Predicting Reading Comprehension: Investigating the Influence of Multiple Variables Through Multiple Regression Analysis

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Abstract

Reading comprehension is a skill that can aid pupils in grasping the meaning of a text or gaining new insights from it. This study investigated the influence of multiple variables on reading comprehension and identified the key factors that contribute to reading comprehension. It utilized the descriptive-correlational method to describe the relationship between multiple independent variables and reading comprehension. It was conducted in one of the elementary schools in Himamaylan City during the school year 2022-2023, utilizing 50 Grade 6 students who were selected using total enumeration. The researcher utilized the Philippine Informal Reading Inventory to determine students' reading comprehension and standardized instruments in measuring various variables in reading. It was revealed that out of the ten variables considered, it was reading fluency (t=-2.197, p=0.034), nonsense word fluency (t=-2.018, p=0.050), phonological awareness (t=2.923, p=0.006) and phonemic awareness (t=-2.809, p=0.08) were found significantly related to the reading comprehension of the students. These four variables are the key factors that impact reading comprehension and help them better build an understanding of the text. Using multiple regression analysis, it was found that reading fluency, nonsense word fluency, phonological awareness, and phonemic awareness are the influential variables in the students' reading comprehension indicating the essence of primary language development. Moreover, phonological awareness is significant in developing the student's reading comprehension. It is recommended that the development of reading comprehension in the primary grades be given a focus through proper intervention.

Keywords: *Reading Comprehension, Multiple Regression, Descriptive-Correlational, Phonological Awareness, Reading Fluency.*

INTRODUCTION

Reading comprehension is a critical skill crucial for academic success and lifelong learning. However, there are significant concerns about students' reading proficiency, both globally and within the Philippines. According to the World Bank (2022), the Philippines faces challenges ensuring quality education, particularly reading. The report reveals that 91% of Filipino children aged ten still struggle to read simple texts, indicating a decline in the country's education quality. Additionally, the Philippines is among the nations in the East Asia and Pacific region with the highest rates of learning poverty, surpassing the regional average of 34.5% by 56.5 percentage points. These international findings emphasize the urgent need to address the factors contributing to poor reading comprehension and enhance educational outcomes. Moreover, Mohammad (2018) concluded that low phonemic awareness skills of students are one of the predominant factors why students have low reading comprehension.

The Programme for International Student Assessment (PISA) 2018 results revealed that the Philippines ranked the lowest among 79 participating countries in reading comprehension (World Bank Group, 2020). This outcome raises concerns about the overall reading proficiency of Filipino students and highlights the need for research and interventions to address this critical issue. The low ranking of the Philippines in the PISA 2018 results regarding reading comprehension highlights the challenges faced by Filipino students in this critical area. One potential factor contributing to this challenge is the limited vocabulary skills exhibited by students, which can significantly hinder their ability to comprehend texts effectively (Mariecarrier, 2023). The low ranking in PISA 2018 highlights the significant gap in reading comprehension skills faced by Filipino students compared to their peers in other countries, emphasizing the importance of targeted efforts to enhance vocabulary

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acquisition and reading proficiency. Insufficient reading comprehension skills can impede educational progress and restrict opportunities for academic and professional growth.

In research conducted at Doña Julieta Gatuslao Memorial School by Entierro et al. in 2023, it was found that the reading comprehension of the Grade 6 pupils falls at frustration based on the mean score. of 70.63 This indicates that they lack the necessary background knowledge or comprehension skills to engage with texts effectively. The research conducted by Entierro et al. in 2023 contributes to the growing body of evidence that underscores the significance of reading comprehension difficulties among Filipino students. Their study specifically focused on investigating the factors influencing reading comprehension in Himamaylan, adding valuable local context to the existing literature. The research examined various aspects, including the grammar of the test and oral reading fluency. The findings revealed that students in Himamaylan failed to reach the average level in these areas, further highlighting the challenges faced by students in achieving proficient reading comprehension skills.

This research aims to explore the influence of multiple variables on reading comprehension and identify the key factors contributing to poor reading outcomes. By employing multiple regression analysis, this study seeks to determine the relative importance of oral reading, letter naming, phonemic segmentation, nonsense word fluency, word reading fluency, phonemic awareness, vocabulary, grammar, letter identification, and phonological awareness and their predictive power in understanding reading comprehension difficulties. The findings of this study can contribute to the development of evidence-based interventions and strategies to enhance reading comprehension skills. Furthermore, the insights gained from this study can contribute to the broader efforts of improving reading proficiency nationally and internationally, helping to bridge the gap and raise the overall reading achievement of Filipino students.

METHODOLOGY

Research Design

This study utilized the descriptive–correlational method to describe the relationship between multiple independent variables such as oral reading, letter naming, phonemic segmentation, nonsense word fluency, word reading fluency, phonemic awareness, vocabulary, grammar, letter identification, and phonological awareness. Moreover, a dependent variable or reading comprehension without manipulating or intervening in the variables. Using a descriptive-correlational method, the researcher collected data from Grade 6 students, assessing their performance on each independent variable and their reading comprehension abilities. The data collected provided a snapshot of the student's skills and comprehension levels.

It aims to examine the relationships between multiple variables (predictor variables) and their influence on reading comprehension (outcome variable) by collecting data and analyzing the correlations between them. The design does not involve manipulation or intervention but focuses on observing and describing the existing relationship among the variables. Multiple regression analysis allows for exploring the predictive power of the variables and identifying their relative contributions to reading comprehension (Bhandari, 2022).

Samples and Sampling Procedures Or Techniques

Fifty (50) Grade six students were selected using total enumeration.

Total enumeration, also known as complete enumeration or census, is a research method in which data is collected from an entire population or a specific interest group. Instead of sampling a subset of the population, total enumeration aims to gather information from every individual or unit within the defined population (Lavrakas, (2008).

Data Gathering Method

The researcher utilized the Revised Phil-IRI Oral Reading Assessment Tool to determine the student's reading level. An updated evaluation instrument called Phil-IRI comprises graded passages given to the whole class and individual pupils. Its goal is to gauge a student's reading proficiency (Llego, 2019). Moreover, the researcher

used standardized tests and assessments to measure the variables of interest that Orpi (2022) in Thrive Literacy Corner provides.

Data Gathering Procedure

After the approval to conduct this research study, the researcher wrote a letter to the principal and students school covered in the investigation asking them to allow researchers to conduct the study and administer the questionnaire. After the permission was granted, sufficient copies of the questionnaires were reproduced for administration to the respondents, and a schedule for administering the instrument was arranged.

The researcher personally administered the instrument to the respondents. This was done to facilitate answering questions that respondents may have and to ensure the 100% retrieval of the accomplished questionnaires. Data from gathered responses to the questionnaire were then processed and prepared for statistical analysis and interpretation.

Data Analyses

The researcher conducted multiple regression analyses to examine the relationships between these predictor variables and the outcome variable (reading comprehension). This statistical technique allows for the exploration of how the predictor variables collectively contribute to predicting reading comprehension levels.

By employing multiple regression analysis, the researcher can identify which variables significantly impact reading comprehension. This analysis helped uncover the relative importance of each variable and provided a clearer understanding of how they collectively contribute to students' reading comprehension abilities.

Ethical Consideration

The approach in conducting this study was anchored on an unwavering commitment to prioritizing ethical principles so as not to compromise the respondents' welfare, respect, or confidentiality. Before collecting data or engaging with respondents directly, the researchers obtained express permission through an official communication addressed formally by a letter sent expressly requesting from the School Principal. This official communication contained key assurances regarding maintaining proper security measures for handling data collected during research activities while providing needed information.

RESULTS AND DISCUSSIONS

Table 1: Collinearity Statistics of the Variables

Independent Variables	Collinearity Statistics	
	Tolerance	VIF
Reading Fluency	0.875	1.142
Nonsense Word Fluency	0.692	1.445
Phoneme Segmentation	0.898	1.113
Rapid Automized Letter Naming	0.745	1.342
Vocabulary	0.579	1.728
Grammar	0.727	1.376
Letter Identification	0.743	1.346
Phonological Awareness	0.843	1.186
Phonemic Awareness	0.723	1.382
Word Reading Fluency	0.742	1.347

Table 1 presents the collinearity statistics of the variables. Based on the table above, all tolerance values were greater than 0.01and the variance inflation factor (VIF) values were less than 10, suggesting no issues with the multicollinearity when using multiple linear regression. Most researchers desire a lower level of VIF as it may adversely affect the result associated with multiple regression; perhaps a value less than ten has been

recommended (Hair et al., 1995; Kennedy, 1992; Neter et al., 1989). The findings, indicated by the low Variance Inflation Factor (VIF) values, demonstrated that the independent variables were not strongly correlated. This suggests that the independent variables retain their usefulness in determining the factors that impact the dependent variable, namely reading comprehension. As a result, the absence of multicollinearity strengthens the validity and reliability of the independent variables in the regression model, allowing for a more accurate analysis of their impact on reading comprehension.

Table 2: Multiple Variables and Reading Comprehension

Variables	Unstandardized Coefficients	Standardized Coefficients		Reading Comprehension	
	B	Std Error	Beta	t	Sig
Constant	177.558	46.770		3.796	<0.01
Reading Fluency	-1.221	0.556	-0.310	-2.197	0.034
Nonsense Word Fluency	-0.181	0.090	-0.320	-2.018	0.050
Phoneme Segmentation	-0.044	0.084	-0.072	-0.518	0.607
Rapid Automized Naming	-0.148	0.091	-0.250	-1.633	0.111
Vocabulary	-0.429	0.659	-0.113	-0.651	0.519
Grammar	0.861	0.547	0.244	1.575	0.123
Letter Identification	0.014	0.088	0.025	0.161	0.873
Phonological Awareness	0.283	0.097	0.421	2.923	0.006
Phonemic Awareness	-0.398	0.142	-0.436	-2.809	0.008
Word Reading Fluency	-0.060	0.130	-0.071	-0.466	0.644

Table 2 shows the multiple variables and their relationship with reading comprehension. It was revealed that out of the ten variables considered, it was reading fluency (t=-2.197, p=0.034), nonsense word fluency (t=-2.018, p=0.050), phonological awareness (t=2.923, p=0.006) and phonemic awareness (t=-2.809, p=0.08) were found significantly related to the reading comprehension of the students. These four variables are the key factors that impact reading comprehension and help them better build an understanding of the text. The result suggests that when students can read text smoothly, it enhances their comprehension by allowing them to focus on the text they are decoding (Hoffman, 2021). Decoding unfamiliar text helps students understand it as they can apply phonics rules and decode words accurately (Hurst, 2022). Identifying and manipulating sounds in words helps student decode words effectively, which later contribute to their way of comprehending the text, and being able to decode individual phonemes of spoken words accurately, promotes strong comprehension in reading and spelling (Murray, n.d.; MacPhee, n.d.). This further suggests that administrators, teachers, and parents should give primary consideration to these factors as it will enhance students' skills in comprehending written text more effectively, especially by building targeted interventions and becoming more creative in instructional strategies in teaching reading.

Moreover, phonological awareness had the highest standard coefficient (Beta=0.421), indicating that identifying the sound of each letter is the foundation of reading. Phonics is the fundamental aspect of reading. When students can identify the sound of each letter, they can apply the phonics rules and improve their reading fluency. When students know the sound of each letter, they can combine these sounds and decode these written symbols. It is important to note that decoding is essential to reading comprehension (Pikulski & Chard, 2005). By developing phonological awareness skills, children can break down words into their sounds, which enables them to decode and encode words more effectively (Jonas & Director, 2019). Moreover, understanding the sound of each letter leads to word recognition, reading comprehension, and the development of spelling. This suggests that parents should take the first step in developing children's phonological awareness at home, and teachers, especially in the primary grades, should focus on giving intervention to improve this aspect as it is crucial in reading comprehension.

CONCLUSIONS

In general, it was indicated in the study that reading fluency, nonsense word fluency, phonological awareness, and phonemic awareness are the key factors that influence the reading comprehension of the students. Moreover, phonological awareness is significant in developing the student's reading comprehension.

One defining characteristic of a good reader is the ability to read and express text accurately. Fluency is connected with how text is understood as words are being read inaccurately, meaning changes, or misinterpreted. Furthermore, reading fluency allows readers to recognize their difficulties in understanding the text and make significant changes to capture its meaning, like a rereading strategy. Therefore, reading fluency gives more opportunities for readers to explore and have a smoother and more efficient reading experience.

Students who did not meet the outcomes of nonsense word fluency did the same performance with oral reading fluency. As students practice their nonsense words, they develop their familiarity with knowledge and skills in phonics. This knowledge and ability that they have, in turn, help them recognize and decode unfamiliar words in the real context. These strong decoding skills would also later facilitate their reading comprehension and proficiency. Nonsense word fluency helps the student build an association of letters, sounds, and phonemes as they develop their construction and pronunciation of words and later acquire essential foundational skills that contribute to their reading comprehension. Using nonsense words as part of a comprehensive phonics program can enhance students' skills and help them later become successful readers.

Phonological awareness is considered the foundation of reading proficiency and is also associated with writing development. It is a crucial factor in reading comprehension as it supports word decoding, vocabulary development, spelling and writing skills, phonemic awareness, and reading fluency. The child`s level of phonological awareness can be accounted for if a child is ready to read. If the child encountered reading difficulty in the future, it could be associated with phonological awareness. This is because the child failed to understand the sound structures of words at an early age. Hence, if a child's phonological awareness was developed earlier, they can break down words into individual sounds and decode and encode more effectively.

Phonemic awareness is considered the most challenging phonological awareness level as it is not acquired naturally when a human speaks. It is usually acquired through reading and writing, and young children pick it up quickly while learning the alphabet. On the other hand, many poor readers do not acquire phonemic awareness easily as they do not perceive the individual sounds of the letters that is why learning the native for these children is like learning a foreign language that they never took before. Decoding must come first before understanding what you are reading, and phonemic awareness is the foundational ability for this skill. After producing the sound of the letter, one must blend this individual sound to hear it in sequence, and that is phonemic awareness. One can never recognize a word without phonemic awareness. In this sense, phonemic awareness is an essential skill in reading comprehension as it is a necessary code the beginning readers need to break. They must be able to express and manipulate these phonemes so that they can be a successful reader. Beginning readers must convert the letters on the page into the sounds that go with them to decode written words. Readers can connect the dots between the letters and the sounds they stand for thanks to phonemic awareness, which offers the essential awareness and understanding of these sounds. Words' phonemes can be identified by readers, who can then accurately decode and pronounce words.

REFERENCES

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). Multivariate data analysis. Englewood Cliffs, NJ Prentice-Hall. - References - Scientific Research Publishing.(n.d.).
https://www.scirp.org/(S(351jmbntvnsjt1aadkozje))/reference/referencespapers.aspx?referenceid=435421

Hoffman, B. (2021, November 17). What Is Reading Fluency? And why Is It Important? My Learning Springboard.https://mylearningspringboard.com/what-   is-reading-fluency-and-why-is-it-important/

Hurst, S. (2022). Why and How to Use Nonsense Words When Teaching   Reading. Reading   Horizons.
https://readinghorizons.com/blog/post/2012/10/17/nonsense-words- boost-reading-instruction

Jonas, D., & Director, R. E. L. (2019). Project 5.2. 4: Evidence-Based Practices for Teaching Phonological and Phonemic Awareness.

Kennedy,P.(1992).A   Guide   to   Econometrics.   (n.d.).   Google   Books.
https://books.google.com.ph/books?hl=en&lr=&id=69MDEAAAQBAJ&oi=fnd&pg=PR10&dq=Kennedy,+P.+(1992).

+A+Guide+to+Econometrics.+Oxford:+Blackwell.&ots=VQNXGNZYjh&sig=5EvI95vv7P_0zjoRPrOF8ZP6AO0&redir_esc=y#v=onepage&q=Kennedy%2C%20P.%20(1992).%20A%20Guide%20to%20Econometrics.%20Oxford%3A%20Blackwell.&f=false

Lavrakas, P. J. (2008). Encyclopedia of Survey Research Methods. SAGE Publications, Inc.eBooks. https://doi.org/10.4135/9781412963947

Llego, M. A. (2019). Revised Philippine Informal Reading Inventory (Phil-IRI).TeacherPH. https://www.teacherph.com/revised-phil-iri/

MacPhee, K. (n.d.). The Critical Role of Phonemic Awareness in Reading Instruction | EDU. https://edublog.scholastic.com/post/critical-role-phonemic-awareness- reading-instruction

Mariecarrier. (2023, April 10). Learning is Aided by Reading Comprehension. EWU. https://online.ewu.edu/degrees/education/med/reading-literacy/reading-comprehension-onlearning/#:~:text=It%20helps%20children%20build%20vocabulary,and%20lead%20a%20quality%20life.%E2%80%9D

Mohammed, I. (2018, November 29). Predominant factors contributing to low reading abilities of pupils at Elsie Lund Basic School in the Tamale Metropolis, Ghana. African Educational Research Journal - Net Journals. https://www.netjournals.org/z_AERJ_18_071.html

Murray, M. S. (n.d.). 3. Word Recognition Skills: One of Two Essential Components of Reading Comprehension. Pressbooks. https://milnepublishing.geneseo.edu/steps-to-success/chapter/3-word-recognition-skills-one-of-two-essential-components-of-reading-comprehension/

Neter, J., Wasserman, W. and Kutner, M.H. (1989) Applied Linear Regression Models. 2nd Edition, Richard D. Irwin, Inc., Homewood. - References - Scientific Research Publishing. (n.d.). https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/References Papers.aspx?ReferenceID=1668283

Orpi,D.(2022).Reading Assessments To Evaluate Decoding and Encoding. Thrive Literacy Corner. https://thriveedservices.com/reading-assessments-to-evaluate- decoding-encoding/

Orpi, D. (2023). The Importance of Nonsense Words in Reading Instruction (with Free Printable Lists!). Thrive Literacy Corner. https://thriveedservices.com/nonsense-words/

Pikulski, J. J., & Chard, D. J. (2005b). Fluency: Bridge Between Decoding and Reading Comprehension. The Reading Teacher, 58(6), 510–519. https://doi.org/10.1598/rt.58.6.2

World Bank Group. (2020). Philippines - Programme for International Student Assessment 2018 Country Report (Issue June). http://documents.worldbank.org/curated/en/184251593328815913/Main- Report

World Bank Group. (2022, September 15). 70% of 10-Year-Olds now in Learning Poverty, Unable to Read and Understand a Simple Text. World Bank. https://www.worldbank.org/en/news/press-release/2022/06/23/70-of-10-year-olds-now-in-learning-poverty-unable-to-read and-understand-a-simple-text