

Improving Problem Solving Skills and Reading Comprehension of Grade 5 Pupils Using Weekly Five-Revamping Question

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Abstract

This research determined the effect of weekly-five revamping question in problem solving with reading comprehension on the performance of grade 5 pupils in Lumban Central Elementary School, Lumban Sub-Office, division of Laguna during the school year 2022-2023. This study is pursued for the successful development of Grade 5 pupils in the society in the near future. The researcher used the five-revamping question in order to help pupils think of different ways to overcome barriers. The method used in the data gathering was a pre-test and post-test method. This method was used to find out the effect of “Weekly Five-Revamping Question” in solving word problems with reading comprehension. It revealed that the “Weekly Five-Revamping Question” with regards to learners’ skills in solving word problems with reading comprehension has a significant effect on the performance of pupils. Weekly Pre-test was given on the duration of study. The same set of questions was given after the completion of the course to determine what the pupils have learned. Based on the results, there is a need to focus in improving the difficulty in Solving Word Problems in Mathematics and in Reading Comprehension Skills of Selected Grade 5 pupils of Lumban Central Elementary School for SY 2022-2023. It was found out that solving word problems and reading comprehension were some of the difficulties of pupils. Indeed, the used of new technology, contextualized and localized instructional materials, motivation and support from parents and peers were needed to improve the learners. In addition, the area of mathematics performance instruction should be of great concern of all teachers in different research practices. It is recommended that teachers should be capacitated in teaching mathematics.

Keywords: revamping, reading comprehension, word problems

1. Introduction

In a past changing world of the ideal Filipino learner, the one who is empowered for lifelong learning is an aggressive maker of meaning and can learn whatever he/she needs to know. The aggressive learner is competent in learning how to learn and has a life skill for him/her to become competitive individual.

Mathematical skills are needed by learners as one of the basic skills that children should have in order to assimilate knowledge and skills.

Problem Solving is one of the major aspects in mathematics curriculum in the K to 12 Program which required students to apply and to integrate many mathematical concepts and skills as well as making decision. However, students were having difficulties in mathematics problem solving based on the Problem-Solving Skills Test for Grade 5 Pupils. The previous result of the pre-test and post-test method in Reading Comprehension Skills tells that all the pupils fall on the below average score belong to the Frustration level. The researcher thought that it was their reading skills that were making them struggle with word problems that in order to resolve the problem-solving difficulty of pupils they need to improve their reading comprehension skills.

One of the Learning Principle in the NCTM principles and standards (NCTM, 2000), stated that students must learn mathematics with understanding. If students were not able to read the questions accurately and understand what was being asked, then the students were not getting a full understanding of the math topic because their reading skills were an obstacle to comprehension of mathematical problems. Pupils just memorize the facts and procedures instead of fully understanding them. With the NCTM standards the students must express mathematical relationships using equations. If a student could not read the expression in words, he or she may have had difficulty in putting it into an algebraic equation or putting into numerical solution of the problem. Other difficulties could arise under various standards and could even lie within reading the directions correctly. Sometimes students would not be able to pronounce a word and just skip over it, other times they just mispronounced words and at times they would even put in different words than what was written in the directions. The issue of reading difficulties relating to problem solving is that, the problems were written in words that need to be understand and analyze how to solve them. The problems were more in-depth and had more detail that require the problem solver to think more to get to the correct answer. There are different mathematical concepts that required understanding in order to solve a problem. They have to read and understand mathematical questions clearly. If they did not understand what the directions were asking, they might have difficulty solving a problem.

The researcher plan to address this problem by using five (5) questions in a week in Resolving Difficulty in Mathematics and Improving the Reading Comprehension Skills of Selected Grade 5 pupils for SY 2022-2023. The Problem Solving Skills Pre-test for Grade 5, and Reading Comprehension Skills Pre-test will be given at the beginning of the week to the pupils, in which the results will be compared to the test after administering the post-test of Selected Grade 5 pupils in Problem Solving and Reading Comprehension.

1.1. Statement of the Problem

The Researcher would like to find out the answer of the following questions:

- What is the level of performance of selected Grade 5 pupils with regards to problem solving and reading comprehension by using “Weekly Five-Revamping Questions”?
- What are the possible causes and remedial measures to improve problem solving skills and reading comprehension skills of selected Grade 5 pupils in Lumban Central Elementary School?
- To what extent does the reading comprehension skills affect the mathematical problem-solving skills of pupils?
- Is there any improvement regarding the level of performance of selected Grade 5 pupils after implementing the intervention Weekly Five-Revamping Questions?.

1.2. Possible Causes

- Insufficient Parental Support
- Poor Problem Solving and Reading Comprehension Skills

1.3. Generation of Alternative Solution

To overcome the problem and provide understanding of the main objective of this action research. The following alternative solutions will be undertaken during the conduct of this study.

- Introduce parent and pupil monitoring form for Weekly Five-Revamping Questions.
- Give follow up activities to pupils on the Implementation of Weekly Five-Revamping Questions.
- Analyze the result regarding the effect of Weekly Five-Revamping Questions on the performance level of selected Grade 5 pupils of Lumban Central Elementary School.

2. Review of Related Literature

As follows are some research literatures that recognized reading difficulties affecting problem solving that could be the focused to help them read, analyse, understand and solve mathematical problem with accuracy and comprehension. Pupils should develop reading skills at the same time their mathematical skills accuracy in problem solving because lacking these skills may hinder them to reach the solution to the problem.

Goddard, Sweetland and Hoy (2000) examined the importance of a school climate characterized by high levels of academic emphasis. Students were motivated by the respect they got from other students and teachers when they succeeded, and teachers accepted responsibility for student achievement and did not let temporary setbacks unduly frustrate them (Goddard, Sweetland & Hoy, 2000). They studied 45 elementary schools and established that their research sustained their theoretical ideas that in a school atmosphere, in which teachers set reasonable goals and believe in their students' abilities to achieve, students worked hard to succeed and respected those who did the same, and the learning environment was, in essence, orderly and serious.

An article by Fuentes (1998) examined the importance of reading comprehension in mathematics and the role of reading in mathematics. Fuentes went on to discuss why students failed when it came to comprehension. When it came to reading and comprehension, most educators tended to assume that these were things taught in English class and not in math class. This was probably one of the most misunderstood concepts today that's why some of the teachers stay away from teaching any kind of reading skills in math. That so much of the math today entailed reading accuracy and comprehension. Lots of words in the mathematical problem stresses them because they lack comprehension or understanding of what does the problem mean. This article went on to give several ideas for increasing the comprehension of students. Whatever educators did, just remember, that they were doing all of this to get students to experience success. Mathematics teachers faced an even more difficult challenge: creating in students a love for mathematical texts—or at least teaching them not to dislike or fear them (Fuentes, 1998).

More researcher did surveys to find out what were the difficulties the pupils were having and then tried something to resolve pupils' difficulty in solving problems by upgrading their reading comprehension skills. Blessman and Myszcak (2001) did an action research project on a program for improving student comprehension of mathematical vocabulary. Blessman and Myszcak talked about various strategies that could be used to improve comprehension in mathematics like math journals, math dictionaries, children's literature and graphic organizers. Math anxiety was an intricacy they found with several students in one of their surveys, and they talked about various reasons for the anxiety. Students thought of math as punishment. Their parents did not like math or felt it was just a source of stress. Unlike Fuentes, (1998), who just listed various methods that could be used, Blessman and Myszcak (2001) tried various methods with students and showed tables and graphs of student improvement. Many students today even tended to have a negative attitude toward math (Blessman & Myszcak, 2001). Most of the time, their excuse was that it was too difficult. So then how could teachers make it easier for them, or get their attitudes changed? I thought that the atmosphere in the classroom would be a good start. Be positive about what one was teaching was a beginning. Showing some enthusiasm so students would get excited about math was a strategy to help them improve their mathematical understanding. The other way I went about creating a positive atmosphere was by putting up all kinds of math visuals. We made signal word charts, story webs, and reviewed the steps involved with solving word problems.

Learning strategies article of Yan, Wiles, and Ye-Ying (2008) did a study to examine the effect of teaching word problem story grammar on arithmetic word problem solving that emphasized the algebraic expression of mathematical relations in conceptual models. Yan, Wiles, and Ye-Ying studied five fourth and fifth grade students with or at risk for mathematics disabilities and found varying results on each test they did

ranging from no consistent increase or decrease to large (63%) increases. An article by Jonassen (2003) focused on story problems used in mathematics and science problem solving. Jonassen showed how to use technology to enhance story problem solving. These two articles focused mostly on the students' understanding of the conceptual model (i.e. combine, compare, change) being shown in the story problem and then the authors went through the proper steps to solve the problem.

Another article by (Jonassen, 2003) did much work with learning strategies using technology. Since we are developing 21st century learners we need to adapt new technology in improving their reading comprehension skills to resolve their problem solving difficulty in Mathematics.

Immersing Students in the Language of Math (Blessman & Mysczak, 2001) says that If reading comprehension was something that pupils were struggling with then surround them with things that were going to help them: vocabulary lists, dictionaries, story problems, other teachers and students that could help them, and a positive environment with learning that has meaning. These were all things that others had found had helped struggling pupils. Surround them things that they need to understand the problem better by letting them make dictionaries for vocabulary development, signal word lists, and mastering the problem solving steps.

Van Harpen et al. (2013) investigated relationship between students mathematical problem posing abilities and their mathematical content knowledge. This study claims that mathematical problem posing activities are helpful in developing creative approaches to mathematics. Singer et al. (2013) studied on problem solving and its implications in designing problem posing tasks. This study offers insights for more effective teaching and can be used in problem posing and problem analysis in order to devise questions more relevant for deep learning.

Kritzer and Karen (2011) in their study on math in Reley's world found that teachers should encourage their students to ask questions and should guide them towards figuring out the answers for themselves. Sandy (2011) experimented on understanding the nature of stumbling blocks in teaching inquiry lesson. This study recommends that teacher educators focus novice teacher preparation in giving pedagogically meaningful explanation that bridge mathematical context to students thinking.

Shikha and Asthana (2008) investigated on the effectiveness of instructional material on thinking skill of classification in terms of students achievement and relations at middle school level. Instructional material was found to be significantly effective in terms of achievement and development of thinking skill of classification of the students.

Sastry (1998) presented mathematical creativity in a different direction. Problem creating ability to create mathematical problem taking clue from given data. This was expressed through the scores on three factors, namely fluency, flexibility and originality.

Biswal (1988) had studied creativity in mathematics as a function of study habits (SHM) and pupils perception of teachers impression about their performance in mathematics (PPTIM). It was found that pupils creativity in mathematics was a linear function of each of the variables SHM and PPPTIM. He reported significant relationship between study habits, pupils perception of teachers impression about their performance in mathematics and mathematical creativity.

Abrahamson and Dor (2012) in their study Discovery reconceived product before process found that student discovery of mathematical concepts is viewed as their guided heuristic semiotic aligning of the product of analysis process with informal inference from naively seeing situations.

Andrew and Diana (2012) experimented on the role of the scientific discovery narrative in middle school science education. Studies shows that students exposed to the scientific discovery narrative performed significantly better on both immediate and delayed outcome measures.

Tim and Karima (2012) conducted a study on the effects of Polya's heuristic diary writing on children's problem solving. Analysis of students response indicated that most students showed improvement in their solution strategies. Students writing about their thinking pattern are beneficial for developing their problem solving skills. Naomi et al. (2011) studied on does discovery based instruction enhance learning.

Analysis revealed that outcomes were favourable for enhanced discovery when compared to other forms of instruction. The findings suggested that unassisted discovery does not benefit learners, where as feedback, worked examples, scaffolding and elicited examples do.

Conceptual Framework

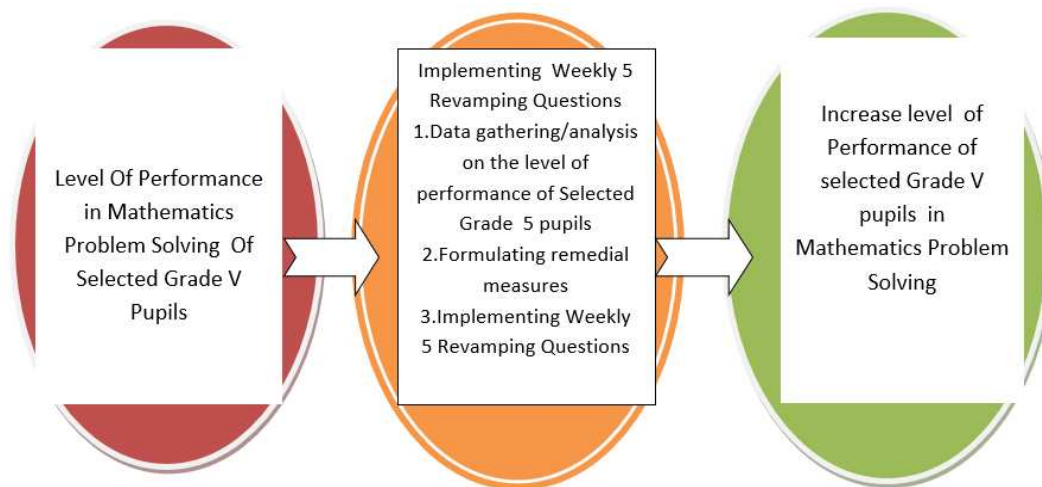


Fig. 1. The paradigm

3. Methodology and Research Design

This action research aims to use the Descriptive Normative Survey in data gathering technique According to

3.1. Scope and Limitation

This action research is limited only in resolving problem solving difficulty in Mathematics by improving the reading comprehension skills of Selected Grade 5 pupils of Lumban Central Elementary School, SY 2022-2023

3.2. Sampling

In this study Purposive sampling is applied. It is a non-probability sample that is selected based on characteristics of a population and the objective of the study. Purposive sampling is also known as judgmental, selective, or subjective sampling. It is a sampling technique in which researcher relies on his or her own judgment when choosing members of population to participate in the study. Black, K. (2010) "Business Statistics: Contemporary Decision Making" 6th edition, John Wiley & Sons Purposive sampling is a non-probability sampling method and it occurs when elements selected for the sample are chosen by the judgment of the researcher. Researchers often believe that they can obtain a representative sample by using a sound judgment, which will result in saving time and money. Alternatively, purposive sampling method may prove to be effective when only limited numbers of people can serve as primary data sources due to the nature of research design and aims and objectives. In purposive sampling personal judgment needs to be used to choose cases that help answer research questions or achieve research objectives. Saunders, M., Lewis, P. &

Thornhill, A. (2012) “Research Methods for Business Students” 6th edition, Pearson Education Limited. According to the type of cases, purposive sampling can be divided into the following six categories[1]:

- Typical case. Explains cases that are average and normal.
- Extreme or deviant case. Deriving samples from cases that are perceived as unusual or rare such as exploring the reasons for corporate failure by interviewing executives that have been fired by shareholders.
- Critical case sampling focuses on specific cases that are dramatic or very important.
- Heterogeneous or maximum variation sampling relies on researcher’s judgment to select participants with diverse characteristics. This is done to ensure the presence of maximum variability within the primary data.
- Homogeneous sampling focuses on “focuses on one particular subgroup in which all the sample members are similar, such as a particular occupation or level in an organization’s hierarchy
- Theoretical Sampling is a special case of purposive sampling that is based on an inductive method of Grounded Theory. Saunders, M., Lewis, P. & Thornhill, A. (2012) “Research Methods for Business Students” 6th edition, Pearson Education Limited p.288

According to Palys, T. (2008). Purposive sampling. In L. M. Given (Ed.) The Sage Encyclopedia of Qualitative Research Methods. (Vol.2). Sage: Los Angeles, pp. 697-8 It is a virtually synonymous with qualitative research, However, that there are many objectives that the qualitative researchers might have, the list of purposive strategies that may be followed is virtually endless and any given list will reflect only the the list of situation the author of the lists has considered.

3.3. Data Collection

Table 1. Activities and expected results

Target Subjects	Person Involved	Processes	Expected Results
Information Dissemination of Lumban Central ES Three Years Achievement Test Result in Mathematics 5.	Principal Teacher Pupils Parents	*Inform the teachers, pupils and parents about the existing problem of Grade 5 in Achievement Test Results especially in Mathematics.	The teachers, pupils and parents were informed.
Preparation and gathering of data	Principal Teacher Pupils	*Data Gathering Survey for Parents support and Pupils performance level in Mathematical Problem Solving	All the necessary data were gathered
Analysis of Data	Principal Teacher Parents Pupils	Analyze the data gathered	Data gathered were fully analyzed and interpreted.
Formulating remedial measures	Principal Teachers Parents	Prepare different instructional materials to be use during remedial measures	Well prepared Instructional materials for remedial measures
Implementation of the Weekly Five-Revamping Questions	Principal Teacher Pupils	*STAR/Process Observation Report	Increase in the Performance on the Problem Solving Skills Test and Sample *Mock Test
Weekly Five-Revamping Questions Evaluation	Principal Teacher	Analysis/evaluation of result	Increase performance of Selected Grade V pupils in Mathematics Problem Solving
Update the reward system of the pupils.	Teacher Pupils	Giving rewards for the high performance of pupils in Mathematical Problem Solving	Increase performance of Selected Grade V pupils in Mathematics Problem Solving

3.4. Ethical Issues

Reading accuracy and comprehension played an important role in pupils' mathematical thinking on problem solving. The activities mentioned are some of the strategies that could make Mathematics interesting to the learners. It is a challenge to the researcher to upgrade the performance of the Grade Five pupils in Mathematics especially in resolving problem solving difficulty by improving the reading comprehension skills on mathematical problems which will be reflected in the evaluation of pupils homework, and tests. The result of this action research shall be identified after the increased MPS in Mathematics Test in Problem Solving has been achieved by the Selected Grade 5 Pupils of Lumban Central Elementary School.

3.5. Plan for Data Analysis

The target of this action research is to resolve problem in solving difficulty in Mathematics and improving reading comprehension skills of selected Grade 5 pupils of Lumban Central Elementary School SY 2022-2023. Hence, the following research design were formulated.

Table 2. Statistical treatment

ACTIVITIES	DATA TO BE COLLECTED	ANALYSIS OF DATA /STATISTICAL TREATMENT
1.Administering survey using positive questions about Mathematics.	Result of the Pre-Survey	Get the average score of the pupils by dividing the results into 2- which is Strongly Agree, Agree, Disagree, Strongly Dis Agree.
2 .Giving Pre-and post tests survey, Interview on their interests and study habits in Mathematics. Etc.	Survey test questions.	Gathered and interpret the results of the survey form.
3. Conduct weekly /monthly test.	*Test papers Pre-Test and Post Test *Third Periodical Test	Upgrade pupils performance in the Mathematics by attaining higher MPS in the Test Result.
5.(Pre-Test) Third Periodical Test	Sample Test	Achieved the 75% Mastery Level in Mathematics and 10% increase in the MPS of Third Periodical Test in Mathematics V
6. Actual Third Periodical Test	Actual Third Periodical Result	Achieved at least 10% MPS increased in Third Periodical Test Result

4. Analyzing the Data

The researcher had analysis on the list of Homeworks done by the Grade V pupils , I found that the Grade 5 mathematics class got an average of 53.33% on the computational problems correct and only 33.33% of the word problems. On this assignment, pupils were given five computational problems and five word problems. The information can be seen in table (fig. 2). There were 5 out of 6 who got very low level in doing mathematical test in problem solving . I noticed they were struggling in answering the problem solving with word problem than just the computational problem on their assignment.

When I looked at it it seems that they were having a hard time understand the word problem than just the computational problem. Therefore, I tried using this table and looking at outcomes of all assignments together to compare their differences and have found out the differences between the average of computational problems they got correct and the average of word problems that they got correct ,the graph on (Figure 3) showed the differences on a table. The progress of improvement of solving word problems would see a steady decline with all the points as the arrow on this graph shows. A decline would signal a decrease in the difference between the percent of word problems that were incorrect compared to the percent of computational problems that were incorrect. If there was no improvement, the Reading Strategies of graph the pattern that I was looking for was for the red to stay level across the top of the graph, and the blue line to be lower at the left side and going up as the arrows

Table 3. Assignments and scores

Assignment	# of computational problems	Avg. & % correct	# of word problems	Avg. & % correct
Pupil A	5	60%	5	40%
Pupil B	5	80%	5	40%
Pupil C	5	100%	5	60%
Pupil D	5	20%	5	20%
Pupil E	5	20%	5	20%
Pupil F	5	40%	5	20%

Table 3 shows the result of Assignment of 10% of the population of grade V pupils of Lumban

Central E/S for S.Y. 2022-2023.

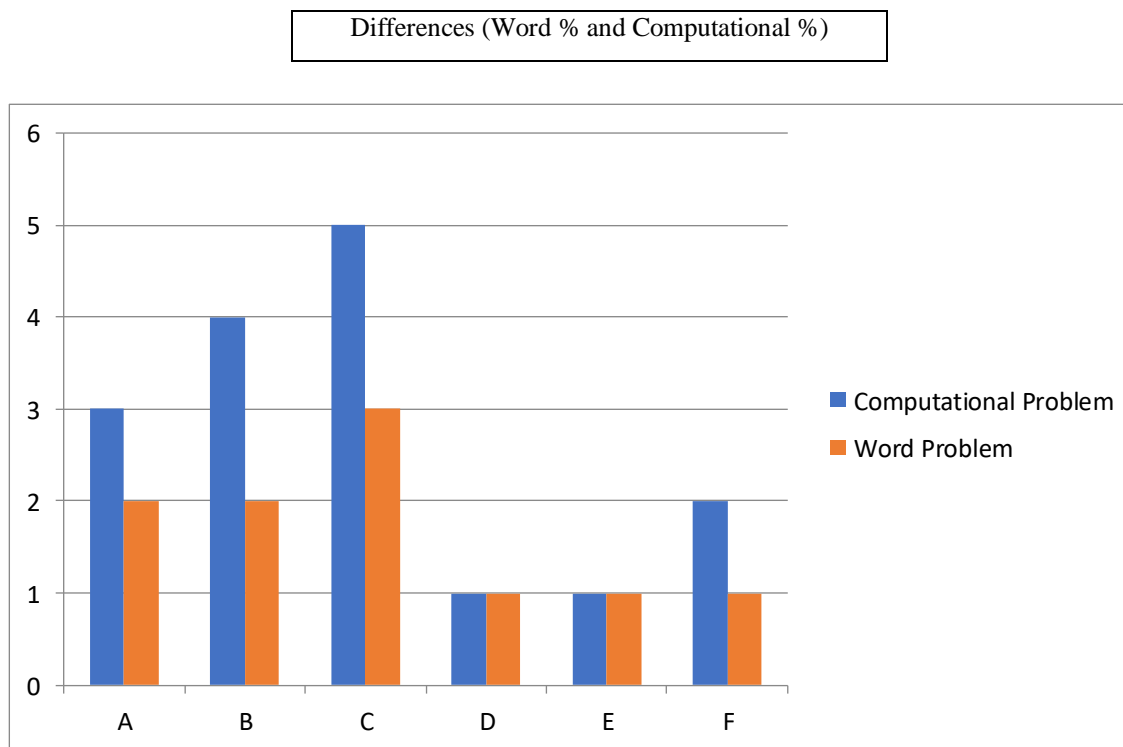


Fig. 2. Word vs. computational

Figure 2 shows the result of scores of 10% of the population of grade 5 pupils of Lumban Cebntral E/S, showing that most of the pupils got a high scores in computational problems than word problems.

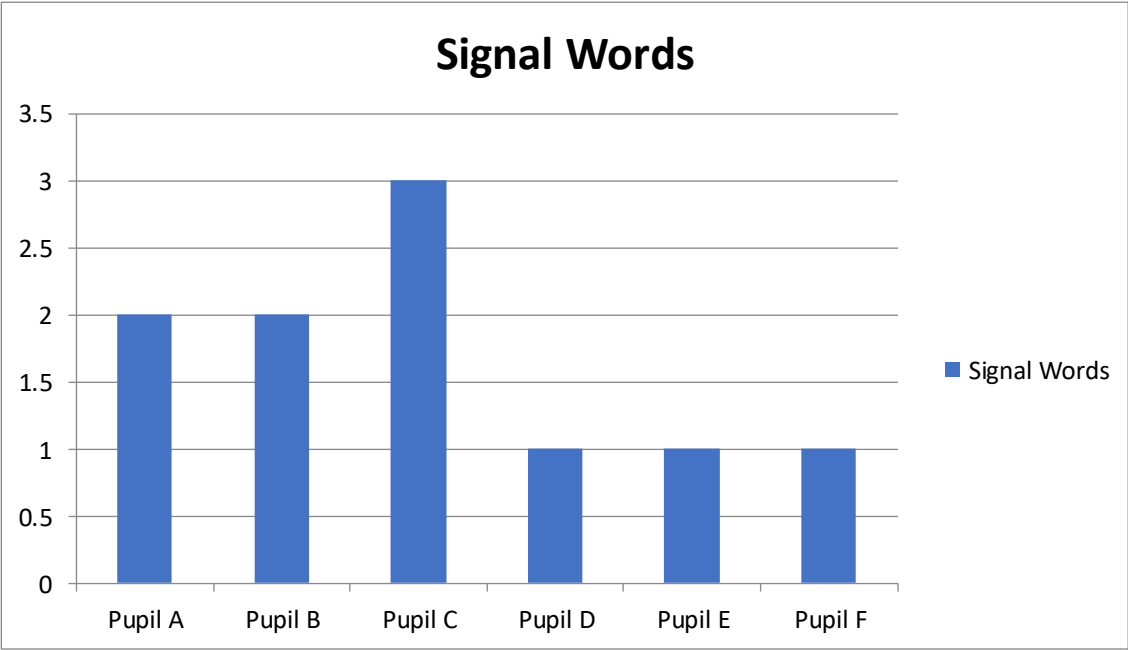


Fig. 3. Signal words

Figure 3 shows the different signal words used in word problems. Only 3 signal words were obtained by the pupil with the highest word.

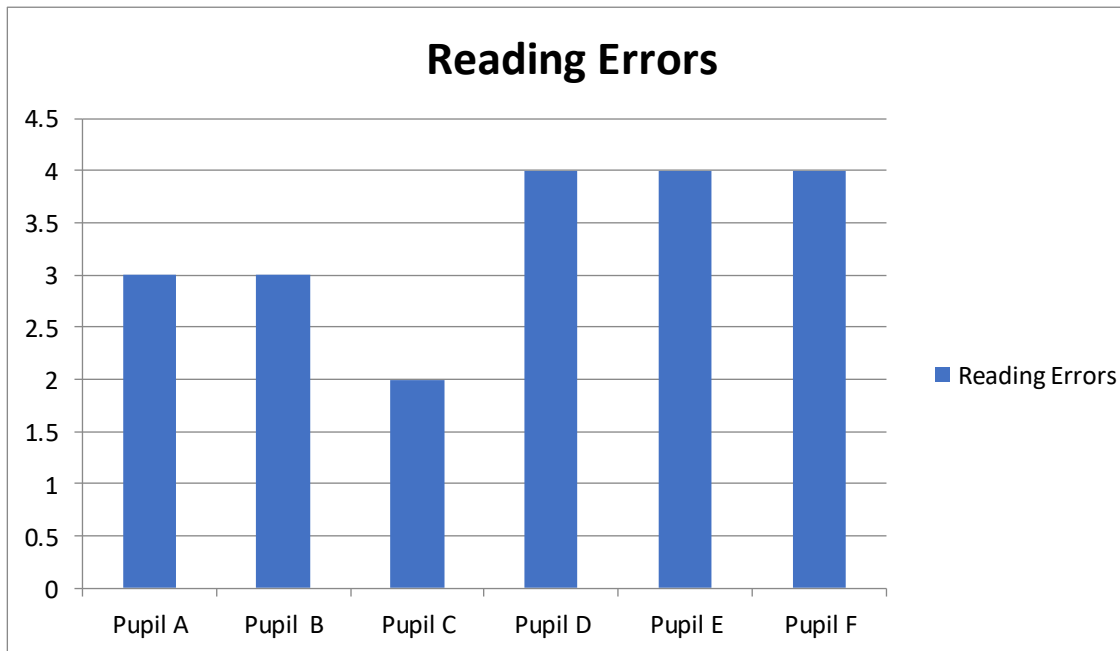


Fig. 4. Reading errors

Figure 4 shows the reading errors committed by 6 pupils of Lumban Central E/S. Three (3) pupils got 4 reading errors in reading the word problems.

4.1. Results of Surveys

The researcher gave a pre- and post-math survey to pupils and parents . The results were shown in the following table (Figure 14). The first number in each box represented the survey in October, 2022 , and the second number represented the post-survey in December , 2022

Table 4. Math survey results

Statement		Strongly Agree		Agree		Disagree		Strongly Disagree		Not Applicable	
	Standard Deviation	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Math is my favorite subject	1.55	1	1	1	2	1	1	1	1	2	1
The most difficult area in Math for me is Problem Solving.	1.01	3	2	2	1	1	2	0	1	0	0
I need help in making me solve the problem easier.	0.99	3	0	2	2	1	2	0	1	0	1
Math is easier	0.46	4	5	2	1	0	0	0	0	0	0

if I did not have to read sentences.											
Sometimes in Math I feel nervous like I cannot do the work especially in Problem Solving because I don't understand some words.	0.20	6	5	0	1	0	0	0	0	0	0
I like to use new technology in Solving Math Problem.	0	6	6	0	0	0	0	0	0	0	0

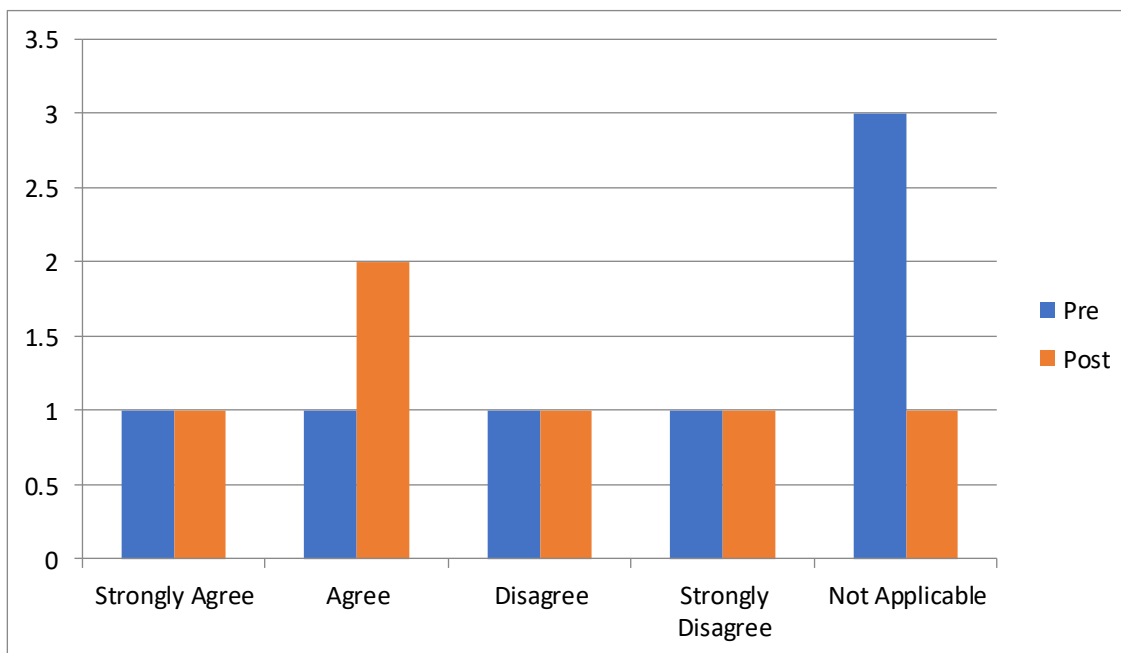


Fig. 6: Favorite subject

Figure 6 shows that most of the pupils did not show that math is their favorite subject before the survey and it increases number of pupils who love math as their favorite subject after the project has been finished.

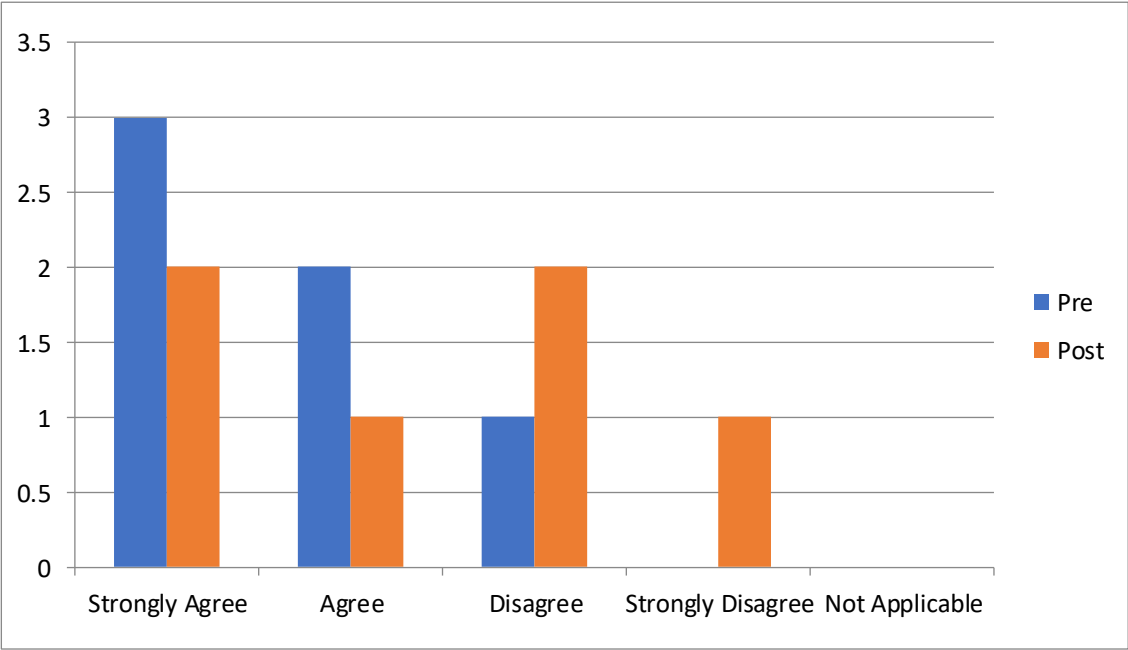


Fig. 7. Solving word problems

Figure 7 shows that before the project was implemented, solving word problems was the most difficult part of mathematics subject but it decreases after the project has been finished.

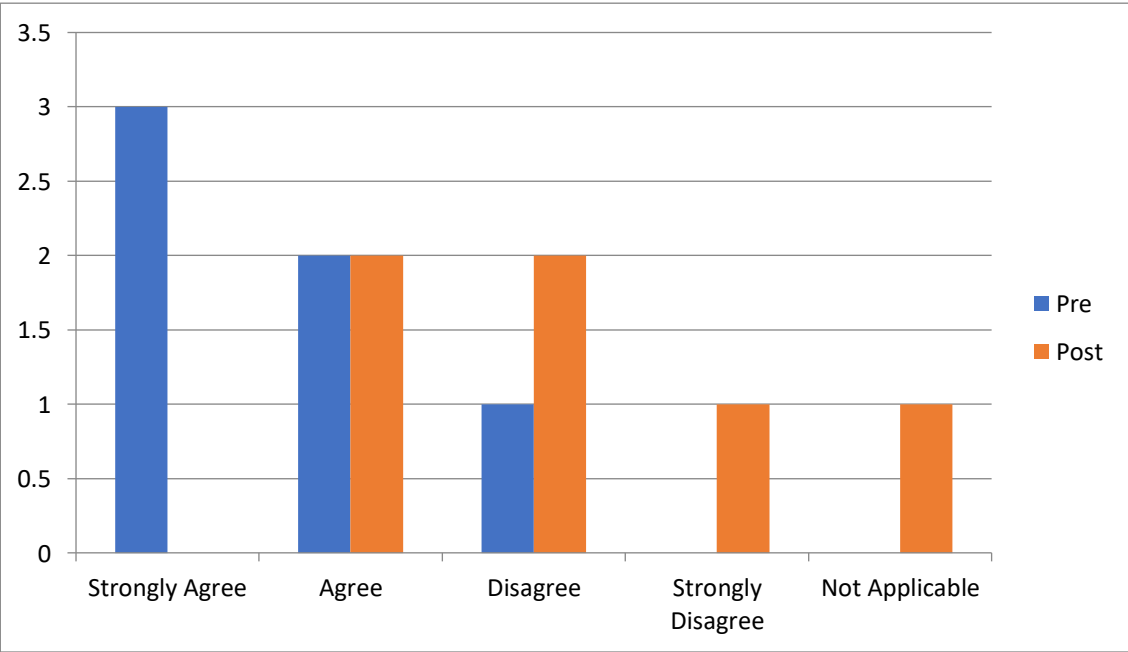


Fig. 8. Needing help explaining answers

Figure 8 shows most of the pupils need help in explaining the word problems before the project was implemented and it decreases the number of pupils who need to explain the answer after the project was implemented.

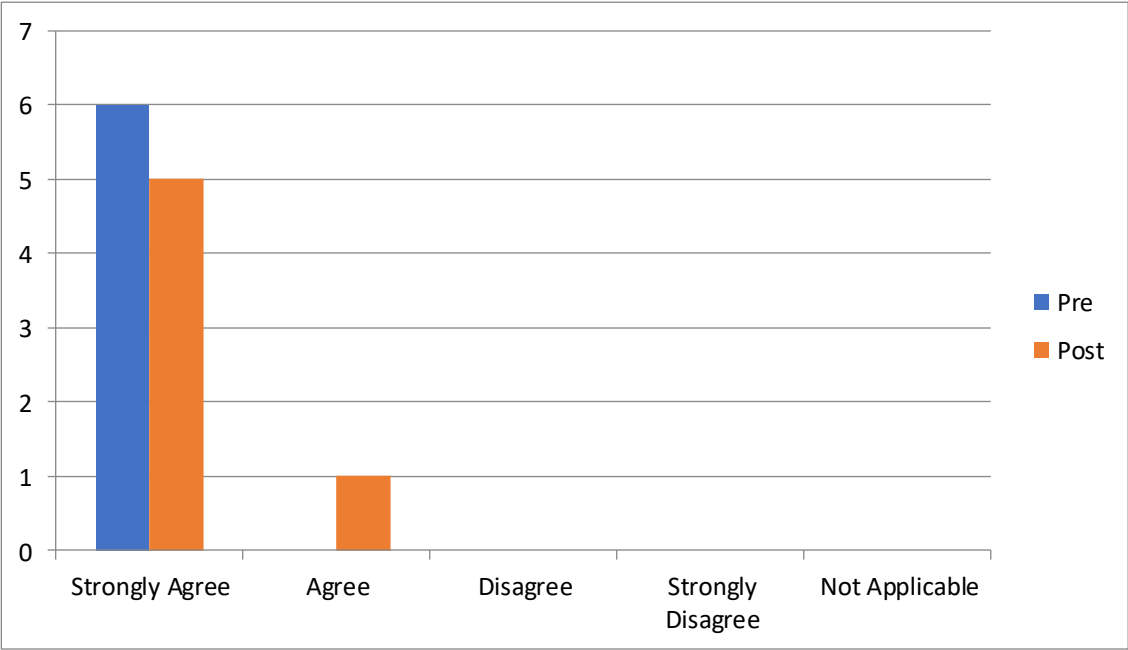


Fig. 9. Nervousness

Figure 9 shows that all of the pupils were nervous in answering word problems, and it decreases the result after it was implemented.

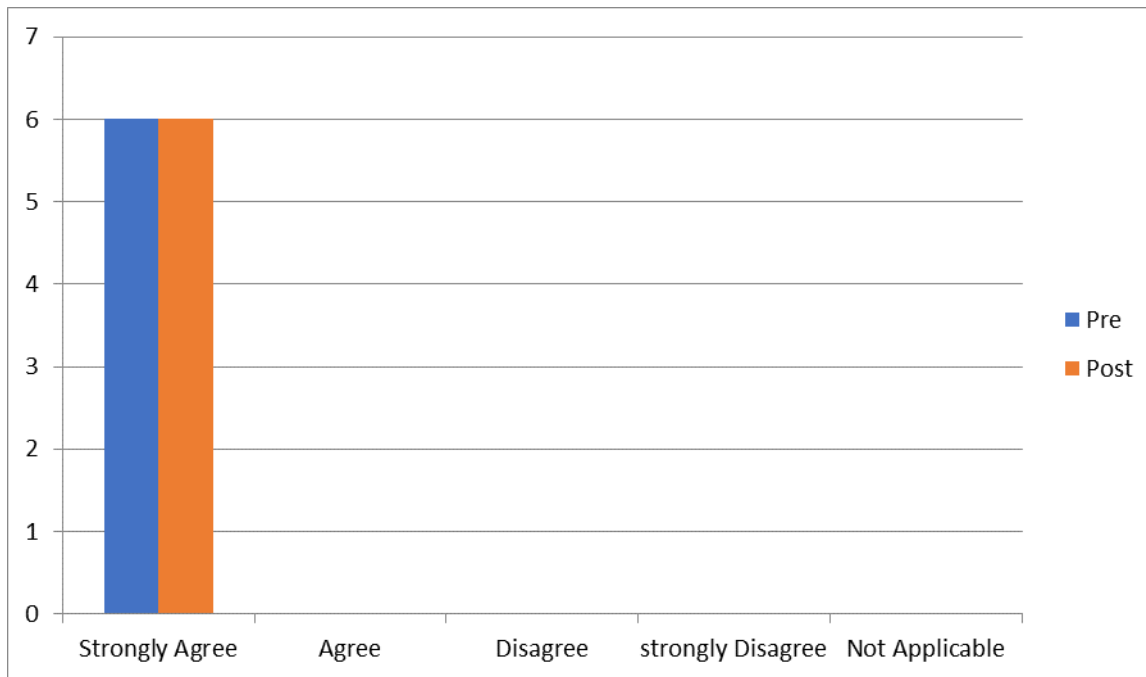


Fig. 10. Technology with Math

The figure shows that all of the pupils strongly agree that they love to solve word problems using technology.

4.2. Applying Reading Strategies

The Grade 5 pupils' mathematical understanding changed after applying reading strategies in the classroom. The evidence of this was the results of the homework and tests that was shared earlier. The reading survey stressed out which reading strategies are effective to resolve pupils difficulty in mathematical problem solving. In these graphs, the bar represents the percentage of pupils that responded with strongly agree to strongly disagree. With this information I could see the exact percentage of Selected Grade 5 pupils as respondents.

The majority of the pupils did agree that the strategies were helping them in math and that they needed to continue to improve their reading skills to help them in math (Figure 21). According to the survey, the math dictionaries helped them a lot and so did the creating of their own word problems; however, the one that had the most positive feedback was the effective reading strategy that would develop their reading comprehension skills on mathematical problem solving.

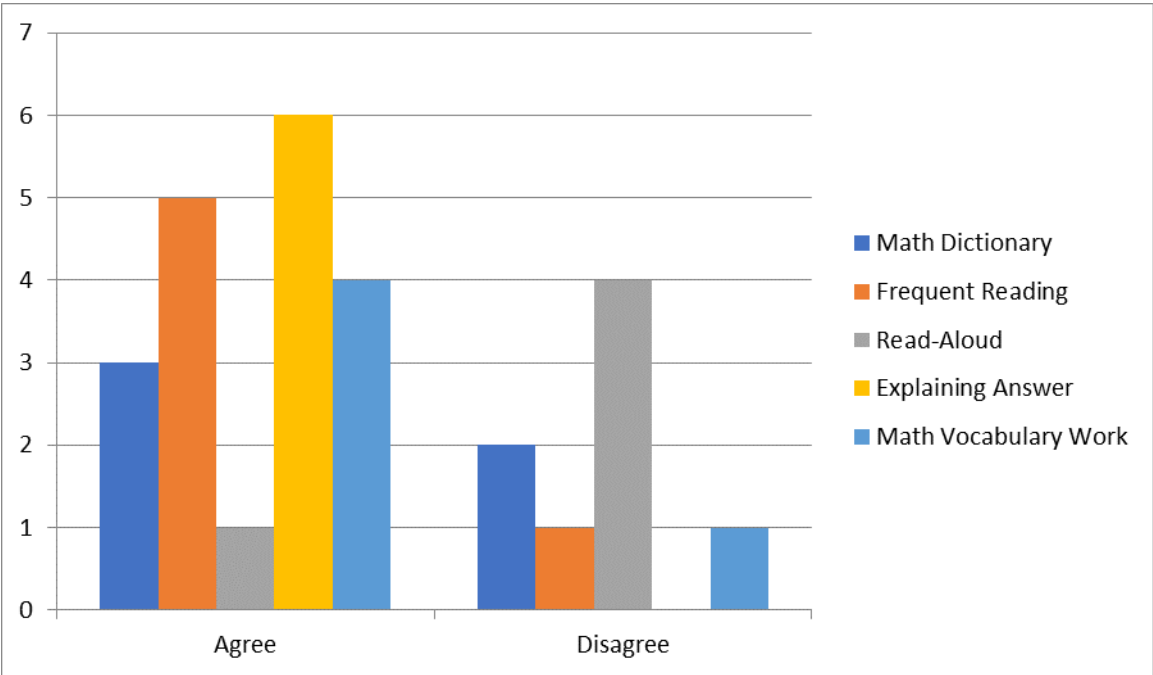


Fig. 11. Reading strategies helping in Math

Figure 11 shows the reading strategies that help in math problems. The figure shows that all of the pupils agree that explaining the answer was the best strategy.

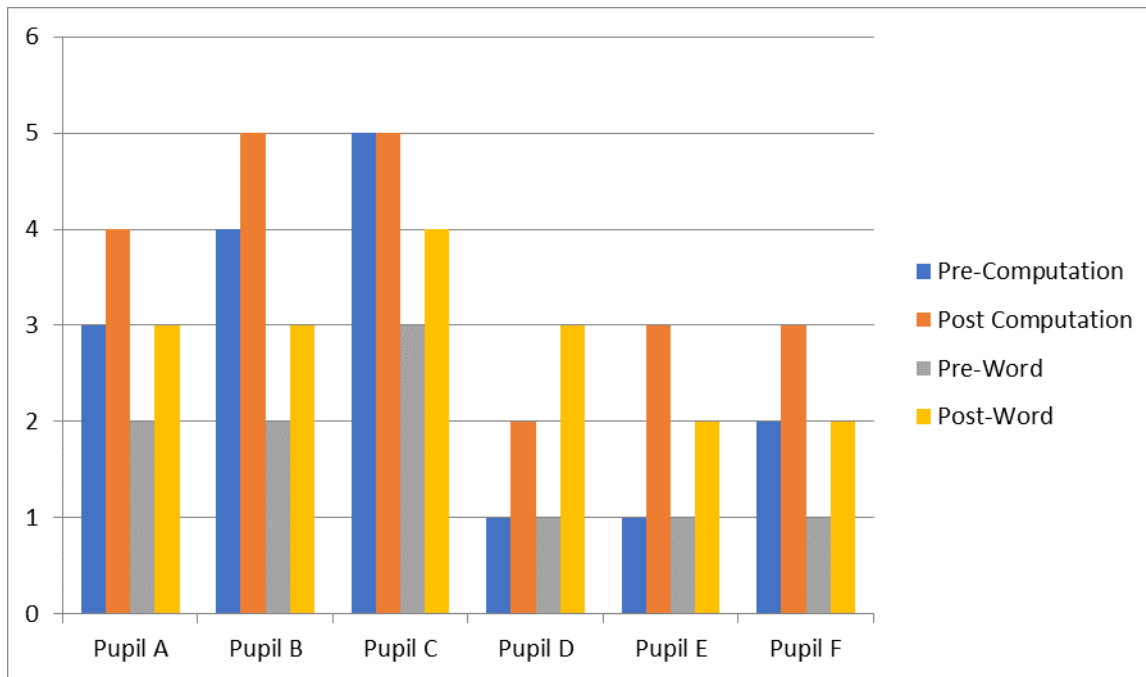


Fig. 12. Student pre- and post-test examples - good improvement

Figure 12 shows that most of the pupils improved their ability in solving word problems after the project was implemented.

5. Conclusions

The first thing that comes into my mind was that there was a problem with reading skills, and it could be connected to our pupils' problem solving skills that is why I have focused my action research on using "Weekly Five-Revamping Questions" in Solving Difficulty in Mathematics and improving the Reading Comprehension Skills of Selected Grade 5 pupils of Lumban Central Elementary School, SY 2022-2023.

My research lasted from October to December 2022. I gave pre- and post-math surveys. I also used a pre- and post-math test along with interviews and Problems of the Week. I gathered all of the pupils' homework and tests and analyzed them. I also gathered surveys and interview to pupils regarding their Math Interest.

I have recognized that a problem existed in their understanding of the word problem. We are building great problem solvers, and to get these they need to become better readers. It was found out that reading problems were some of the difficulties our pupils were experiencing but it does not account entirely for their performance in mathematics.

Our learners need effective trainings from dedicated and versatile teachers, the use of new technology and contextualized and localized instructional materials, proper motivation and moral support from parents and peers to be able to be a great problem solver and a wholistically developed 21st century learner.

5.1. Implications

As a result of this study I am now very aware of the relationship between reading skills and problem solving. That teachers should be aware of what types of reading strategies they should use for effective understanding of Mathematical Problem Solving that there are interesting strategies that can catch the attention of pupils for easy comprehension. For example, the charts with signal words (Figure 9) and, according to the reading survey (Figure 25), this was a popular reading strategy for them. Teachers need to keep their minds open to new ideas. They need to try to convince their pupils to keep their minds open to ideas that could help them become better problem solvers. To be able to achieve a great problem solver and a great reader and become a holistically developed 21st century learner I suggest to keep on going on best practices learned in this action research. As Blessman & Mysczak (2001) said, “we need to improve our student’s mathematical language.” Mathematics has its own language, and we need to teach them and improve our pupils’ learnings. The insights I gained in this action research is that there is something about reading difficulties that have also a major role in how well pupils solve word problems that there are different reading strategies that could be effective to resolve problem solving difficulty in Mathematics and at the same time improve the reading comprehension skills of pupils.

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