Reading Comprehension Skills and Numeracy Performance of Grade 8 Students

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Abstract —The study aimed to determine the relationship between the reading comprehension skills and numeracy performance of Grade 8 students. Utilizing the descriptive-correlational research design for an in-depth analysis of the study, the researcher used the Phil-IRI and the Regional numeracy tool Simple Percentage, Standard Deviation and Pearson r were the statistical tools used. Results of the study revealed a significant relationship between the level of reading comprehension skills and numeracy performance of the Grade 8 students. The level of reading comprehension skills influence numeracy performance of the Grade 8 students. Thus, improving the comprehension skills of the students will also improve their numeracy performance for the two variables influence one another.

Keywords — Reading Comprehension Skills, Numeracy Performance, Grade 8 Students

I. Introduction

School Year 2020-2021 has proven to be challenging in the education sector of our country due to COVID-19 pandemic. Schools nationwide have shifted from the traditional face-to-face academic instruction to the relatively new non-face-to-face approach of teaching and learning. Most of the schools in the country had adapted the new normal learning modality, the modular or blended distance learning. Public schools' resort to the use of self-learning modules as their primary mode of learning especially with that of the far-flung areas. This approach mainly utilizes teacher-made learning modules that students are expected to independently comprehend the content and answer the given tasks and activities. And based on the previous studies, there are students who were able to achieve high rating in literacy and numeracy despite the fact that face-to-face interaction is prohibited.

Kanchan (2016), in his study on the effectiveness of self-learning modules on the achievement of students, states that SLMs helps to inculcate self-study habits and self-confidence among students. These two characteristics are essential in this time where learners are basically the captain of their learning. Using modules as the primary mode of learning forces students to

understand the learning contents of their learning material. As opposed to having their teacher provide lectures and discussions in school; they are left to read and comprehend the lesson with minimal supervision from their parents or guardians.

The deteriorating performance of the students in literacy and numeracy was revealed when the school implemented the limited face-to-face classes. It was found out that learning gaps occur and there are some students who have difficulty in word recognition and comprehension. Moreover, during the 1st month of implementation of limited face-to-face for this school year, it is not only literacy where students lag behind but also in their numeracy performance. With these results, appropriate measures were undertaken to improve student's performance in reading comprehension skills and numeracy. Some of these measures included implementing various reading programs of the DepEd, training of mathematics teachers, and strengthening the use of English language as a primary medium of instruction in all public institutions of learning at the secondary level (Arroyo GM, 2003). Despite all these government efforts to improve the quality of mathematics performance as well as reading skills, the problem on these two areas still persist.

With this problematic condition, reading cannot be taken for granted if mathematics performance needs to be enhanced. Snow, Burns, and Griffin (1998) as cited by Imam & Jamil (2013) point out that reading particularly in the early years of schooling paves way to achievement in other content areas like mathematics. Reading is regarded as an indispensable part of mathematics and "mathematical knowledge". Learning to love and value mathematics language requires a good foundation in reading (Cowen, 2012), (Fuentes, 2012). Fuentes (2012) maintains that mathematics and reading go together, i.e. improving mathematics achievement necessitates enhancing students' reading. For him, it is also vital to recognize that young learners develop reading and mathematics skills at different rates.

The dramatic change on the theories of learning from behavioral to holistic approach in the turn of 20th century has also changed the thinking about reading comprehension from merely a static activity in the past into a dynamic process where readers create meaning from the written text (Arieta, 2010). This reader-text interaction describes how reading comprehension takes place which provides impact to new learning situation such as understanding mathematics. When considering reading as a factor identified to have bearing on students' performance in mathematics achievement test (Fuentes, 2012), it is important to take a look at how both areas are related.

Since reading was established as a tool in learning other fields including mathematics (Callahan & Clark, 1998), (Corcoran & Mamalaki, 2009), various researches have been undertaken to examine the relationship of the two especially on the aspect of comprehension which is a critical skill to perform understanding of mathematical process (Balas, 2012). Success in reading is seen as a significant measure achievement in mathematics. Previous studies reveal the existence of close relationship between mathematics performance and reading skills (Vilenius-Tuohimaa PM, Aunola K, Nurmi JE, 2008), reading ability and performance on mathematics items assessing higher level cognitive skills (Walker CM, Zhang B, Surber J, 2008), language and test

performance on mathematics word problems (Abedi J, Lord C, 2012), and early reading skills and changes in mathematics (Grimm K, 2008). The connection between language skills and mathematics has been supported by early developmental theory (Carey S., 2004), (Gelman R, Butterworth B, 2005), illustrating that language skills are believed to develop number concepts to have an association to numerical skills (Carey S., 2004) although this link is affected by difficulty of learning language and mathematics.

Reading and mathematical development are deeply interconnected processes, and emerging evidence reveals both shared and unshared predictors of reading and mathematical skill development (e.g., Purpura et al., 2011; Davidse et al., 2014; Purpura and Ganley, 2014; Purpura et al., 2017a; Korpipää, 2020; Vanbinst et al., 2020). At school age, the comorbidity of reading difficulties (RD) and mathematical difficulties (MD) is also common: The rate of the cooccurrence of these difficulties has been estimated to be approximately 30–70% (Landerl and Moll, 2010; Moll et al., 2019). Although the estimates vary considerably, existing evidence suggests that the likelihood of this comorbidity is significantly higher than chance.

It is not easy to understand the association between mathematics skills and reading comprehension since mathematics skills are a set of different skills consisting of arithmetic skills, logical reasoning, and spatial skills (Lin, 2011). Arithmetic skills are related to procedural knowledge and the correctness, flexibility, and fluency of arithmetic operations in natural numbers, integers, fractions, decimals, real numbers, percentages, algebra, and calculus (Xie et al., 2020). Logical reasoning covers the comparison, generalization, induction, analysis, and synthesis of real-world situations, rules, and quantitative relationships in the context of mathematics (Lin, 2011). Spatial skills are associated with mental rotation, visualization, spatial memory, spatial orientation, spatial perception, understanding symmetry, translation, and transformation of geometric figures, along with the interpretation of algebraic rules in the context of geometry (Xie et al., 2020). Moreover, the first thing that comes to mind when thinking of mathematical skills is problem-solving because the application of mathematical ideas in the real world and STEM fields can be reflected by problem-solving (Fuchs et al., 2020). Problem-solving has great prominence in each part of the mathematics curriculum and a teach grade level from kindergarten to high school (Fuch et al., 2015). Therefore, problem-solving performance is the greatest indicator of mathematics achievement, as students' mathematics skills are generally assessed based on problem-solving tasks (Fuchs et al., 2020).

And it is in the above premise that the researcher is motivated to conduct this study to determine the relationship between the reading comprehension skills and performance of the Grade 8 students in numeracy. A proposed intervention plan will be formulated based on the findings of the study.

It is in the rationale that the researcher who is currently a Grade 8 Mathematics teacher in Lim-ao National High School, would like to delve worthy research undertaking that will benefit the school she is currently teaching and that of her Graduate Program she is enrolled at.

This study determines the relationship between the reading comprehension skills and numeracy performance of Grade 8 students in Lim-ao National High School, Kananga III District, Leyte Division for School Year 2022-2023. The findings of the study were bases for the proposed intervention plan in reading comprehension and mathematics.

Specifically, this study sought to answer the following questions:

1. What is the level of reading comprehension of the Grade 8 students?
2. What is the level of performance of the Grade 8 students in numeracy?
3. Is there a significant relationship between the reading comprehension skills and performance of the Grade 8 students in numeracy?
4. What intervention plan can be proposed based on the findings of this study?

II. Methodology

Design. This study employed descriptive-correlational research design to determine the level of reading comprehension skills and numeracy performance of Grade 8 students in Math and its relationship. Lim-ao National High School, Kananga, District, Leyte Division is the main locale of the study. The 36 Grade 8 students enrolled in the said locale for School Year 2022-2023 are the main respondents of the study and a modified numeracy test based on the Regional Numeracy Tool provided by DepEd Region 8 and the Philippine Informal Reading Inventory (Phil-IRI) for the grade were used. This research is focused in determining the level of reading comprehension skills and numeracy performance of Grade 8 students and its relationship. A Proposed Intervention Plan based on the findings of the study is the output.

Sampling. There are 36 Grade 8 students involved in this study. The research instruments were distributed personally with consent from the Local IATF and strictly following the prescribed Health Protocol.

Research Procedure. The researcher prepared the research design and tools to be utilized in the study. Approval and recommendation from the Panel of Examiner of the Graduate Studies was sought. A letter request to conduct this study was forwarded to the Office of the Schools Division Superintendent. Upon approval, permission from the District Supervisor and School Head was secured before the actual gathering of data. Orientation of the participants and administration of the DepEd Region 8 numeracy test was done through face-to-face after the approval of the permit from the respondents. Moreover, the Phil-IRI test for comprehension skills was also conducted. It is the School Head who conducted the oral reading and numeracy test to avoid bias. Results of the tests were collected. Data were tallied and submitted for statistical treatment. Analysis and Interpretation of Data. Making of Proposed Intervention Plan followed.

Ethical Issues. The right to conduct the study was strictly adhered through the approval of the Schools Division Superintendent of the Division, District Supervisor, and School Head.

Orientation of the respondents was done using face to face modality. In the orientation, issues and concerns were addressed and consent to be included in the study were signed.

Treatment of Data. The Simple Percentage and Standard Deviation was employed to determine the level of reading comprehension and performance of Grade 8 students. **Pearson r** was used to determine the significant relationship between the dependent and independent variables of the study.

III. Results and Discussion

Table 1
Level of Comprehension Skills of Grade 8 Students

LEVEL OF COMPREHENSION SKILLS	FREQUENCY	PERCENTAGE
Independent	4	11
Instructional	5	14
Frustration	27	75
TOTAL	**36**	**100**

Table 1 presents the level of comprehension skills of the Grade 8 students. It was revealed on the table that among the 36 Grade 8 students, 4 or 11% are having independent level. This means that these are the Grade 8 students whose word recognition is 97-100% and comprehension score is 80-100%. This implies that these students can independently read the text with fluency, intonation and correct pronunciation and be able to understand what has read. Moreover, the table also shows that among the 36 respondents, 5 or 14% are instructional level. This means that the students score in word recognition is 90-96% and comprehension score is 59-79%. This implies that the highest level at which a reader is not independent, but has adequate background knowledge for a topic, and can access text quickly and with no or few errors. Think of independent level as the highest level the teacher would ask a child to read with only a small amount of assistance. Lastly, the table also shows that among the 36 students tested, 27 or 75% are frustration level. This means that most of the Grade 8 students have literacy gaps and they need intervention to address their needs. This implies that students have difficulty in understanding what they read. Formal Education's most important outcome is to produce learners who could read and understand the texts being read (Miñoza & Monteroa, 2019). In a similar vein, Catts & Kamhi (2017) pointed out that to make learners proficient in reading is one of the essential goals of the educational system. Reading comprehension is one of the most important components of reading to master. It requires students to move beyond decoding individual vocabulary and statements to constructing a solid understanding of the entire passage (Woolley, 2011). Comprehension is a complex process that requires an active interaction between the students' background knowledge of the context, the

purpose of the reading material, and the level of vocabulary and language used by the authors in order to gain meaning of a text (Fountas & Pinnell, 2001; Hollenbeck, 2011; Jones, Hughes, Donahue, Parker-Katz, Talbott, & Tatum, 2012; Pardo, 2004; RAND Reading Study Group, 2002; Snow & Sweet, 2003; Snow, 2002; Woolley, 2011). The process is complex because it requires students to engage in multiple cognitive activities, processes, and skills. These skills involve fluently decoding words, understanding the language syntax, making inferences, using background knowledge, and managing working memory as needed (FletcherJanzen, Reynolds, & Vannest, 2013; Hollenbeck, 2011; Kendeou, McMaster, & Christ, 2016; Woolley, 2011). Even a short passage of material requires the reader to have strategic control of when and how to use each of these skills.

Table 2
Level of Numeracy Performance of the Grade 8 Students

LEVEL OF COMPREHENSION SKILLS	FREQUENCY	PERCENTAGE
Highly Numerate	0	0
Moderately Numerate	6	17
Non-Numerate	30	83
TOTAL	**36**	**100**

Table 2 presents the numeracy performance of the Grade 8 students. It was revealed on the table that among the 36 Grade 8 students, 6 or 17% are identified moderately numerates. This means that these students got one or more mistakes in any of the 4 sub-tests. This implies that these students need enrichment activities. Teachers have to prepare activities and lessons which will help address the gap in numeracy. Moreover, the table also shows that among the 36 students tested, 30 or 83% are identified non-numerates. This means that these students got zero in any of the four (4) fundamental operations or sub-tests. This implies that these students need numeracy intervention or the need to reteach or review the lessons on the four fundamental operations. This implies further that these students failed to master the skills on addition, subtraction, multiplication and division of numbers. This alarming performance of the students necessitates urgent decisions and actions to address the needs of the students.

Table 3
Test of Relationship Between the Comprehension Skills and Numeracy Level of the Grade 8 Students

Variables Correlated	r	Computed value or t	Table Value @.05	Decision on Ho	Interpretation
COMPREHENSION AND NUMERACY SKILLS OF GARDE 8	0.87	3.014	1.037	Reject Ho	Significant Relationship (Very Strong)

Table 3 presents the test of relationship between the level of comprehension skills and numeracy performance of the Grade 8 students. It was revealed on the table that the level of comprehension and numeracy performance of the Grade 8 students has the computed value or t of 3.014 which is greater than the tabular value of 1.037 at 0.05 level of significance, so null hypothesis rejected. This means that there is a significant relationship between the level of reading comprehension skills and numeracy performance of the Grade 8 students. The r value of 0.87 shows a very strong significant relationship. This implies that the performance of the students in reading comprehension affects the numeracy performance or vice-versa. Reading and mathematical development are deeply interconnected processes, and emerging evidence reveals both shared and unshared predictors of reading and mathematical skill development (e.g., Purpura et al., 2011; Davidse et al., 2014; Purpura and Ganley, 2014; Purpura et al., 2017a; Korpipää, 2020; Vanbinst et al., 2020). A student's mathematics skills and learning process in mathematics can be influenced by reading comprehension, which is one of the most important predictors of academic performance as supported by Bullen et al (2020). There are many studies investigating the association between reading comprehension and mathematics skills. The studies indicate that a significant and positive relationship between reading comprehension and mathematics skills (e.g., Vilenius-Tuohimaa et al., 2008; Boonen et al.,2013; Schaffner & Schiefele, 2013; Bullen et al., 2020).

IV. Conclusion

Results of the study revealed a significant relationship between the level of reading comprehension skills and numeracy performance of the Grade 8 students. The level of reading comprehension skills influence numeracy performance of the Grade 8 students. Thus, improving the comprehension skills of the students will also improve their numeracy performance for the two variables influence one another.

V. Recommendations

1. The proposed intervention plan formulated should be utilized;
2. Teachers should develop reading materials and adopt differentiated teaching strategies and methods to improve the comprehension level of the students;
3. Teachers should prepare activities which will help improve the comprehension skills of the students;
4. Teachers should create parallel test questions in math to attain mastery of the four fundamental operations;
5. Teacher should institutionalize the integration of drill and other activities in their lessons in English and Math;
6. Teachers should prepare innovative projects to address the learning gaps in literacy and numeracy;
7. School Heads should focus their technical assistance in the improvement of the teaching learning process in literacy and numeracy;
8. School Heads should provide materials for the construction of learning activity sheets in reading and numeracy;
9. School Heads should provide capability building to teachers in teaching reading comprehension skills and numeracy;
10. School Heads should conduct regular monitoring on the literacy and numeracy performance of the students; and
11. Future researchers should replicate this study to include different locale and include different variables aside from the mentioned in this study.

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AUTHOR'S PROFILE

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She was teaching for almost eight years and a Teacher I at Lim-ao National High School. Her first station was at Kananga National High School - Libertad Annex for 1-year handling Mathematics 7, 9 and 10. In the year 2015 – 2016 at Rizal National High School, she was teaching Mathematics 8 and MAPEH 8 and 2016 up to present, she is teaching Mathematics 8 and an adviser of Grade 8 at Lim-ao National High School. She also attended series of webinars/seminars and trainings to increase her professional growth as a teacher.