READING COMPREHENSION COMPLEXITY AND MATHEMATICS ACHIEVEMENT: A LEXILE-BASED ANALYSIS

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Abstract

Reading comprehension plays an important role in students' success across academic domains, including mathematics. Lexile measures were used to assess students' reading comprehension in this study, which examined the relationship between Lexile level and mathematics performance among junior high school students at Baliuag University during the school year 2022–2023. Using a quantitative-correlational research design, data were collected from 305 students through their Lexile scores and final mathematics grades. A Pearson correlation analysis indicated a moderately strong positive association between Lexile level and mathematics performance among 305 students (r = .582). These findings contribute local evidence to the limited research exploring how reading comprehension supports mathematics learning in the Philippine junior high school context. The results highlight the importance of integrating reading comprehension development into mathematics instruction to strengthen students' academic performance.

Keywords: comprehension, junior high school, Lexile level, mathematics performance, reading

In the K to 12 Basic Education Curriculum, English and Mathematics are two of the major subjects taken by learners from Grade 1 up to Senior High School. English as a subject comprises various competencies taught from Grades 1 to 10, including linguistic, sociolinguistic, discourse, strategic, and multimodal literacies that strengthen communication and comprehension (Hallador, 2023; Meneses et al., 2023). On the other hand, Mathematics includes number sense, measurement, geometry, patterns and algebra, and statistics and probability, domains essential for higher-order reasoning and problem-solving (Department of Education [DepEd], 2013a; Kitta & Likinjie, 2020).

Although English and Mathematics develop different sets of skills, recent studies consistently show that reading comprehension significantly contributes to mathematics learning and performance. Strong comprehension skills help students interpret mathematical vocabulary, understand complex problem statements, and navigate multi-step reasoning tasks (Gomez et al., 2020; Villaseñor, 2023). Reading processes also support the cognitive demands shared by literacy and numeracy,

including logical reasoning and inferential thinking (Can, 2020; Hadianto et al., 2021). Meta-analytic findings likewise show that comprehension processes and reading strategies significantly predict mathematics performance, especially when tasks require integrating linguistic and conceptual information (Sun et al., 2021). In contrast, limited comprehension skills can hinder students' understanding of mathematical concepts, particularly in word problems with high linguistic complexity (Can, 2020; Gomez et al., 2020).

Reading comprehension involves understanding texts, selecting and analyzing information, and interpreting meaning. Contemporary research emphasizes that vocabulary knowledge, syntactic processing, and discourse comprehension interact to shape the reader's ability to make sense of text (Kim & Petscher, 2021). These processes parallel those required in mathematical cognition, where students decode symbolic language, integrate contextual details, and generate problem-solving pathways. Prior knowledge, text information, and the reader's perspective also continue to play an essential role in comprehension (DepEd, 2013b).

One framework widely used to understand how well a reader can comprehend a text is the Lexile Framework for Reading. This framework includes a Lexile measure, which indicates a reader's ability or the difficulty of a text, and the Lexile scale, a developmental scale that ranges from 0L to 2000L. Contemporary literature supports the reliability of Lexile-based assessments, particularly when administered through computer-adaptive testing, as these tools accurately monitor reading growth and guide appropriate text assignment (Ochs et al., 2020; Stenner, 2022). Lexile measures remain widely used in primary and secondary education due to their strong alignment with text characteristics and reading performance (Scannell, 2021).

Since 2017, the Baliuag University Basic Education Department has been using the Scholastic PR1ME English Program from Kindergarten to Grade 10 to further strengthen and build students' English literacy skills. The program consists of phonics, reading comprehension skills, interactive read-aloud activities, and guided reading. In addition, students are required to take the Scholastic LitPro Test, a computer-adaptive test designed to measure students' reading comprehension using passages from fiction and nonfiction texts. In this test, each student is presented with a unique set of items whose difficulty level matches the student's reading ability and comprehension. If a student answers a question correctly or incorrectly, the difficulty of the next item is adjusted by the software to maintain an optimal level of challenge. Upon completion of the test, the student receives a Lexile measure describing the level of text complexity that they can read and comprehend with 75 percent accuracy. The SRI includes 4,800 items that can measure a student's reading comprehension between 100 and 1500 Lexiles (Scholastic, n.d.).

Recent studies from 2020 to 2023 have increasingly used Lexile scores to investigate the relationship between reading comprehension and mathematics achievement. Findings consistently reveal that higher Lexile levels are associated with stronger mathematics performance, especially in tasks requiring conceptual interpretation and processing of verbal information (Gomez et al., 2020; Valencia et al., 2023). Philippine-based studies reaffirm this pattern, showing that reading

comprehension is a strong predictor of mathematical competence among junior high school learners (Villaseñor, 2023). Structural and mediational analyses further demonstrate that reading comprehension contributes directly and indirectly to mathematics achievement through logical reasoning and representational processing (Can, 2020; Hadianto et al., 2021).

Grounded in these contemporary findings, this study aimed to determine the relationship between the Lexile level and mathematics performance of junior high school students of Baliuag University for the school year 2022–2023. The findings may help the school strengthen students' reading comprehension, particularly among those with lower Lexile measures, so they can also improve their performance in mathematics. The results can also serve as a basis for designing instruction that integrates the cognitive and processing skills needed in both mathematics and reading.

Research Questions

1. How may the respondents be described in terms of:
   1.1. Lexile level; and
   1.2. mathematics performance?

2. Is there a significant relationship between the junior high school students' Lexile level and their performance in mathematics?

Theoretical Framework

To understand the connection between the process of reading and mathematical tasks, Bergqvist and Österholm (2010) suggested a theoretical model anchored on the following perspectives: linguistic, psychological, and mathematics education. The model uses a structure that "takes into account the mutual constraint between aspects of mental representation and aspects of behavior" (p. 54). In this model, reading the text creates a mental representation through the process of comprehension and the use of prior knowledge. With this, the mental representation can include the answer to the question being asked or a strategy to arrive at a correct answer. This mental representation and its properties then guide the behavior and choice of the student in presenting the answer. However, any changes made to the mental representation can also activate prior knowledge, which may cause the new version of the mental representation to produce new answers or strategies. This cycle continues until the student finally arrives at the correct answer.

Methods

This study employed a quantitative correlational research design to determine the relationship between the Lexile levels of junior high school students from the Baliuag University Basic Education Department for the school year 2022 to 2023 and their mathematics performance. A correlational design is appropriate for analyzing how variables relate using numerical data (Creswell & Creswell, 2021; Privitera & Ahlgrim-Delzell, 2023). Pearson *r* was used to assess the strength and significance of the relationship between the variables, following established guidelines for correlation

analysis (Schober & Schwarte, 2020). The significance level was set at $p < .05$. Confidentiality was maintained by using anonymized records and securing administrative approval for data access.

Participants and Sampling Procedure

The participants of this study were 305 junior high school students from the Baliuag University Basic Education Department for the school year 2022 to 2023, consisting of 141 males and 164 females. They were selected through convenience sampling, a method where participants are chosen based on accessibility and availability (Etikan et al., 2020). The participants included only those with complete Scholastic LitPro Lexile results and final mathematics grades. All data were obtained from the Office of the Principal using existing school records.

Data Gathering Procedure

The students' mathematics performance was obtained through their final grades in Mathematics, as submitted by their subject teachers. These grades were interpreted using the Department of Education's grading scale and descriptors based on DepEd Order No. 8, s. 2015, wherein scores from 90 to 100 are classified as Outstanding, 85 to 89 as Very Satisfactory, 80 to 84 as Satisfactory, 75 to 79 as Fairly Satisfactory, and below 75 as Did Not Meet Expectations.

The students' Lexile measures were sourced from their Scholastic LitPro Test results for the school year 2022–2023. According to the Lexile Framework, junior high school students are expected to attain reading measures of approximately 925L or higher. For interpretation purposes, standard Lexile benchmarks per grade level were used. These benchmarks show a developmental progression beginning with BR to approximately 295L for Grade 1 readers, gradually increasing across grade levels, and reaching typical ranges of 1085L to 1400L by Grade 10. Senior high school students, particularly those in Grades 11 and 12, are generally expected to fall within the higher range of 1130L to 1440L.

Data Analysis and Statistical Treatment

The students' mathematics grades and Lexile measures were organized, tabulated, and analyzed using descriptive statistics, specifically the mean and standard deviation. To determine the relationship between the students' Lexile levels and their mathematics performance, the Pearson r correlation coefficient was computed. The correlation strength was interpreted using established benchmarks for correlation magnitude, where coefficients between .40 and .69 are classified as moderately strong (Hinkle et al., 2020; Schober & Schwarte, 2020). All analyses were carried out using the Statistical Package for the Social Sciences (SPSS).

Results and Discussion

Table 1
Lexile Level of the Baliuag University Basic Education Junior High School Students

Grade Level	N	Mean	SD	Interpretation
Grade 7	53	600L	267	3 Lexile Levels Below /Grade 4 Lexile Reader
Grade 8	69	816L	313	2 Lexile Levels Below /Grade 6 Lexile Reader
Grade 9	92	964L	347	2 Lexile Levels Below /Grade 7 Lexile Reader
Grade 10	91	986L	236	2 Lexile Levels Below /Grade 8 Lexile Reader
Overall	305	951L	296	Within Lexile Level /Grade 7 Lexile Reader

Table 1 shows the Lexile levels of the junior high school students using descriptive statistics. The overall mean Lexile measure is 951L (SD = 296), which corresponds to the expected range for a Grade 7 reader. This suggests that, on average, the students' reading ability falls within the typical level for junior high school learners.

Across grade levels, Grade 10 students posted the highest mean Lexile score (M = 986L, SD = 236), aligned with the Grade 8 Lexile band. Grade 9 students followed with an average of 964L (SD = 347), corresponding to the Grade 7 reading range. Grade 8 students averaged 816L (SD = 313), which aligns with the Grade 6 reading level, while Grade 7 students recorded the lowest average (M = 600L, SD = 267), corresponding to Grade 4 reading proficiency.

Table 2
Mathematics Performance of the Baliuag University Basic Education Junior High School Students

Grade Level	N	Mean	SD	Interpretation
Grade 7	53	92.43	3.24	Outstanding
Grade 8	69	90.02	4.60	Outstanding
Grade 9	92	89.35	4.96	Very Satisfactory
Grade 10	91	90.33	4.66	Outstanding
Overall	305	90.72	4.48	Outstanding

Table 2 presents the mathematics performance of the respondents. The overall mean score is 90.72 (SD = 4.48). Based on the Department of Education grading scale (DepEd Order No. 8, s. 2015), this average falls under the "Outstanding" category. Three grade levels (Grades 7, 8, and 10) obtained mean scores within the Outstanding range, while Grade 9 posted a "Very Satisfactory" rating (M = 89.35, SD = 4.96). These results show that, as a group, students demonstrate high achievement in mathematics based on institutional grading standards.

Table 3
Relationship Between the Baliuag University Basic Education Junior High School Students' Lexile Level and Mathematics Performance

Variables	N	Pearson *r*	*p-value*
Lexile Level and Math Performance	*305*	.582**	<.001

Table 3 shows the correlation between the students' Lexile levels and their mathematics performance. Results indicated a positive and moderately strong correlation ($r = .582$, $p < .001$). Based on established correlation benchmarks, coefficients between .40 and .69 are classified as moderate to moderately strong associations (Hinkle et al., 2020; Schober & Schwarte, 2020), supporting the interpretation that higher reading proficiency corresponds to higher mathematics achievement.

This relationship carries meaningful educational implications, as reading proficiency shapes learners' ability to comprehend problem statements, follow multi-step instructions, and interpret mathematical vocabulary. Students with higher Lexile levels are therefore more likely to demonstrate stronger performance in mathematics, particularly in tasks requiring substantial verbal and conceptual processing, such as word problems and reasoning activities. These findings highlight the importance of embedding reading-support strategies within mathematics instruction, especially for learners with lower Lexile measures.

Conclusions and Recommendations

The study found that the junior high school students' Lexile levels fall within the expected range for their grade level, while their mathematics performance is classified as Outstanding based on DepEd standards. Although their reading proficiency meets grade-level expectations, strengthening lexical processing and comprehension remains important, as these skills support broader academic learning. The significant and moderately strong correlation between Lexile levels and mathematics performance reinforces the idea that reading comprehension contributes to mathematical cognition, particularly in tasks requiring interpretation of vocabulary, problem statements, and multi-step reasoning (Hinkle et al., 2020; Schober & Schwarte, 2020).

Given these findings, it is recommended that literacy development continue to be integrated into instruction across subject areas. Mathematics teachers may incorporate reading-oriented supports such as explicit vocabulary instruction, guided reading of problem statements, and modeling of annotation techniques to help students process mathematical text more effectively. English and Mathematics teachers may also collaborate more intentionally by aligning vocabulary lists, co-developing word-problem structures, and sharing strategies that strengthen comprehension across both domains. Using Lexile data to guide differentiation and targeted intervention may further assist learners with lower reading measures.

Future research may extend this investigation to elementary grades, particularly since students from Grades 1 to 6 also receive Lexile scores and formal mathematics instruction. Exploring the reading–math relationship earlier in schooling may provide valuable insight into how foundational literacy supports long-term mathematical development.

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