awareness.

To address difficulties in multiplication and division, targeted interventions such as remedial instruction, math-related games, and peer-assisted learning may be employed. Schools may also consider collaborative lesson planning between English and Math teachers to design interdisciplinary sessions that build connections between language and numeracy. This collaborative approach may support the development of both reading comprehension and mathematical reasoning, leading to improved academic outcomes.

**References**

Augis, C. J. D., Satra Bano, J. T., Lalag, G. M., Maturan, J. J., & Alcover, K. C. (2024). The relationship between reading comprehension skills, problem solving skills, and academic achievement: a correlational research approach. *Ignatian International Journal for Multidisciplinary Research*, *2*(6), 1731-1757.

Bayazit, I., & Öztürk, M. (2021). Examining the relationship between reading comprehension and mathematical problem-solving. International Journal of Educational Methodology, 7(3), 429–441. <https://doi.org/10.12973/ijem.7.3.429>

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). Sage Publications.

Daryanti, T. (2015). The Contribution Of Vocabulary Mastery Toward Reading Comprehension. *Universitas Negeri Yogyakarta*.

Del Rosario, M. C., & Tagle, M. J. (2020). Reading comprehension and mathematical problem-solving performance of junior high school students in Davao City. Philippine Journal of Education, 95(1), 45–58.

Department of Education (DepEd). (2020). Policy guidelines on the implementation of learning delivery modalities for formal education. https://www.deped.gov.ph/

Department of Education. (2015). Policy guidelines on classroom assessment for the K to 12 basic education program (DepEd Order No. 8, s. 2015). Department of Education. <https://www.deped.gov.ph/2015/04/01/do-8-s-2015>

Fetters, M. D. (2023). The mixed methods research workbook: Activities for designing, implementing, and publishing projects. Sage Publications.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). How to design and evaluate education research (10th ed.). McGraw-Hill Education.

Fuchs, L. S., Fuchs, D., Compton, D. L., Powell, S. R., Seethaler, P. M., Capizzi, A. M., & Schatschneider, C. (2015). The cognitive correlates of third-grade skill in arithmetic, algorithmic computation, and arithmetic word problems. Journal of Educational Psychology, 97(3), 493–513.

Fuchs, L. S., Gilbert, J. K., Fuchs, D., Seethaler, P. M., & Martin, B. N. (2016). *The role of cognitive processes in mathematical word-problem solving*. Learning and Individual Differences, 50, 139–145. https://doi.org/10.1016/j.lindif.2016.07.007

Oakhill, J., Cain, K., & Bryant, P. (2003). The dissociation of word reading and text comprehension: Evidence from component skills. Language and Cognitive Processes, 18(4), 443–468.

Organisation for Economic Co-operation and Development. (2019). PISA 2018 results (Volume I): What students know and can do. OECD Publishing. <https://doi.org/10.1787/5f07c754-en>

Timario, R. R. (2020). Reading Comprehension And Problem Solving Skills Of Grade Sevenstudents: A Mixed Sequential Explanatory Approach. *American Journal of Humanities and Social Sciences Research (AJHSSR)*, *4*(6), 83-91.

Van Rinsveld, A., Brunner, M., Landerl, K., Schiltz, C., & Ugen, S. (2016). *The relation between language and arithmetic in bilinguals: Insights from different stages of language acquisition*. Frontiers in Psychology, 7, 1396. https://doi.org/10.3389/fpsyg.2016.01396

Wangmo, P. (2021). Factors Affecting Bhutanese Secondary School Students’ Ability in Solving Mathematical Word Problems: A Case Study. *Asian Research Journal of Mathematics*, 17(1), 1–13. <https://doi.org/10.9734/arjom/2021/v17i130260>