

Reading Comprehension, Attitude and Error Patterns in Solving Word Problems in Mathematics

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Abstract: This descriptive-correlative study found out the relationship between reading comprehension and attitude towards solving word problems of Grade VI learners in Kiamba District II as well as their error patterns in solving word problems in mathematics. Fifty learners from randomly selected schools were the respondents of this study who answered the instrument which was divided into three parts: (1) test of reading comprehension; (2) word problem solving; and (3) questionnaire on the learners' attitude towards solving word problems. Rate and percentage revealed that Grade VI learners are Frustration-level readers. The same treatment was also used to present that learners are in the middle of positive and negative attitude towards problem solving. It was also found out that learners had the highest degree of difficulty in the formulation of equations and its analysis from the given data of the word problems. Pearson r finally revealed that there is a significant relationship between the reading comprehension and attitude of the learners towards solving word problems. Given with the above-mentioned evidences, the study concluded that the learner cannot comprehend what he is reading if he does not have positive attitude towards it.

Keywords: Reading Comprehension, Attitude, Error Patterns, Problem Solving

1. Introduction

Reading is a habit where students learn, gain knowledge and develop new skills [12]. Since it is a basic life skill, a child is expected to understand everything else when he/she knows how to read. Evidently, reading is the main focus of the Department of Education's Every Child A Reader Program (ECARP).

The revision of the Philippine Informal Reading Inventory assessment tool had lead teachers and school administrators to furthermore assess learners' reading capacity and capability to answer questions. Moreover, this tool is also a device to measure learners' strengths and weaknesses in reading.

Mathematics, on the other hand, has importance over and above the application of basic numeracy skills [7]. It plays a major role in a number of other specific fields, such as physics, engineering, and statistics. Essentially, a positive attitude towards mathematics among students is an important goal of mathematics education in many jurisdictions.

Literacy and Mathematics are two of the most basic learning that children should acquire. While a child is

expected to fully comprehend text read on his/her third grade, so as he/she is expected to master the four fundamental operations in the fourth grade.

While Mathematics is one core learning, reading is the key to learn and understand different disciplines. The National Assessment of Educational Progress reported that in 2015, the percentage of learners learning below basic across Mathematics and Reading were higher compared to the results in 2013, but there was no significant difference noted in the results.

The United States Agency International Development (USAID) also noted that there are hundreds of millions of children around the world who are unable to read and are struggling to do basic math. In fact, there were 387 million primary school-age children who are unable to read proficiently while two-thirds of them are already in school.

When the learner struggles to do basic math and to read, it can also be inferred that the learner cannot do problem solving in mathematics due to the lack of basic knowledge and pre-requisites of learning. Tan and Saligumba [18] explain that the

learners' understanding in mathematics should thrive in with the learners' attitudes to obtain standard to higher performance.

In the Philippines, various literacy and numeracy awareness programs have been developed with aims to enhance and improve learners' performance in such disciplines. Aligned with this, DepEd Division of Sarangani also assessed the reading comprehension of learners to further craft special programs to address this common but still unsolved problem.

Reports of the Phil IRI pre-test showed that almost 25% of Grade VI learners in Sarangani, SY 2018-2019, face struggles in reading. In the municipality of Kiamba, the division focuses on more than two hundred non-readers and more than a thousand frustration readers.

In Kiamba District II, reports on different leaning areas were not yet completely gathered. However, the Mean Performance Score (MPS) of learners in Mathematics which includes mostly of solving word problems were only one digit more than fifty percent. The interpretation of this was failed. This means that teachers did not achieve the standard in teaching when it will be interpreted from the learners' performance in quarterly tests. Teachers' anecdotal records also revealed how the learners were deemed 'uninterested' in learning mathematics, especially in solving word problems, due to multiple factors that may occur inside the classroom.

To identify connections between reading comprehension, attitude towards solving word problems, and problem solving skills of learners and create solutions to these problems, this study was conducted. Furthermore, this study attempted to find out if there is a significant relationship between the reading comprehension and attitude towards solving word problems as well as the error patterns of Grade VI learners in problem solving.

This study was designed to determine the reading comprehension and mathematics performance of Grade VI learners in Kiamba District II.

Specifically, it sought to find answers to the following questions:

1. What was the reading comprehension level of Grade VI learners in Kiamba District II in terms of:
 - a. Independent;
 - b. Instructional; and
 - c. Frustration.
2. What was the attitude level of Grade VI learners in solving word problems?
3. What were the common error patterns of Grade VI learners in solving word problems in terms of the following parameters:
 - a. given;
 - b. required;
 - c. representation;
 - d. equation; and
 - e. analysis.
4. Was there a significant relationship between the reading comprehension and attitude towards solving word problems of Grade VI learners?

2. Method

2.1. Research Design

This study used the quantitative type of research. It applied the descriptive-correlation design to establish the relationship between the reading comprehension and attitude of learners towards solving word problems and describe the error patterns of Grade VI learners in solving word problems.

2.2. Respondents

The respondents of this study were 50 Grade VI learners randomly selected from 5 elementary schools in Kiamba District II. Table 1 shows the distribution of the respondents.

Table 1. Distribution of Respondents of the Study.

School	Number of Respondents
Datu Dani Elementary School	10
JBT Caing Sr. Memorial Integrated School	10
M. Quinto Elementary School	10
Severo T. Inong Elementary School	10
Tamadang Elementary School	10
TOTAL	50

2.3. Research Instruments

To gather data of the learners' reading comprehension, the revised Philippine Informal Reading Inventory (Phil IRI) was used. The reading passage was from the Posttest articles in Set A.

The attitudes of the respondents were gathered through a questionnaire adapted and modified from Sia [16] with 15 items.

The errors in problem solving were analyzed from 10 word problems constructed by the teacher, covering lessons from four quarters of the Grade VI learning competencies.

2.4. Data Gathering Procedure

To have permission on gathering the needed data, the researcher secured a letter of permission checked by her adviser and signed and approved by the Schools Division Superintendent and brought the received copy to the school head of each school.

The researcher had administered the tests: Phil IRI, the questionnaire for the learners' attitudes, and the word problems for the learners to answer.

After each instrument had been accomplished, the researcher retrieved these and analyze the results through item analysis.

3. Results

3.1. Reading Comprehension of Grade VI Learners in Kiamba District II

Table 2 shows the reading comprehension level of Grade VI learners in Kiamba District II which was analyzed through frequency, percentage and mean.

Table 2. Reading Comprehension of Grade VI Learners in Kiamba District II.

Comprehension Score	Frequency	Percentage	Comprehension Level
80% – 100%	2	4%	Independent
59% – 79%	6	12%	Instructional
58% and below	42	84%	Frustration

Overall Comprehension Score: 36.46 Frustration.

Based on the test scores in oral reading, more than 80% of the learners obtained 58% and below which makes them fall under the Frustration level. This is followed by 12% under Instructional level with scores ranging from 59% to 79%. Remarkably, only 4% of the respondents fall under Independent level with scores from 80% to 100%.

The overall result indicates that a remarkable majority of the learners fall under Frustration level in reading comprehension. This implies that the Grade VI learners of

Kiamba District II are Frustration-level readers in comprehension. This means that the number of Frustration readers in comprehension are four times more than Independent and Instructional readers combined.

3.2. Attitude of Grade VI Learners in Solving Word Problems

The attitude of learners towards solving word problems is presented in Table 3.

Table 3. Attitude of Grade VI Learners in Solving Word Problems.

Attitude	Mean	Qualitative Description
1. Word problems make the learner feel comfortable.	3.36	Agree
2. The learner feels a sense of security when working word problems.	3.32	Agree
3. The learner does not under strain in solving word problems.	3.28	Agree
4. The learner likes to spend more time in solving word problems.	3.02	Agree
5. The learner does not feel nervous when I encounter word problems.	3.02	Agree
6. Solving word problems is stimulating.	2.78	Agree
7. The learner finds solving word problems exciting.	2.76	Agree
8. The feeling that the learner has towards word problems is good.	2.68	Agree
9. Solving word problem makes the learner feel relaxed.	2.65	Agree
10. Solving word problems is fascinating and fun.	2.64	Agree
11. The learner enjoys studying word problems.	2.58	Agree
12. The learner really likes solving word problems.	2.48	Moderately Agree
13. The learner enjoy solving word problems.	2.38	Moderately Agree
14. Solving word problems is very interesting to the learner.	2.26	Moderately Agree
15. Solving word problems is challenging.	2.10	Moderately Agree
Mean	2.75	Agree

Legend:

Range	Description
1.00 – 1.49	Strongly Agree
1.50 – 2.49	Moderately Agree
2.50 – 3.49	Agree
3.50 – 4.49	Moderately Disagree
4.50 – 5.00	Strongly Disagree

As presented in the table, the Grade VI learners agree that solving word problems make them comfortable ($\bar{x} = 3.36$) and that they feel a sense of security doing so ($\bar{x} = 3.32$). The same attitude is also portrayed about learners not undergoing strain in solving word problems ($\bar{x} = 3.28$); wanting to spend more time in solving word problems ($\bar{x} = 3.02$); and not feeling nervous when solving word problems ($\bar{x} = 3.02$). Learners still agree that solving word problems is stimulating ($\bar{x} = 2.78$); exciting ($\bar{x} = 2.76$); and provides good feeling ($\bar{x} = 2.68$). Additionally, the same attitude was expressed about solving word problems being relaxing ($\bar{x} = 2.65$); fascinating and fun ($\bar{x} = 2.64$); and enjoyable to study about ($\bar{x} = 2.58$). Furthermore, learners moderately agree about solving word problems being

likeable ($\bar{x} = 2.48$); enjoyable to do ($\bar{x} = 2.38$); very interesting ($\bar{x} = 2.26$); and challenging ($\bar{x} = 2.10$).

The overall mean is 2.75 which is interpreted as agree. This implies that the learners' attitudes towards problem solving is neutral.

The overall mean was interpreted as agree. This implies that the learners' attitudes towards problem solving is neutral.

3.3. Common Errors in Solving Word Problems of Grade VI Learners

Table 4 presents the error patterns of the Grade VI learners in solving word problems. It shows the responses of learners to different parameters in problem solving.

Table 4. Common Errors in Solving Word Problems of Grade VI Learners.

Topic of the Problem	Steps in Solving Word Problems									
	Given		Required		Representation		Equation		Analysis	
	F	%	F	%	F	%	F	%	F	%
1. Division of Fractions	19	38	46	92	48	96	49	98	49	98
2. Addition and Subtraction of Decimals	19	38	29	58	41	82	47	94	48	96
3. Division of Decimals	18	36	37	74	40	80	43	86	44	88
4. Ratio and Proportion	20	40	34	68	50	100	50	100	50	100
5. Percent of Change	21	42	37	74	50	100	50	100	50	100
6. Operation on Integers	20	40	27	54	50	100	45	90	43	86
7. Expression and Equation	19	38	31	62	45	90	46	92	46	92
8. Surface Area	20	40	36	72	50	100	50	100	50	100
9. Volume	21	42	32	64	47	94	49	98	49	98
10. Electric Consumption	22	44	47	94	46	92	48	96	48	96
Mean	19.9	39.8	35.6	71.2	46.7	93.4	47.7	95.4	47.7	95.4

N=50.

The data in Table 4 shows that in terms of finding out the given from the word problems and identifying the required, learners found difficulty in noting down those from the topic of electric consumption, with frequencies of 22 and 47 respectively.

When it comes to representation learners tend to find it difficult from problems about ratio and proportion, percent of change, operation on integers, and surface area. Furthermore, ratio and proportion, percent of change, and surface area were also found difficult with the same frequencies of 50 when in terms of formulation of equation and the analysis.

Overall, the data revealed that the learners exhibited the highest degree of difficulty in formulation of equations and it's analysis from the given data of the word problems. This

showed the greatest incorrect responses on these items with mean of frequency 47.7. This also presented that learners find the given as part of the word problems the easiest, given with the least number of errors identified, 19.9.

3.4. Relationship Between Reading Comprehension and Attitude Towards Problem Solving

Table 5 shows the significant relationship of the Grade VI learners' reading comprehension level and attitude towards solving word problems. The result of the correlation showed a significant relationship between the reading comprehension of Grade VI learners and their attitude towards problem solving ($r=0.342$, $p=0.015$).

Table 5. Relationship between Reading Comprehension and Attitude towards Problem Solving.

Variable	Attitude towards Problem Solving		
	Correlation coefficient (r)	p-value	Remarks
Reading comprehension	0.342	0.015	With significant relationship

This means that when learners can understand what they are reading, they tend to be more positive and interested in solving word problems. It also implies that learners at this grade level cannot respond correctly to the word problems because of factors such as: (1) they cannot comprehend what they are reading; and (2) they do not have the positive attitude to do so.

This implies that the Grade VI learners find the most difficulty in formulating the equation of the problems and the least difficulty in identifying the given facts of the problems. Meaning, since the problem solving process should be found out in a chronological pattern, the learners are evidently delayed in learning to formulate equation since problem solving was taught from the first grade.

4. Discussion

4.1. Reading Comprehension of Grade VI Learners in Kiamba District II

The result implies that Grade VI learners of Kiamba

District II are Frustration-level readers in comprehension. This means that the number of Frustration readers in comprehension are four times more than Independent and Instructional readers combined.

This agrees with Cabardo [2] who emphasized that majority of the learners are in Frustration level of reading proficiency. Gillaco [8] also supports this result with his study explaining that learners in elementary particularly in intermediate level are mostly Instructional and Frustration level with the lowest percentage of Independent.

As Cain & Oakhill [1] described 'good' reading comprehension depends on good language understanding in general, Spear-Swerling [15] found out that learners had trouble in reading comprehension. He found out that factors such as: weak decoding skills, slowness in comprehending multisyllabic words; poor sight word vocabulary; poor oral reading, lack of fluency; good oral self-expression but essentially poor in writing.

According to Cain, et. al; Finnegan and Mazin, [6] reading comprehension is an act of understanding meaning from print. They also emphasized that this task is a very difficult

one since it involves the integration and coordination of various high-level cognitive processes, necessitating active reader engagement. They also added that the level of readers in comprehension reflect the learning that they took since beginning reading. Therefore, since the learners tend to have 'confused' language milestones in primary level, it will be more difficult to attain the standards set for them in comprehension. Thus, they likely fall to the lowest level of comprehension.

4.2. Attitude of Grade VI Learners in Solving Word Problems

From the results, learners were in average level in terms of their attitude towards problem solving. This agrees with Salleh; Zakaria & Yusoff [21] who found that students' attitudes towards problem-solving are considerably favorable. Surif et. al. [17] suggests that encouragement to learners will develop the learners' positive attitude in problem solving.

The attitude of learners in a certain subject or topic is considered as one of the biggest influence in their performance. Yee [20] determined that even if learners have positive attitude towards problem solving, they may lack intrinsic motivation. This absence will apparently cause their attitude to drop from positive to neutral in time.

However, Duque and Tan [4] suggested that teachers should determine learners' attitudes towards problem solving and mathematics in order to upraise their performance in such courses. Learners' attitudes are their predisposition towards the course which means that the learners' attitude towards problem solving is their predisposition towards solving word problems.

Ma and Kishor; Duque and Tan [4] also expressed that since attitude towards the course is the belief that it may be 'good' or 'bad', or that it is 'useful' or 'useless', attitude towards solving word problems are likely to be either positive or negative.

Robson, cited by Farooq and Shah [5] said that having a positive attitude towards problem solving generally means enjoying working with it and having confidence in one's ability to do it. This, though, does not mean that a learner will display this positive attitude because of other factors that may affect the learners' predisposition towards it.

4.3. Common Errors in Solving Word Problems of Grade VI Learners

The Grade VI learners find the most difficulty in formulating the equation of the problems and the least difficulty in identifying the given facts of the problems. Meaning, since the problem solving process should be found out in a chronological pattern, the learners are evidently delayed in learning to formulate equation since problem solving was taught from the first grade.

These findings on error patterns confirm the study of Lugo [10] who found out that the common problems exhibited by the students were wrong representations, wrong computation,

and use of trial and error method, misinterpretation, forgotten formulas, and forgotten concepts.

Surif et. al. [17] suggested that when learners find difficulty and misconceptions in problem solving, they must think, make decisions, and use specific strategies. Chinn [3] also identified areas of difficulty of learners in solving word problems. They are enumerated as: direction and sequence, perception, retrieval, speed of working, math language, cognitive style and conceptual ability.

Pinter [13] explained that the most important part for teachers in problem solving was to foster creative thinking and discovery learning. Since among the parameters given, the ones that need the abovementioned qualities are that have high error percentage, learners are most likely to fail or cannot meet standards for those phases.

4.4. Relationship Between Reading Comprehension and Attitude Towards Problem Solving

Matel [11] supported the result of this study when he who found out that there is a significant relationship between learners' reading comprehension skills and problem-solving skills. Java [9] also believed that learners must have positive attitude towards solving word problems and must be able to comprehend fully to excel and perform better in problem solving.

Aiken, cited by Yaratana and Kasapoğlu [19] also supports this result by finding out that learners' attitudes toward Mathematics as a subject, and problem-solving as a topic, is stronger than any other learning areas. Also, according to Bloom, cited by Yaratana and Kasapoglu [19] developing positive attitudes toward mathematics courses increase learners' achievement in mathematics. Therefore, developing positive attitudes towards reading comprehension or solving word problems increase the learners' achievement in such.

Akkoyunlu; Yaratana and Kasapoglu [19] also mentioned that as the attitude towards problem solving is a matter of like and dislike of such, learners' attitudes towards problem solving play a significant role in obtaining good performance in it.

Ramos, et. al [14] even found out that reading level of learners had a significant relationship to the learners' performance in various learning areas, but mostly in mathematics and specifically in problem solving. This also affects the learners' attitude towards the learning area since they have different emotional predisposition in reading and comprehension.

5. Conclusions

Majority of the Grade VI learners of Kiamba District II are Frustration-level readers. Also, the learners' attitudes towards problem solving is neutral, which means that they may have positive and negative attitude towards certain processes in problem solving but had ended up being neutral in the end. Additionally, the Grade VI learners find the most difficulty in formulating the equation of the problems and the least difficulty in identifying the given facts of the problems. This

further indicates that the learners' remembering and recalling skills are more dominant than when they analyze and interpret the situation given in the word problems. Finally, it may also be concluded that when learners can understand what they are reading, they tend to be more positive and interested in solving word problems. Word problems does not only circulate in Mathematics, however, it is the learning area that mostly exposes the learners to word problems. Therefore, it may be inferred from the results that the environment of the learners in terms of the class's attitude towards reading, Mathematics, and problem solving may influence them a lot and therefore develop common attitudes as proven in this study.

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