Improving Grade 7 Students' Reading Comprehension in Relation to Mathematical Analysis Through Clue Word Identification

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Abstract- ***Enhancing students' capacity to comprehend what they read is an essential educational goal. The effect of clue word identification on students' reading comprehension in mathematical analysis was examined in this action research study. It is essential to comprehend the reading material in order to analyze and interpret mathematical difficulties. With the use of this approach, students can better grasp how words and numbers can be used to solve problems by manipulating important concepts and identifying suitable answers. A pre-test was administered to 35 participants, who were then given a week to discuss the hint word strategy and a post-test to gauge its efficacy. The mean scores increased from 8.89 in the pre-test to 16.40 in the post-test, indicating a significant improvement in the outcomes. The majority of students showed improved results, demonstrating the effectiveness of the intervention. Some students maintained their scores the same, while a single student exhibited no improvement, indicating the need for additional one-on-one assistance. The results of the study showed that the identification of clue words considerably improves students' mathematical comprehension and problem-solving abilities. Teachers are urged to use this approach together with other innovative methods to improve their teaching abilities in a variety of subject areas. Furthermore, it is advised that clue word identification and related techniques be included in the regular curriculum for teaching disciplines other than mathematics. Heads of schools are asked to assist teachers in developing their teaching skills through workshops, seminars, and training sessions. This will help to create a good learning environment that will pique students' interest in and understanding of mathematics. By implementing these techniques, teachers can help students communicate mathematical concepts more effectively and foster a dynamic and interesting learning environment. This study emphasizes the importance of creative teaching strategies in improving student achievement.***

Indexed Terms- ***Reading Comprehension, Mathematical Analysis, Word Identification, Grade 7 Students***

I. INTRODUCTION

Reading comprehension among students is important for it make analyzation, interpretation, and communication easier. Reading Comprehension helps in manipulating or visualizing ideas in the given problem. It gives a better grasp of how numbers, and words works in problem solving. It helps in raging a wider perspective of strategies and find the appropriate solutions to the problems.

According to McKee (2012), and as cited by Akin (2022), reading is a crucial skill for people to succeed in real-world circumstances since it helps one grasp a subject. The ability to read well is essential because it gives the reader a polished, informed, and intelligent appearance in daily situations. One of the key elements of reading proficiency is reading comprehension. It is described as a student's capacity to comprehend written content (Lin, 2020). Reading comprehension is a cognitive process that allows a person to choose facts, information, or opinions from a written passage. In this reading-related cognitive process understanding, a person ascertains the meanings the author wishes to express; ascertains how they relate to earlier data, and assesses the applicability and worth of that in writing to fulfill her personal objectives (Veeravagu et al., 2010). It is not the case in reading comprehension not only be able to read the content,

but also comprehend, dissect, and reorganize it ideas and information in a paragraph (Mckee, 2012).

In the study of Karacaomlu, O.C. and Kasap, Y. (2023), it was stated that numerous national and international use, the ability to read comprehension is considered a fundamental life skill. Furthermore, the study's findings highlight that there is a correlation between accomplishments and abilities in several domains and reading comprehension skills reveals that reading comprehension abilities and thinking, self-expression, and learning results are related. Skills and cognitive achievement (Cam, 2006; Demirel & Epcacan, 2012; Chung, 2010; Coskun, 2010; Bozan, 2012).

Research has shown that readers' reading comprehension abilities vary depending on their developmental stage. In Chae (2004). Van den Broek's (1997) study's findings showed that younger pupils were not as ability to draw conclusions and apply causal linkages within the text's context as older students.

In addition to helping students build their critical thinking and memory abilities, reading comprehension is crucial for language and literature. It also helps students focus and problem-solve, all of which are important for all types of students and professionals (Eastern Washington University, 2022).

According to Ilter (2019), as cited in the paper of Putri and Fitrawati, lots of strategies and techniques were introduced and practiced in the classroom. However, there are a few that may be more pleasurable and relaxing for both the teacher and the students in order to learn efficiently. One of the best strategies is to employ context cues methods for strengthening and growing reading comprehension because it aids readers in deciphering unfamiliar words and expands their vocabulary. According to Putri and Fitrawati (2019), the utilization of context clues was strongly correlated with readers' overall efficacy. The phrases and sentences that surround a word and aid in elucidating its meaning are known as context clues. It also assists the reader in deciphering unfamiliar vocabulary. Contextual cues include synonyms, antonyms, contrasts, restatements, and given examples. Understanding and effectively utilizing contextual clues is essential for academic performance. They can improve the student's vocabulary, reading comprehension, and writing skills (Al Jumaily, 2021).

The aim of this action study was to determine how well students comprehended what they were reading and how well they understood mathematical word problems. The researchers aimed to broaden the students' limited mathematical vocabulary and identify any difficulties they might have in reading mathematical word problems by concentrating on word problems specifically. The study also sought to enhance students' reading comprehension abilities with connections to mathematical analysis using clue identification of words. The aim of this study, in relation to seventh-grade students' mathematical analysis, was to measure the effectiveness of clue word identification as an intervention for the problem of poor reading comprehension. This action research provides teachers with beneficial strategies to help students understand what they read and solve mathematics problems more efficiently.

- Objectives of the Study

This study aimed to determine the reading comprehension of students in relation to mathematical analysis.

Specifically, the study sought to:

1. observe students' reading comprehension and investigate their ability to understand mathematics word problems;
2. enhance the reading comprehension ability of the students in relation to mathematical analysis;
3. improve the students' limited vocabulary words in Mathematics; and
4. improve students' reading comprehension in relation to mathematical analysis through clue word identification.

- Significance of the Study

The results of this study would be highly beneficial and significant to the following:

Students. Through this study, the students may be able to enhance their problem- solving abilities, deepen their understanding of mathematical concepts, improve their vocabulary, and foster critical thinking skills. Good reading skills also make it easier for

students to explain their ideas and get ready for advanced math studies or tests. So, when students read well and understand what they read, it boosts their confidence, makes learning, and solving math problems a lot smoother to them.

Teachers. This study helps teachers explain concepts more easily and makes lessons clearer for students. Teachers can use reading skills to guide students through problems, making it simpler to understand and discuss math ideas together. When students understand better what he/she read in math, it makes teaching and learning math more effective and enjoyable for both students and teachers.

School Heads/Principals. The results of this action research can serve as baseline information for school heads to understand students' needs for improving their reading comprehension in relation to mathematical analysis. It also helps school heads see better academic results, enhancing the school's reputation. The results can motivate principals to encourage teachers to participate in training sessions, seminars, and workshops to improve their teaching abilities, assisting students in explaining math concepts and creating a positive learning environment. Whatever the findings, they can be used as information to establish educational initiatives aiming to improve students' reading comprehension, ensuring high-quality education and enhancing programs for the overall development, success, and reputation of the school.

Curriculum Planner. The results of this study can help them evaluate the current programs, considering students' abilities, to improve their reading comprehension in relation to mathematical analysis. This information serves as their guide to take necessary actions or adjustments to enhance the curriculum, aligning it with the students' capabilities.
Future Researcher. This study could be beneficial to the future researcher as they could use this as a reference material or as foundation for their own study.

II. LITERATURE REVIEW AND METHODOLOGY

- Review of Rlated Literature

    - Reading Comprehension's Impact on Mathematical Performance

The ability to comprehend information is essential for kids to enhance their ability to solve problems. Answers to certain word problems can only be provided by someone who fully comprehends the concepts and the situation at hand. As a result, when a student attempts to solve a particular problem, they are also practicing reading comprehension. It was stressed by Roldan, Neuhaus, Boulware-Gooden, and Swank (2006) that comprehension of what one is reading and the ability to solve problems go hand in hand. Students must improve their comprehension skills in order to comprehend and apply factual knowledge that is pertinent, understandable, and thorough and that can offer multiple interpretations or solutions to a given issue.

Akashi (2016), reports that an analysis was conducted on the reading and arithmetic results of school children worldwide to determine whether any noteworthy links existed. This work made the assumption that reading comprehension has shown notable advantages in other areas of schooling, and the researchers made an effort to quantify it. Program for International Student Assessment, or PISA, data were used to gather student data from fifteen nations that varied in performance and economic background. The researchers, as well as me, when gathering my data, assumed that a higher average score corresponded to a higher level of student proficiency in a certain field. They discovered that there is a statistically significant association between reading and math scores among higher- performing nations, but they did not explain the significance of these findings. The first thought that comes to mind is that the student's reading proficiency contributed to their superior math section scores. This argument, though, might be flawed. It's highly likely that a student's association between these two results depends more on their educational history than the exam topic.

Imam and Jamil (2013), state that their poor reading comprehension abilities correlate with their math

performance. In contrast, though, private school pupils outperformed their public-school counterparts in these two categories. While students in private schools cannot be taken into account when examining the relationship between reading comprehension skills and students' performance in mathematics (Imam OA), reading comprehension skills can be linked to the performance of students in public schools. On the other hand, reading comprehension abilities did not directly correlate with students' success in mathematics as a whole, suggesting that elements unrelated to reading should be investigated in order to account for kids' subpar mathematical performance.

- Enhancing Students' Mathematical Modelling Competencies through Reading Strategy

The literature on Capraro et al. (2011), states that successful reading strategies—one type of comprehension strategy—for working on mathematical word problems are scarce, despite recent scrutiny of the usefulness of comprehension strategies. There is a connection between students' struggles with math word problems and their weak reading comprehension skills. Teachers often assume that students are already proficient readers and only focus on teaching math skills. However, there is a growing demand for teaching methods that are more sensitive to students' language abilities. Preliminary investigations have been carried out in this particular setting to ascertain the interaction between reading and the discovery of mathematical relationships. A study was done to examine methods for promoting students' comprehension strategies, specifically in the context of multi-step algebraic word problems. The study's findings indicate that the interaction of six distinct techniques helps students' cognitive

processes. Several of these six tactics prioritize assisting students in locating pertinent information and establishing significant associations among different pieces of knowledge (Prediger & Krägerloh, 2015). Nevertheless, additional study is necessary to explore the potential transferability of these findings to different mathematical contexts, particularly in the realm of mathematical modeling.

- Using a Context Clue to Strengthen Students' Reading Comprehension

The development of students' reading comprehension is one of the main goals of education. According to the study of Casinillo & Oclarit (2021) The curriculum's apparent objective is to have students construct knowledge through higher information processing and order thinking abilities (Tavera & Casinillo, 2020). Therefore, to enhance the academic success of students, pupils ought to be exposed to a specific type of instructional technique or intervention (Casinillo & Guarte, 2018; Suarez & Casinillo, 2020; Adewale, 2014).

In addition, one of the best strategies for growing and improving reading comprehension is the use of context clues, which make it easier for readers to understand unfamiliar words and expand their vocabulary (İlter, 2019; Mauliza et al., 2019; Putri & Fitrawati, 2019). Overall reading effectiveness was strongly correlated with the use of context clues (Putri & Fitrawati, 2019). Words and sentences surrounding a word that provide context and clarification on its meaning are known as context clues. It also assists the reader in deciphering unfamiliar vocabulary. According to Humes (1978), context clues include synonyms, antonyms, stated examples, contrasts, and restatements. Context clues are extremely significant because understanding and proper application result in academic achievement.

- The Impact of Teaching Context Clue Strategies on the Reading Comprehension Development

Context clues is one of the ways on how to deeper comprehend the words, or text. It is one way of recalling how much you learn and how effective learning to you. According to the study İlhan İlter from the University of Kahramanmaraş Sutcu Imam, as students’ progress and move up the grades, reading comprehension becomes more and more important, with knowledge derived from content growing in importance as a source of conceptual knowledge (Smagorinsky, Citation 2001). According to several studies (Beck, McKeown, & Kucan, Citation 2002; Silva & Cain, 2015; Paris, Carpenter, Paris, & Hamilton, Citation 2005; Wright, & Cervetti, Citation 2017), vocabulary knowledge and context clues are crucial for both connecting to a text and understanding what is read. Expansion and depth of vocabulary are good markers of comprehension of what one is reading

(Akyol, Citation2011; Rupley, Logan, & Nichols, Citation 1999).

- Scope of the Study

The purpose of this study is to improve students' reading comprehension in relation to mathematical analysis. Participants of the study were the selected seventh-grade students at a private university in Iloilo City of school year 2023–2024. They were purposely chosen as participants to ensure that they can provide the information needed to address the pre-test and post-test made by the researchers. The researchers gathered data through Zoom meeting with the participants using Google Forms regarding the reading comprehension ability of seventh-grade students in relation to mathematical analysis.

Researchers will be able to develop an intervention regarding reading comprehension in connection to mathematical analysis with the use of the information from this investigation.

- Proposed Intervention and Strategies
- Pre-Assessment: To find out the students' baseline reading comprehension abilities and degree of experience with mathematical analysis, conduct a pre-assessment.
- Teaching Clue Words: In mathematical word problems, teach students to recognize clue words that represent certain mathematical operations (e.g., "sum," "difference," "product," "quotient"), connections (e.g., "more than," "less than," "equal to"), and quantitative information (e.g., "total," "all together," "each").
- Modeling: Think-aloud and examples can be used to demonstrate how to find clue words and solve mathematical word problems.
- Scaffolded Instruction: Provide scaffolded instruction by gradually increasing the degree of independence needed to solve word problems as well as their complexity.
- Post-Assessment: To determine whether the intervention was effective in raising students' reading comprehension levels in connection to mathematical analysis, conduct a post-assessment.

III. FINDINGS

This section provides a comprehensive exploration of the results derived from the comparison and evaluation of pre-test and post-test scores among the students. The analysis encompasses various aspects, including the overall performance, individual student progress, notable improvements, and areas for further enhancement.

- Action Design

The table below (table 1), show the action design which composed of the summary of actions used in the study. To test the hypothesis, the researchers prepared an action design considering all the aspects befitting the case. After observing their class and students' performance in the classroom on a regular basis, the researchers conducted a pre-test utilizing a set of questionnaires. Following that, the data were examined, and the researcher developed a lesson to be discussed for a week using clue word approach to improve students' understanding of the topic and other associated features. Afterwards, to assess the method's effectiveness, a post-test was carried out using a different set of questionnaires relevant to the lessons taught.

Table 1. Actions Utilized in the Study

No.	Time Duration	Plan of Work	Expected Tools
1	One week	Observing the class and performance of students inside the classroom	Checking the copies of the students
2	One day	Pre-test	Questionnaire
3	One week	Class discussion	Using Clue Word Approach
4	One day	Post-test	Questionnaire

- Data Collection and Analysis

Pre-Test

At the beginning of the procedure of the action research, to collect data, a pre-test was conducted on the two sections of Grade 7 students at Central Philippine University Junior High School. The

researchers prepared a set of questionnaires composing of word problems. Then the researchers checked and made a list of their scores obtained on the test. After checking and observing the pre-test result, it appears that the respondents are indeed having difficulty understanding mathematical word problems.

Table 2.
Pre-test Result of the Students

No. of Students	Highest Possible Score	Score Obtained
1	20	8
2	20	3
3	20	2
4	20	1
5	20	20
6	20	7
7	20	12
8	20	3
9	20	6
10	20	13
11	20	16
12	20	15
13	20	2
14	20	15
15	20	1
16	20	5
17	20	15
18	20	12
19	20	1
20	20	4
21	20	14
22	20	16
23	20	13
24	20	16
25	20	12
26	20	14
27	20	1
28	20	5
29	20	14
30	20	12
31	20	3
32	20	10
33	20	8
34	20	11
35	20	1
γ = 8.89*	$p - value$ = 5.743*	

- Post-Test

After taking the pre-test of the students and after conducting the one-week remedial class discussion, the researchers gave a post-test on the same respondents to check the improvement of the students with a different set of questionnaires. The results of the post- test reveal that the respondent's comprehension of mathematical word problems has improved since the initial test was administered.

Table 3.
Post-test Result of the Students

No. of Students	Highest Possible Score	Score Obtained
1	20	18
2	20	7
3	20	10
4	20	6
5	20	20
6	20	11
7	20	19
8	20	10
9	20	16
10	20	15
11	20	20
12	20	20
13	20	20
14	20	20
15	20	5
16	20	19
17	20	20
18	20	12
19	20	3
20	20	20
21	20	20
22	20	20
23	20	20
24	20	20
25	20	15
26	20	20
27	20	15
28	20	20
29	20	20
30	20	20
31	20	20
32	20	13
33	20	20
34	20	20

35	20	20

γ = 16.40* $p - value$ = 5.192*

- Comparison of Pre-Test and Post-Test Result

Table 4 shows the comparison of the pre-test and post-test results of 35 students to measure their improvement. Each student is listed with their scores before (pre-test) and after (post-test) a period of instruction or intervention. The results reveal that most students demonstrated significant improvements in their scores from the pre-test to the post-test.

Notably, several students reached the highest possible score of 20 in the post-test, reflecting outstanding progress. However, two students, Student 5 and Student 18, showed no change in their scores. Student 5 consistently maintained a perfect score of 20, while Student 18 remained at a score of 12.

Remarkable improvements were observed in some cases, such as Student 13 and Student 35. Both students initially had very low pre-test scores (2 and 1, respectively) but managed to achieve perfect post-test scores of 20, highlighting the effectiveness of the instructional methods.

Overall, this indicates a positive outcome, with nearly all students showing increased scores, underscoring the success of the educational intervention or teaching strategies applied.

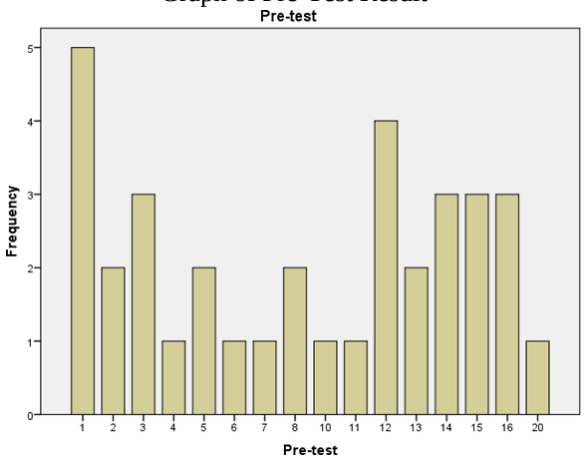
Table 4.
Comparison of Pre-Test and Post-Test Result

No. of Students	Pre-test	Post-test
1	8	18
2	3	7
3	2	10
4	1	6
5	20	20
6	7	11
7	12	19
8	3	10
9	6	16
10	13	15
11	16	20
12	15	20
13	2	20
14	15	20
15	1	5
16	5	19
17	15	20
18	12	12
19	1	3
20	4	20
21	14	20
22	16	20
23	13	20
24	16	20
25	12	15
26	14	20
27	1	15
28	5	20
29	14	20
30	12	20
31	3	20
32	10	13
33	8	20
34	11	20
35	1	20

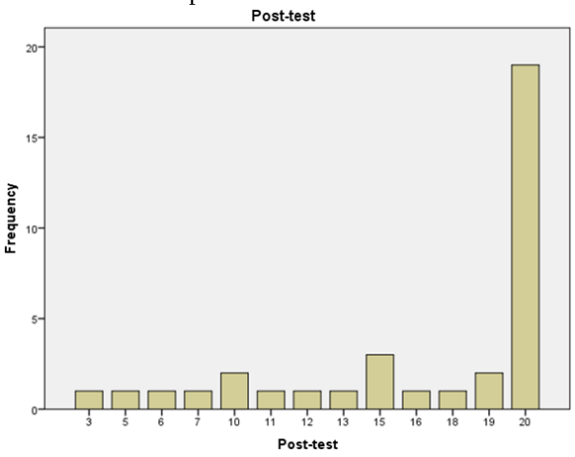
γ = -7.514* $p - value$ = 5.147*

Graphical Analysis Graph 1.

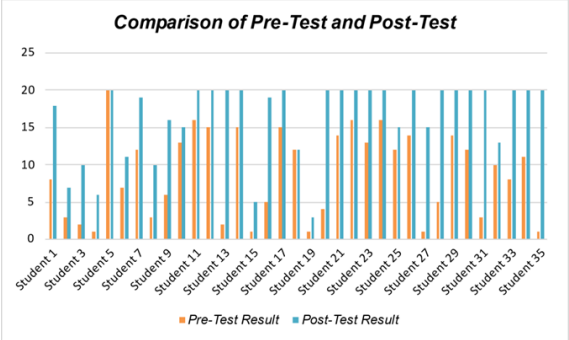
Graph of Pre-Test Result



Graph 2.
Graph of Post-Test Result



Graph 3.
Graph of Comparison of Pre-Test and Post-Test Result



The data from the pre-test and the post-test was analyzed to draw a conclusion. In the pre-test, thirty-five (35) students from two (2) sections of Grade 7 students of the Central Philippine University Junior High School took the test, out of which eighteen (18) students scored less than or equal to 10 ($n \leq 10$) and seventeen (17) students scored more than 10 ($n > 10$). While in the post-test, the number of students taking the exam was the same as in the pre-test: six (6) students scored less than or equal to 10 ($n \leq 10$), and twenty-nine (29) students scored more than 10 ($n > 10$). In the post-test, the majority of the students performed better than in the pre-test. The mean value of the pre-test is 8.89, and the mean value of the post-test is 16.40. The mean difference between the pre-test and post-test is 7.514.

- Strategies Implemented

After observing the performance of the students in the pre-test, the researchers applied a different approach, specifically applying clue words while teaching mathematical word problems in the class, since the students are dealing with poor comprehension in math class, especially if the topic is about work problems. Thus, the researchers conducted an intervention that involved applying a clue word approach in discussing such topics.

- Applying Clue Words in Class Discussion

The researchers focused on familiarizing students with mathematical clue words or terms that indicate specific mathematical operations (e.g., "sum," "difference," "product," "quotient"), relationships (e.g., "more than," "less than," "equal to"), and quantitative information (e.g., "total," "all together," "each"). Moreover, the researchers provided students with plenty of seatwork and activities related to the lesson discussed, as well as giving them encouragement and feedback on their work.

- Proposed Solution

When looking at the pre-test and post-test scores, it was found that most students have made notable progress and reached a satisfactory level of comprehension. This advancement demonstrates the efficiency of the teaching approach utilized by the researchers.

Nevertheless, prolonging the remedial courses for more weeks could enhance these outcomes even more. Additional time would permit students to enhance their understanding, address any remaining knowledge gaps, and fully practice newly learned skills.

The research highlights the significance of offering students sufficient support and new teaching techniques to assist them in overcoming their misunderstandings and worries. Specifically, the researchers have had great success utilizing clue words in the teaching and learning process. Clue words help students explore and solve mathematical word problems by providing important keywords and phrases, thus enhancing their problem-solving skills and understanding.

Enhancing the application and refinement of strategies will lead to an improved discussion and comprehension of mathematical word problems. The effectiveness of these methods demonstrates their ability to be consistently applied in the classroom to improve students' understanding and achievement in mathematics

CONCLUSION

This section provides a comprehensive overview of the study, which is then followed by concise outcomes and their corresponding implications. The researcher's further recommendations come after this.

- Outcomes

This action research investigated the impact of "clue word identification" on improving students' reading comprehension in relation to mathematical analysis.

The comparison of pre-test and post-test scores indicated significant improvements. Based on the results and discussion presented in the previous chapter, the following outcomes are:

1. When it comes to the improvement of scores, pre-test results showed a mean score of 8.89, while post-test results showed a mean score of 16.40, with a mean difference of 7.514. This substantial increase reflects the effectiveness of the intervention.
2. When it comes to high achievement, several students achieved the highest possible score of 20 in the post-test, with notable improvements seen in students who initially had very low scores. For example, Student 13 and Student 35 improved from pre-test scores of 2 and 1, respectively, to perfect post-test scores of 20.
3. When it comes to consistency in performance, while most students showed improvement, Student 5 maintained a perfect score across both tests, indicating consistently high performance. Student 18, however, showed no improvement, suggesting the need for further individual support.

- Implications

In schools, teachers are always looking for better ways to help students learn. In this study, the researchers find that one strategy that has demonstrated efficacy is clue word identification, especially for improving students' comprehension and problem-solving skills in mathematical analysis. From the findings, the researcher produced the following implications:

1. The clue word identification, which involves teaching students to recognize key mathematical terms and phrases, is evidently effective in enhancing comprehension and problem-solving skills in mathematical word problems.
2. The improvement in scores suggests that students were more engaged and better able to understand and solve mathematical problems through this clue word identification.
3. The success of this intervention implies that incorporating similar strategies into regular curriculum could benefit students, particularly those struggling with math comprehension. It can also benefit the teachers in delivery of instructions and assessment.
4. Schools might consider allocating more resources and time to training teachers in these effective methods to further improve student outcomes across various subjects.

- Further Recommendations

Based on the findings and the implications drawn from the study, the following recommendations are given:

1. Extending the duration of the intervention beyond an hour of classes could provide students with more opportunities to practice and consolidate their understanding, potentially leading to even greater improvements in performance.
2. Identifying students who do not show significant improvement (like Student 18) and providing them with additional, tailored support could help address specific learning challenges.
3. Implementing regular assessments using both pre-tests and post-tests can help track student progress and the effectiveness of different teaching strategies over time.
4. Providing ongoing professional development for teachers on the clue word identification and other innovative teaching methods can enhance their instructional skills and benefit students across different learning areas.
5. Engaging parents in the educational process by informing them about the strategies being used and how they can support their children at home could further reinforce learning and comprehension.

6. Integrating clue word identification and other similar strategies into the standard curriculum, particularly for subjects that require strong comprehension and problem- solving skills, could be beneficial. This is also beneficial and can co-relate in other subject areas.
7. Encouraging group work and peer-teaching can help students learn from each other and improve their understanding of mathematical concepts through collaborative problem-solving.
8. Conducting additional research to explore the long-term effects of the clue word identification on student performance and expanding the study to include more subjects and diverse student groups could provide deeper insights and broader applicability of the findings.

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