Reading Comprehension and Perceived Mathematical Problem-Solving Skills among Junior High School Students: The Mediating Role of Mathematics Content Competencies

Mylene T. Tubo

mylene.tubo@hcdc.edu.ph
Toril, Davao City, 8000, Philippines

Abstract

Problem-solving skills remain a global concern. The mediating role of mathematics content competencies on the relationship between reading comprehension and perceived mathematical problem-solving skills was examined. Predictive research design, stratified random sampling, survey approach, mediation analysis were applied. The data from 300 Grade 7 students revealed that the interest variable does not mediate the predictor-criterion correlation, partially supporting the Dual Coding Theory. Future research may explore additional mediating variables to account 28.6% variance in the strength of the mediation. School leaders may strengthen reading comprehension alongside mathematics instruction among students.

Keywords: Reading comprehension; mathematical problem-solving skills; junior high school students; mathematics content competencies

1. Introduction

Poor problem-solving skills are a global concern (Hadi et al., 2018). PISA results consistently showed that students across countries struggle with problem-solving (OECD, 2019). In Indonesia, many students have difficulty interpreting and solving basic problems (OECD, 2023; Kandaga et al., 2024), while in Brazil, a large number also showed weak analytical and problem-solving skills (OECD,2023; Vale et al., 2025). In the Philippines, the Philippine Institute for Development Studies (PIDS) emphasized that most students did not reach the standards required for problem-solving (PIDS, 2021). In Davao City, studies likewise revealed poor problem-solving skills in mathematics among students (Timario, 2020; Lemana, 2025).

Numerous studies have examined poor problem-solving skills; most employ qualitative or descriptive methods, and there is little statistical data on the relationships among reading comprehension, mathematical subject competence, and perceived mathematical problem-solving abilities. It was suggested in order to ensure fairness, minimize risks, and maximize the possible benefits from the study. To ensure the validity of the research procedure, honesty was used when presenting the study's results. The results of Öztürk et al. (2019) and Cho et al. (2022) showed that reading comprehension influences the skills to solve mathematical problems. Nonetheless, no quantitative studies have been employed for the findings of Luna et al. (2024) and Mabansag (2024). It was found that students in the Philippines lacked problem-solving skills in mathematics. This information is required for fair conduct throughout the research for safety reasons and to maximize its benefits.

Conflicts of interest, if they occurred, were openly declared, and the results of the research were accurately presented. The obtained information can be considered purely descriptive, as no causal or mediating relationships were examined. This points to a gap in quantitative research on the impact of mathematical topic skills on problem-solving skills.

Poor problem-solving skills hinder students' academic achievement and their skills to handle higher-order tasks (OECD, 2019). These skills also reduce future career readiness and global competitiveness, as problem-solving is a key 21st century skill valued by employers (Kennedy & Sundberg, 2020). In the Philippines, if left unaddressed, this problem may widen learning gaps and limit the application of knowledge in real-life situations (OECD, 2022; PIDS, 2021). Thus, it is important to examine how reading comprehension predicts perceived mathematical problem-solving skills, with mathematics content competencies as mediators that improve critical thinking, academic performance, and future readiness.

2. Methodology

2.1. Research Design

In this study, a predictive research design was employed. This design is a quantitative method that forecasts future results using one or more predictor variables (Lim, 2025). Arunkumar et al. (2025) highlighted the significance of this architecture, especially for predicting future events, spotting trends, and evaluating and quantifying probability using quantifiable data. Improved decision-making, increased forecasting accuracy, more successful risk identification, and increased data analysis efficiency are only a few benefits of this approach (Nyoni, 2025). However, to ensure the precision, applicability, and reliability of prediction models and to generate efficient, reliable outcomes, appropriate validation is necessary (Hrehova, 2025). All tables should be numbered with Arabic numerals. Headings should be placed above tables, left justified. Leave one line space between the heading and the table. Only horizontal lines should be used within a table, to distinguish the column headings from the body of the table, and immediately above and below the table. Tables must be embedded into the text and not supplied separately. Below is an example which authors may find useful.

2.2. Locale of the Study

This study was conducted in Cluster 5 of the Division of Davao City Junior High Schools, covering 9 schools. Two schools were selected, namely: Dona Carmen Denia National High School and J. V. Ferriols National High School. These schools were chosen for the study because of their active involvement. Moreover, these schools demonstrate the city's dedication to expanding school access and improving educational quality, in line with the Department of Education's mission to deliver a fair education to all students.

2.3. Sample and Sampling Technique

The study includes 300 Grade 7 students from two public schools. These students were chosen among the 1,403 Grade 7 students enrolled in the 2025–2026 academic year. The research study must be formally enrolled; complete enrolment records must be maintained; consistent attendance must be maintained; signed

parental consent papers must be presented; and the participant must indicate their willingness to participate to be eligible for the study. The sample did not include students who changed schools during the study.
The study utilized a proportional stratified sampling technique to ensure fairness among the two schools. This method was chosen because samples were taken proportionally from each stratum after the population was split into "strata," according to their class. This ensures that the groups' populations are fairly represented in the study, as observed by Cheung (2024). This strategy reduced bias and ensured that the chosen respondents fairly represented the traits of all Grade 7 students.

2.4. Data Gathering Technique

A survey technique was used to gather data. This method is a systematic approach in gathering data, a standardized questionnaire to describe the traits, beliefs, or behaviours of a broader population. It is frequently used in research to effectively evaluate, test, or extrapolate results within a certain group (Sheik et al., 2024). Reaching large and diverse populations, producing quantifiable data for pattern analysis, facilitating the generalization of findings, enabling faster data collection, and supporting replicability through standardized procedures are just a few of the benefits this approach offers (Oranga & Matere, 2025).

Three survey questionnaires were adapted and modified for this study. The purpose of a structured survey questionnaire is to collect data from students. A four-point Likert scale was employed for data collection and analysis to ensure consistency.

Firstly, the reading comprehension questionnaire proposed by Daryanti (2015) contained 25 multiple-choice items that measure literal, inferential, and evaluative comprehension.

$$Likert\ Score = \frac{Number\ of\ Correct\ Answers}{Number\ of\ Items} x\ 3$$

A linear transformation was used to convert the raw test results into a 4-point Likert scale. The proportion score was calculated by dividing the number of right answers by the total number of items. Three was multiplied by the result. This transformation guarantees that all incorrect responses receive a score of 0. Students who received a perfect score received an extra point in order to align the results. Moreover, respondents who answered all the items correctly will obtain a final score of 4. While the other scores remained within the 0–3 range, this is commonly applied in educational and social research data to improve the interpretability. Boone and Boone (2012) explained that numerical scores may be grouped into Likert-type categories. Likewise, Norman (2010) noted that test scores can be categorized into ordinal scales (such as Likert scales, which are used for analysis, especially to simplify data interpretation in educational studies). Moreover, the adapted instruments were pilot-tested for reliability, achieving a Cronbach's alpha of 0.858.

Secondly, the mathematics content competencies by Raposon et al. (2023) contained 46 items and a Cronbach's alpha of 0.867.

Lastly, the perceived mathematical problem-solving skills scale by He et al. (2024) contained 9 items and had a Cronbach's alpha of 0.866.

2.5. Data Analysis Technique

In this study, the data analysis techniques utilized descriptive, correlation, and mediation analyses. Descriptive analysis systematically organizes and summarizes large datasets and presents the main features of

the mean and standard deviation (Alabi, 2023). It was utilized to describe and organize data before further analysis. Its advantages include simplifying data, identifying patterns, and making interpretation easier (Tumiran, 2024). Furthermore, correlation analysis determines the strength and direction of the relationship between two continuous variables (Schober et al., 2018), and the Pearson Product–Moment Correlation, as described by Creswell and Creswell (2023), was used to examine the relationships among variables. Lastly, the study utilized mediation analysis through regression modelling, and Preacher and Hayes' Bootstrapping Method (2014) was applied. This model helps the researcher figure out how the predictor variables affect problem-solving skills. Moreover, the direct effects of the predictor variables on problem-solving skills and the indirect effects on perceived mathematical problem-solving skills through the mediator were examined.

2.6. Ethical Considerations

Informed consent was obtained before the data gathering. Respondents' information and identities will remain confidential using anonymized data. The survey questions were designed to prevent stress or discomfort to students, ensuring that the respondents are aware of their rights. Protecting participant anonymity and recognizing their participation, the study was conducted in compliance with the values of honesty, integrity, and respect. To guarantee adherence to established ethical, legal, and institutional research norms, Holy Cross of Davao College's Society for Moral Integrity and Legal Ethics (HCDC-SMILE) granted ethical clearance, a formal approval. The researcher requested and obtained formal approval from the Department of Education (DepEd)to carry out the research. This request was made to maintain fairness throughout the research process, reduce potential risks, and enhance the study's potential benefits. The results were presented accurately and openly to maintain the validity and integrity of the study, and any potential conflicts of interest were publicly disclosed.

3. Results and Discussions

3.1. Descriptive Results

Shown in Table 1 are the descriptive, correlation, and mediation results of the study, including the variables involved, namely, reading comprehension, mathematics content competencies, and perceived mathematical problem-solving skills, with their respective indicators; and the number of samples, standard deviation, mean, and descriptive level specifically corresponding with each of the variables.

Table 1: Descriptive Table (n=300)

Variables	Standard Deviation	Mean	Descriptive Level
Reading Comprehension	**.65**	**2.39**	**Low**
Identifying the Main Idea	*1.41*	*2.72*	*High*
Finding Explicit Information	*.91*	*2.69*	*High*
Finding Implicit Information	*.92*	*2.07*	*High*
Identifying Words Meaning	*.96*	*2.20*	*Low*
Identifying Reference	*1.11*	*2.73*	*High*
Mathematics Content Competencies	**.40**	**3.06**	**High**

Number Sense	*.53*	*3.04*	*High*
Measurement	*.46*	*3.03*	*High*
Geometry	*.44*	*3.07*	*High*
Patterns and Algebra	*.48*	*3.08*	*High*
Statistics and Probability	*.46*	*3.06*	*High*
Perceived Mathematical Problem-Solving Skills	**.41**	**3.17**	**High**
Understanding the Problem	*.54*	*3.23*	*High*
Devise a Plan	*.48*	*3.08*	*High*
Carry out the Plan	*.60*	*3.16*	*High*
Look Back and Reflect	*.54*	*3.19*	*High*

The table specifically shows that the overall reading comprehension variable was 2.39, which is relatively low and indicates that respondents' reading comprehension levels are generally low. Of the five variables, three were rated high, while two were rated low. The standard deviation for the variable is 0.65. Moreover, the mathematics content competencies variable, with a mean of 3.06, described as high, indicates that respondents possess a strong level of mathematics content competencies. The corresponding standard deviation of 0.40 indicates very low consistency, with high variability and a lack of consensus. Lastly, the perceived mathematical problem-solving skills variable has a mean score of 3.17, implying that the respondents are effective problem solvers. The standard deviation for this measure is 0.41, indicating high consistency.

3.2. Correlation Results

Table 2 is the correlation table. It contains the determinant and criterion variables. Aside from the variables, it also contained the number of samples, r-value, p-value, decision on the null hypothesis, and the corresponding interpretation.

Table 2: Correlation Table (n=300)

	Mathematical Problem-Solving Skills			
Predictor Variables	**r-value**	**p-value**	**Decision on *Ho***	**Interpretation**
Reading Comprehension	.215	.000	Reject *Ho*	Low positive significant correlation
Mathematics Content Competencies	.641	.000	Reject *Ho*	Moderate high positive significant correlation

***. Correlation is significant at the 0.05*

Decision Rule: Reject H_0 if $p < 0.05$

The table specifically shows that the correlation analysis between reading comprehension and perceived mathematical problem-solving skills variables obtained a p-value of 0.000, which is less than the 0.05 level of significance; hence, the null hypothesis was rejected. It indicates that reading comprehension and perceived mathematical problem-solving skills are statistically significant. The corresponding r-value of 0.215 indicates

a low positive correlation. This indicates that reading comprehension has little influence. The other factors might be more significant. Moreover, the mathematics content competencies and perceived mathematical problem-solving skills variables yielded a p-value of 0.000, lower than the 0.05 level of significance; hence, the null hypothesis was rejected. This means that mathematics content competencies and perceived mathematical problem-solving skills are significantly related. With a corresponding r-value of 0.641, this indicates a moderately high correlation. This implies that mathematical content competencies are associated with better-perceived mathematical problem-solving skills.

The findings show that both correlations are statistically significant at the 0.05 significance level; hence, the null hypotheses can be rejected. From the results above, it is clear that not only reading comprehension abilities but also mathematics content competencies are important considerations when solving mathematical problems.

3.3. Mediation Results

Table 3 presents the mediating table. The table includes several columns: Predictor, Estimate, Standard Estimate, SE (Standard Error), t (t-value), p (p-value), and Decision on null hypothesis.

Table 3: Correlation Table (n=300)

Label	Path / Effect	Estimate (β)	SE	Z-value	p-value	Decision on H_0	Interpretation
A	Reading Comprehension → Mathematics Content Competencies	0.06	0.039	1.55	0.121	Accept H_0	Not Significant
B	Mathematics Content Competencies → Mathematical Problem-Solving Skills	0.63	0.056	11.35	0.001	Reject H_0	Significant
c’	Reading Comprehension → Mathematical Problem-Solving Skills (Direct Effect)	0.10	0.034	2.89	0.004	Reject H_0	Significant
a × b	Indirect Effect	0.04	0.025	1.49	0.137	Accept H_0	Not Significant
(a × b) +c	**(Total Effect)**	**0.14**	**0.041**	**3.33**	**.001**	**Reject H_0**	**Significant**

Level of Significance: 0.05Percentage of Mediation: Indirect: 28%; Direct: 72%
Decision Rule: Reject H_0 if $p < 0.05$
Mediated Proportion = 0.286 or 28.6%

The table shows that, controlling for mathematics content competencies, the direct effect of reading comprehension on perceived mathematical problem-solving skills was estimated at 0.10. With a p-value of 0.004, which is less than the significance level, the null hypothesis was rejected. The result indicates a statistically significant direct effect of perceived ability to solve mathematical problems on reading

comprehension. Nevertheless, an insignificant indirect effect was observed between reading comprehension and perceived mathematical problem-solving skills, as reading comprehension affected mathematics content competencies to the extent of 0.04. Given that the p- value was 0.137, which is above the significance level, the null hypothesis was accepted. This shows that reading comprehension of perceived mathematical problem-solving skills, as measured by mathematics content competencies, is not significant. Lastly, the total effect of reading comprehension on perceived mathematical problem-solving skills was estimated at 0.14. The p-value is 0.001, which is below the 0.05 level of significance; therefore, the null hypothesis was rejected. It indicates that the total effect of reading comprehension on mathematical problem-solving abilities is significant.

Finally, the mediated effect in the table is 28.6%, which is a moderate level of mediation. The findings show that reading comprehension has a significant direct and overall effect on perceived mathematical problem-solving skills. Nevertheless, the indirect effect via the mathematics content competencies is insignificant, suggesting that these competencies do not mediate the relationship between the two variables.

3.4. Reading Comprehension, Mathematics Content Competencies, and Perceived Mathematical Problem-Solving Skills Correlations

The finding that reading comprehension has a significantly low positive correlation with perceived mathematical problem-solving skills affirms previous evidence and confirms that language comprehension helps interpret mathematical problems (Gomez et al., 2020). The current finding affirms Stephany (2021), who emphasized that reading comprehension contributes to better performance in solving worded mathematical problems. However, this finding contradicts the study by Salvo and Ucang (2025), which found that mathematical problem-solving performance may remain high even when reading comprehension skills are weak, suggesting that comprehension does not always strongly determine problem-solving success.

3.5. Reading Comprehension and Perceived Mathematical Problem-Solving Skills as Mediated by Mathematics Content Competencies

The finding that mathematics content competencies do not mediate the relationship between reading comprehension and perceived mathematical problem-solving skills affirms that reading comprehension is an essential component of mathematical cognition. The current finding supports Stephany (2021), who emphasized the importance of language comprehension in mathematical reasoning and problem-solving accuracy. Moreover, the current study's results align with those of Kim et al. (2021), who reported that reading comprehension has a larger, stronger, and more direct effect on math performance than the amount of domain-specific mathematics content competencies. Likewise, Amalina and Vidákovich (2023) highlighted that comprehension skills have a greater influence on one's achievement in solving difficult mathematical problems compared to having mathematics content competencies. In other words, the improvement in reading comprehension could lead to immediate gains in their skills to solve mathematical problems rather than to additional competencies in mathematics.

However, the present result contradicts Sury and Pilchin (2025), who indicated that domain-specific knowledge is more important for mathematical problem-solving skills than comprehension, since the latter influences the former to a lesser degree than domain-specific knowledge does. The findings imply that improving learners' comprehension will further enhance their mathematical problem-solving, as comprehension plays a greater role than domain-specific knowledge. The finding that mathematics content competencies do not mediate the relationship between reading comprehension and perceived mathematical problem-solving skills affirms that reading comprehension is an essential key point in mathematical cognition.

4. Conclusions

Based on the findings, it is concluded that mathematics content competencies do not significantly mediate the relationship between reading comprehension and perceived mathematical problem-solving skills. However, the two determinants were significantly correlated with the criterion variable. Hence, Dual Coding Theory, which posits that verbal and nonverbal systems contribute separately rather than through a mediated process in shaping students perceived mathematical problem-solving skills, was partially supported.

5. Recommendations

Based on the conclusions, the study recommends the following:

1. Researchers may conduct further studies investigating other mediating variables that may help to account for the relationship between reading comprehension and perceived mathematical problem-solving skills, aside from the non-significant mediator of mathematics content competencies.
2. Researchers may pursue qualitative research to examine how students use both verbal and nonverbal information in solving problems, offering valuable knowledge about how each affects problem-solving, as suggested by Dual Coding Theory.
3. Educational leaders may develop educational programs that help improve both reading comprehension and mathematical competency, recognizing their separate impact on improving students' skills to solve math problems. All figures should be numbered with Arabic numerals (1,2,...n). All photographs, schemas, graphs and diagrams are to be referred to as figures. Line drawings should be good quality scans or true electronic output. Low-quality scans are not acceptable. Figures must be embedded into the text and not supplied separately. Lettering and symbols should be clearly defined either in the caption or in a legend provided as part of the figure. Figures should be placed at the top or bottom of a page wherever possible, as close as possible to the first reference to them in the paper.

Acknowledgements

I am truly grateful to everyone who helped make this research possible. A special thank you goes to my adviser, Dr. Carlito S. G. Yurango, for his unwavering guidance, patience, and trust and for giving me the incredible opportunity to conduct this study. His encouragement kept me going when things got tough. And above all, I thank God for the wisdom, strength, and grace that carried me through every step of this journey. I could not have done this without all of you.

References

Alabi, O., & Bukola, T. (2023). Introduction to descriptive statistics. In *Recent advances in biostatistics*. IntechOpen.

Amalina, I. K., & Vidákovich, T. (2023). Cognitive and socioeconomic factors that influence the mathematical problem-solving skills of students. *Heliyon, 9*(9).

Arunkumar, M., Rajkumar, K., Jeyaseelan, W. R., & Natraj, N. A. (2025). Data mining, machine learning, and statistical modeling for predictive analytics with behavioral big data. *Tehnički Vjesnik, 32*(1), 72–77.

Babbie, E. R. (2010). *The practice of social research* (12th ed.). Wadsworth Cengage Learning.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Boone, H. N., Jr., & Boone, D. A. (2012). Analyzing Likert data. *Journal of Extension, 50*(2), 1–5.

Cheung, A. K. L. (2024). Probability proportional sampling. In *Encyclopedia of quality of life and well-being research* (pp. 5472–5474). Springer International Publishing.

Cho, E., Mancilla-Martinez, J., Hwang, J. K., Fuchs, L. S., Seethaler, P. M., & Fuchs, D. (2022). Comorbidity in reading comprehension and word-problem solving difficulties: Exploring shared risk factors and their impact on language minority learners. *Journal of Learning Disabilities, 55*(6), 513–527. https://doi.org/10.1177/00222194211068355

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.

Daryanti, T. (2015). *The contribution of vocabulary mastery toward reading comprehension*. Universitas Negeri Yogyakarta.

Gomez, A. L., Pecina, E. D., Villanueva, S. A., & Huber, T. (2020). The undeniable relationship between reading comprehension and mathematics performance. *Issues in Educational Research, 30*(4), 1329–1354.

Hadi, S., Retnawati, H., Munadi, S., Apino, E., & Wulandari, N. F. (2018). The difficulties of high school students in solving higher-order thinking skills problems. *Problems of Education in the 21st Century, 76*(4), 520–532.

Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British journal of mathematical and statistical psychology*, *67*(3), 451-470.

He, X., Ismail, N. B., & He, M. (2024). A survey on mathematical problem-solving skills and mathematical core literacy among middle school students in Sichuan, China. *International Journal of Academic Research in Progressive Education and Development, 13*(4). https://doi.org/10.6007/ijarped/v13-i4/23749

Hrehova, S., Antosz, K., Husár, J., & Vagaska, A. (2025). From simulation to validation in ensuring quality and reliability in model-based predictive analysis. *Applied Sciences, 15*(6), 3107.

Kandaga, T., Krisnadi, E., Nurhayati, S., & Gusti, V. Y. K. (2024). Improving Indonesian students' mathematical literacy with brain-based learning: A comparative study of PISA scores. *Jurnal Konseling Dan Pendidikan, 12*(3), 99–111. https://doi.org/10.29210/1118500

Kennedy, T. J., & Sundberg, C. W. (2020). 21st century skills. In B. Akpan & T. J. Kennedy (Eds.), *Science education in theory and practice*. Springer. https://doi.org/10.1007/978-3-030-43620-9_32

Kim, J. S., Burkhauser, M. A., Mesite, L. M., Asher, C. A., Relyea, J. E., Fitzgerald, J., & Elmore, J. (2021). Improving reading comprehension, science domain knowledge, and reading engagement through a first-grade content literacy intervention. *Journal of Educational Psychology, 113*(1), 3–16.

Lemana-Velasco, L. M. (2025). Problem-solving skills, psychological attributes, and teaching competence: A structural model on mathematics performance of learners. *Asian Research Journal of Mathematics, 21*(5), 10–9734.

Lim, W. M. (2025). What is quantitative research? An overview and guidelines. *Australasian Marketing Journal, 33*(3), 325–348.

Luna, S., Liana, M., & Azmi, R. D. (2024). Analysis of student errors according to the Nolting procedure on mathematical literacy problems in view of Kolb's divergent and assimilation styles. In *SHS Web of Conferences* (Vol. 205, p. 03004). EDP Sciences.

Mabansag, A. (2024). Error analysis in solving word problems among high school students. *Interdisciplinary Research Review, 19*(5).

Moreira, M. D. F., Gamboa, O. L., & Pinho Oliveira, M. A. (2023). Cognitive-affective changes mediate the mindfulness-based intervention effect on endometriosis-related pain and mental health: A path analysis approach. *European Journal of Pain, 27*(10), 1187–1202.

Niss, M., & Højgaard, T. (2019). Mathematical competencies revisited. *Educational Studies in Mathematics, 102*(1), 9–28.

Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Advances in Health Sciences Education, 15*(5), 625–632.

Nyoni, R. (2025). Harnessing data analytics for predictive insights: Advancing decision-making with big data innovations. *International Journal of Research Publication and Reviews, 6*(1), 2915–2936.

OECD. (2019). *Programme for International Student Assessment (PISA) results from PISA 2018*.

OECD. (2022). Organisation for Economic Co-operation and Development—OECD. In *The Europa directory of international organizations 2022* (pp. 694–701). Routledge.

Organisation for Economic Co-operation and Development. (2023). *PISA 2022 results* (Vols. I & II): *Student performance in mathematics, reading, and science*. OECD Publishing. https://doi.org/10.1787/61b9a64a-en

Oranga, J., & Matere, A. (2025). Quantitative research: Types, advantages, generalizability & limitations. *Open Access Library Journal, 12*, 1–9.

Öztürk, M., Akkan, Y., & Kaplan, A. (2019). Reading comprehension, mathematics self-efficacy perception, and mathematics attitude as correlates of students' non-routine mathematics problem-solving skills in Turkey. *International Journal of Mathematical Education in Science and Technology, 51*(7), 1042–1058. https://doi.org/10.1080/0020739X.2019.1648893

Paivio, A., & Clark, J. M. (2006). Dual coding theory and education. *Pathways to literacy achievement for high poverty children*, *1*, 149-210.

PIDS. (2021). *Our education crisis: Why and what next?* https://www.pids.gov.ph/details/our-education-crisis-why-and-what-next

Patidar, J. (2013). *Writing research objectives*.

Polya, G. (1945). *How to solve it: A new aspect of mathematical method*. Princeton University Press.

Putri, L., Rezani, M. R., & Hermina, D. (2025). Correlational research design. *Jurnal Riset Multidisiplin Edukasi, 2*(6), 306–317.

Raposon, P. A. M., Nerves, C. B., Hermoso, J. A., & Pescuela, E. B. (2023). Development of competency-based assessment in determining the level of content knowledge in mathematics.

Roscoe, J. T. (1975). *Fundamental research statistics for the behavioral sciences*. Holt, Rinehart and Winston.

Salvo, C. M. B., & Ucang, J. T. (2025). The relationship between comprehension skills and academic performance in mathematics. *International Journal of All Research Writings, 7*(5), 146–156.

Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation coefficients: appropriate use and interpretation. *Anesthesia & analgesia*, *126*(5), 1763-1768.

Sheikh, M. A., Bajwa, F., Aslam, M. J., & Mir, B. (2024). Survey research: Descriptive and analytical power, types and usages. *International Journal of Politics & Social Sciences Review (IJPSSR), 3*(3), 231–239.

Stephany, S. (2021). The influence of reading comprehension on solving mathematical word problems. In *Diversity dimensions in mathematics and language learning: Perspectives on culture, education and multilingualism* (Vol. 24, p. 370).

Sury, D., & Pilchin, L. (2025). The language of numbers: Reading comprehension and applied math problem-solving. *Behavioral Sciences, 15*(12), 1746.

Timario, R. R. (2020). Reading comprehension and problem-solving skills of grade seven students: A mixed sequential explanatory approach. *American Journal of Humanities and Social Sciences Research (AJHSSR), 4*(6), 83–91.

Todorova, M. (2024). Cognitive processes in reading comprehension: A theoretical framework for foreign language acquisition. *International Journal of Advanced Natural Sciences and Engineering Researches, 8*(3), 162–170.

Tumiran, M. A. (2024). Constructing a framework from quantitative data analysis: Advantages, types and innovative approaches. *Quantum Journal of Social Sciences and Humanities, 5*(4), 198–212.

Vale, I., Barbosa, A., & Gualandi, J. (2025). Exploring creativity in pattern generalization: A study of future teachers in Brazil and Portugal. *STEM Education*, *5*(5), 732-756.