ENHANCING PROBLEM-SOLVING SKILLS IN MATHEMATICS AMONG GRADE 4 LEARNERS: IMPLEMENTING THE A.C.T.S (ANALYZE, CLUE HUNT, TRANSLATE, AND SOLVE) STRATEGY WITH INTERACTIVE ACTIVITIES

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ABSTRACT

This action research aimed to enhance the problem-solving skills of Grade 4 students at Clementa F. Royo Elementary School through the implementation of the A.C.T.S (Analyze, Clue Hunt, Translate, Solve) Strategy. The study addressed the common difficulty students face in solving mathematical word problems by providing a structured approach to problem-solving. A total of 25 students identified as having low problem-solving skills participated in a three-week intervention involving interactive activities aligned with the A.C.T.S framework. The procedure involved three phases: a pre-test to assess baseline skills using the Oklahoma School Testing Program (OSTP), implementation of the A.C.T.S Strategy through targeted activities, and a post-test to evaluate learning outcomes. Data were analyzed using descriptive statistics and paired sample t-tests to measure the effectiveness of the intervention. Results indicated a substantial improvement in problem-solving skills, with the average score increasing from 35.2% to 70.5% after the intervention. A paired t-test revealed a statistically significant difference between the pre- and post-intervention scores, t (24) = 30.90, $p < 0.001$, indicating a large effect size (Cohen's d = 6.19). Qualitative data from student interviews revealed that the A.C.T.S Strategy not only improved problem-solving skills but also reduced math anxiety and increased confidence. The findings suggest that the A.C.T.S Strategy is an effective instructional approach for enhancing problem-solving skills in mathematics. It is recommended for broader implementation in math instruction, with additional focus on integrating individual tasks and interactive activities to sustain student engagement and learning outcomes.

Keywords: *problem-solving, A.C.T.S Strategy, Mathematics, quantitative-descriptive, Philippines*

INTRODUCTION

Mathematics can be applied to represent, evaluate, and solve real-world problems, helping learners better understand a world full of challenges that require adding, subtracting, multiplying, dividing, and recognizing life connections. However, many students in public schools struggle with problem-solving in Math, as shown by local and national achievement exam results—some even stall completely because they fail to understand the problems themselves. Supporting this, Fitri (2023) found that specially developed strategies and techniques significantly enhance students' problem-solving abilities compared to conventional methods. Similarly, Suparman (2024) emphasized that dynamic, discovery-based learning tools promote active engagement and critical thinking, which in turn boost mathematical problem-solving skills. Uyandiran and Tarim (2024) further showed that student-centered techniques

are more effective than traditional teaching approaches. These findings collectively underscore the critical need to continually invent and refine teaching techniques to better equip students with the skills required to tackle mathematical problems confidently and competently.

Across various countries, students face persistent challenges with higher-order thinking tasks in mathematics, such as analyzing problems, selecting appropriate strategies, and applying logical reasoning. In Thailand, traditional teaching methods that prioritize rote memorization, limited access to engaging instructional materials, and few opportunities for real-life or problem-based learning hinder conceptual understanding (Yaowiwat et al., 2024). Similarly, in Turkey, students often guess answers when unable to comprehend a problem, struggling to identify necessary assumptions, essential information, and key terms—barriers that impede translating problems into mathematical expressions (Amaliya et al., 2024). Moreover, Lariviere et al. (2025) revealed that in the United States, difficulties in reading comprehension and limited vocabulary, both general and math-specific, prevent students from accurately interpreting word problems. This lack of clarity leads to guessing, procedural errors, and reduced confidence.

Across various regions in the Philippines, Grade 4 students face notable challenges in solving mathematical word problems, often rooted in both comprehension and foundational skill gaps. In Cateel, Davao Oriental, learners at San Rafael Integrated School struggle to identify key details within problem statements, making it difficult to determine the required operations and develop effective solution plans (Linaza et al., 2025). Similarly, in Zamboanga City, students at Western Mindanao State University Integrated Laboratory School encounter difficulties due to poor reading comprehension. Even with basic math skills, they often misunderstand problem contexts and instructions, which hampers their ability to solve multi-step problems accurately (Luna et al., 2024). Likewise, Matibag et al., (2023), showed that at Mataas na Lupa Elementary School in Taysan, Batangas, limited mastery of fundamental math skills—such as multiplication, sequencing, and number ordering—combined with poor comprehension of word problem statements, leads to confusion in identifying relevant information and applying appropriate operations.

In the Division of Davao del Norte, specifically at Clementa F. Royo Elementary School, classroom observations and assessment results provide concrete evidence that a significant number of pupils struggle with solving mathematical word problems. This difficulty is closely linked to poor reading comprehension, which hampers their ability to understand problem statements, identify key information, and select appropriate operations. Without a clear grasp of the problem, students often resort to guessing rather than applying structured problem-solving strategies. This trial-and-error approach fosters impatience and frustration, leading many to avoid reading mathematical problems altogether. Over time, this pattern not only undermines their problem-solving skills but also diminishes their confidence and interest in mathematics, as reflected in declining performance and engagement levels during math activities. These issues highlight a concrete and pressing need for targeted interventions that strengthen both comprehension and mathematical reasoning among learners.

This concerning situation prompted the researchers to conduct the present study. As future educators, it is essential for them to identify and implement appropriate interventions that address students' difficulties in mathematical problem-solving—an often challenging yet vital component of mathematics instruction. This study is significant because problem-solving is not only a core skill in mathematics but also a critical thinking tool that supports learners in understanding and applying mathematical concepts in real-life situations. Strong problem-solving skills enable students to approach tasks with logic, creativity, and confidence, thereby improving their overall mathematical performance. In light of this, action research becomes necessary to explore effective, research-based strategies that can enhance learners' problem-solving abilities. Such strategies have been shown to yield better outcomes compared to traditional teaching methods, as they provide structured, student-centered approaches that actively engage learners in the problem-solving process.

In relation to this research, several existing studies have explored factors influencing students' mathematical problem-solving abilities. For instance, Nahdi et al. (2023), in their study “Mathematics Interest and Reading Comprehension as Correlates of Elementary Students’ Mathematics Problem-Solving Skills,” revealed a strong positive relationship between students' reading comprehension, particularly their understanding of math-specific terms, and their ability to solve mathematical problems. Similarly, Lin (2020), in “Investigating the Unique Predictors of Word-Problem Solving Using Meta-Analytic Structural Equation Modeling,” found that a strong mathematics vocabulary significantly influences students' ability to accurately interpret and solve word problems. Joshi et al. (2022), in “Mathematical Word Problem Solver System Using Deep Learning,” focused on developing a system to solve arithmetic single-operation word problems for elementary students using deep learning techniques. However, despite these valuable insights, current literature remains heavily centered on factors such as vocabulary, reading comprehension, and technology-based solutions, with limited attention given to the direct enhancement of problem-solving skills through strategic instructional interventions, particularly for Grade 4 learners. Addressing this gap is crucial, especially given ongoing concerns about elementary learners' performance in Mathematics. Therefore, this study seeks to contribute meaningfully to the existing literature by emphasizing the development and application of targeted techniques aimed at strengthening problem-solving skills, ultimately enhancing overall academic success for Grade 4 learners.

Research Questions

The research questions below investigated the reasons on how to address poor problem-solving skills on Elementary learners. Oklahoma School Testing Program (OSTP) Tool was an intervention for the learners to address this problem. The research questions that guided this study were the following:

1. What is the level of students’ problem-solving skills before the A.C.T.S Strategy intervention on the mathematical performance of the elementary grade pupils?
2. What is the level of students’ problem-solving skills after the A.C.T.S Strategy intervention on the mathematical performance of the elementary grade pupils?
3. What was the quantitative difference in elementary students' problem-solving skills before and after the intervention?
4. What are the insights of the students about A.C.T.S Strategy as an intervention in enhancing their problem-solving skills in mathematics?

Proposed Intervention/Action Plan

To address the low performance in mathematical problem-solving among Grade 4 learners, a structured intervention using the A.C.T.S. Strategy—Analyze, Clue Hunt, Translate, and Solve—was developed and implemented. This three-week action plan, aligned with the learners’ National Mathematics Program (NMP) schedule from Monday to Thursday, aimed to improve comprehension, analytical thinking, and procedural fluency through interactive and learner-centered activities. The strategy emphasized guided instruction and collaboration, allowing students to engage meaningfully with each step of the problem-solving process.

The intervention began with the Introduction Phase in Week 1. On Day 1, a pre-test was administered to assess students’ baseline skills in solving mathematical word problems. This initial diagnostic assessment, based on the Oklahoma School Testing Program (OSTP), measured their ability to interpret, analyze, and solve problems, serving as a benchmark for evaluating the impact of the intervention.

The Implementation Phase, carried out during Week 2 (Days 2 to 11), aimed to develop students’ proficiency in each component of the A.C.T.S. Strategy—Analyze, Clue Hunt, Translate, and Solve. Each step was systematically introduced and reinforced through targeted, interactive lessons. Students began by identifying critical details within word problems to build comprehension.

They then practiced recognizing clue words and associating them with the appropriate mathematical operations. This foundation enabled them to construct accurate number sentences, which they further developed by translating short word problems into equations. These scaffolded activities ensured gradual mastery of each component before progressing to the next. On Day 10, students applied the complete A.C.T.S. sequence in a cumulative problem-solving task to consolidate their understanding. Day 11 focused on review and post-assessment preparation, ensuring students were equipped to independently apply the strategy.

In the Assessment Phase on Week 3 (Day 12), a post-test was administered to evaluate the effectiveness of the intervention. This was followed by reflection sessions in which students discussed how the A.C.T.S. Strategy helped improve their mathematical thinking and problem-solving abilities.

Phase	Time Frame	Objective	Activities/Details
Introduction Phase	Week 1 (Day1)	Conduct baseline assessment	**Day 1:** Pre-Test
Implementation Phase	Week 2 (Day 2 – 11)	Build proficiency in ACTS Strategy	**Day 2:** Introduce Step 1: Analyze **Day 3:** Practice “Analyze” **Day 4:** Introduce Step 2: Clue Hunt **Day 5:** Practice “Clue Hunt” **Day 6:** Introduce Step 3: Translate **Day 7:** Practice “Translate” **Day 8:** Introduce Step 4: Solve **Day 9:** Practice “Solve” **Day 10:** Combine All Steps **Day 11:** Review & prepare
Assessment Phase	Week 3 (Day 12)	Evaluate impact and reflect	**Day 12:** Post-Test

METHODOLOGY

Research Design

This study utilized a quantitative-descriptive method. This approach produces both qualitative and quantitative data that characterize the current state of a situation at a specific moment in time. It is a planned and organized way of finding out facts and clearly explaining what was discovered. It is helpful for studying current situations, common practices, or things that are happening (Siedlecki, 2020). Using a quantitative-descriptive method along with interviews provides a well-rounded approach to research by capturing both measurable data and deeper insights. The quantitative part lets the researchers objectively measure and analyze data on problem-solving skills. Meanwhile, the interviews offered insights into the experiences and feelings of students. By blending these methods, the researchers get a fuller, more reliable picture of the challenges and successes in improving spelling skills

Research Participants

The respondents of this study were the Grade 4 pupils as classroom observations and assessment results at Clementa F. Royo Elementary School revealed that a significant number of pupils at this grade level struggle with solving mathematical word problems. 25 students were purposively selected as participants in this study in which it is based on their pre-test scores. This study included 9–10-year-old students from Clementa. The intervention focused solely on enhancing problem solving skills in

Mathematics using A.C.T.S strategy, appropriate for the participants grade level. The researchers specifically selected Grade 4 pupils, to improve their understanding and problem-solving skills in mathematics as they are particularly prone to challenges in transitioning to higher grade level. The research aims to enhance students' comprehension skills in solving Mathematics problem. By the end of the study, students should improve their problem-solving skills and be able to understand problem statements using the A.C.T.S strategy approach.

Data Collection

The researchers followed the subsequent procedures when collecting the data in order to get the information required for the investigation.

The researchers used the Oklahoma School Testing Program (OSTP) Tool to assess learners' level of problem-solving skills before and after the implementation of A.C.T.S strategy. The test consisted of word problems with items, recall and reproduction level, and skills and concepts level. Moreover, the researchers sought validation of the questionnaire from experts or a panel well-versed in questionnaire development to ensure its validity and reliability.

Before starting the study, the researchers sent a request to the principal of the school where the participants were enrolled. Then, the researchers administered a pretest using the OSTP tool to determine the participants' initial problem-solving levels. Following the pretest, A.C.T.S strategy was introduced, followed by a three-weeks intervention period. At the end of the research process, a posttest was conducted using the same tool to evaluate any improvements in the participants' problem-solving levels after the intervention. The data from the pretest and posttest were then collected and tabulated.

In assessing problem-solving skills for the total score, the following criteria by Sinaga et al. (2023) were used:

Table 1. *Range of Percentage Score*

Range of Percentage Score	***Descriptive Level***	***Interpretation***
90-100	Very High	If the measures described in the mathematical problem-solving skills of the students is outstanding.
80-89	High	If the measures described in the mathematical problem-solving skills of the students is very satisfactory.
65-79	Average	If the measures described in the mathematical problem-solving skills of the students is satisfactory.
55-64	Low	If the measures described in the mathematical problem-solving skills of the students is fairly satisfactory.
0-54	Very Low	If the measures described in the mathematical problem-solving skills of the students did not meet the expectation.

Statistical Tool

To analyze the data effectively, appropriate statistical tools were employed to ensure the accuracy and reliability of the results.

Mean. The mean, or average, was computed by dividing the total scores of the students in both the pretest and post-test by the number of respondents. This measure was used to assess the students' performance levels prior to and following the implementation of the intervention, providing a clear picture

of any improvements or changes in academic achievement.

Standard Deviation. Standard deviation measures how spread-out values are in a dataset. A low value means data points are close to the mean, while a high value indicates greater variability. It's used to assess the consistency of results and is calculated as the square root of the variance (Field, 2013). In this study, the paired t-test was used to assess how consistently students performed before and after the intervention. It provided context for interpreting the observed changes in mean scores and effect size by determining whether these differences were statistically significant. This helped establish whether the improvement in performance was likely due to the intervention rather than random variation.

Paired t-test. Also referred to as a dependent or correlated t-test, this statistical method is widely used to compare the means of two related groups (Gleichmann, 2020). It is particularly suitable for research designs that involve measuring the same group before and after an intervention, such as pretest and post-test setups. In this study, the paired t-test was utilized to determine whether the observed difference between the average scores of the pretest and post-test was statistically significant. This analysis helped verify whether the changes in student performance were meaningful or simply occurred by chance. By examining the relationship between the two sets of scores, the paired t-test served as a vital tool in evaluating the effectiveness of the intervention and measuring its impact on student learning outcomes.

Cohen's d. Is a statistical measure of effect size that expresses the difference between two group means in standard deviation units, indicating the magnitude of an intervention's impact (Cohen, 1988). In this study, Cohen's d was used to assess the practical significance of the improvement in problem-solving skills after the intervention, revealing a large effect size.

Data Analysis

In analyzing the data, the researchers tabulated the raw scores of the students from both pre-test and post-test. Afterwards, the overall mean was calculated to reveal the level of students' problem-solving skills before and after the implementation of the intervention.

In addition to quantitative analysis, qualitative data from in-depth interviews were systematically analyzed to provide a nuanced understanding of the intervention's impact. The process began with coding of the interview transcripts to identify meaningful segments related to students' experiences. This was followed by data reduction, wherein similar codes were grouped to form coherent categories, allowing for clearer interpretation of patterns. Using thematic analysis, these categories were further refined into key themes that captured students' perspectives on the A.C.T.S Strategy. The analysis revealed rich insights into the strategy's effectiveness in enhancing problem-solving skills, its perceived benefits in fostering engagement and comprehension, and students' constructive suggestions for further improvement.

RESULTS AND DISCUSSIONS

This section presents the findings and elaboration of results of the A.C.T.S strategy for enhancing the problem-solving skills among grade 4 pupils of Clementa F. Royo Elementary School. This section of the study presents the data gathered by the researchers, which was meticulously organized, presented, analyzed, and interpreted to achieve a comprehensive understanding of the collected information.

Research Question No.1: What is the level of students' problem-solving skills before the A.C.T.S Strategy intervention on the mathematical performance of the elementary grade pupils?

The Table 2 shows the pre-test data on the problem-solving skills of grade 4 learners. There were 25 participants for the A.C.T.S Strategy implementation. It revealed that it has a standard deviation of 11.1, and an average percentage score of 35.2% indicating very low performance by the pupils in pre-test. The highest score achieved was 60, achieved by 1 student, while the lowest score is 15, also achieve by 1 student. The most frequent score was 25 and 35, with a frequency of 5.

Table 2. *Frequency of the Pre-Test Scores*

Pre-Test Score	***Frequency***	***Percentage***
15	1	4.0%
20	1	4.0%
25	5	20.0%
30	4	16.0%
35	5	20.0%
40	3	12.0%
45	2	8.0%
50	2	8.0%
55	1	4.0%
60	1	4.0%
Total	25	100%
Average Percentage Score (%)		35.2%
Standard Deviation		11.1
Description		Very Low

To support the findings, Maghfiroh and Wahuningsih (2024) stated that students frequently struggle with understanding and solving word problems due to various challenges, such as limited conceptual understanding, weak operational skills, and difficulties navigating the overall problem-solving process. These challenges often lead to confusion, errors in computation, and a lack of confidence when approaching mathematical tasks. Such difficulties highlight the ongoing need to strengthen students' mathematical problem-solving abilities. Therefore, the authors recommend the implementation of more structured, step-by-step problem-solving strategies in the classroom. These approaches can provide students with a clear framework to follow, enhance their logical thinking, and improve their ability to break down complex problems into manageable steps, ultimately leading to better learning outcomes.

Moreover, the study conducted by Syaf et al. (2024) reveals that students encounter challenges specifically in comprehending the problem and determining suitable operations and strategies to apply. These struggles are often rooted in several interconnected factors, including a lack of deep conceptual understanding, frequent errors in performing accurate calculations, and an underdeveloped habit of critically evaluating their final answers. Such issues not only hinder students' ability to solve problems effectively but also limit their capacity to reflect on and learn from their problem-solving experiences. The findings underscore the urgent need for a more structured and intentional instructional approach that emphasizes scaffolding, metacognitive awareness, and consistent strategy use.

Likewise, Kusumadewi and Retnawati (2020) found that elementary students frequently faced difficulties in several key areas of problem-solving: comprehending problem statements, selecting appropriate strategies, and executing the necessary steps accurately. These challenges were largely attributed to a weak foundation in conceptual understanding and a lack of sufficient guided practice. Their study emphasized that without a strong grasp of underlying mathematical concepts, students struggle to apply logical reasoning and make connections between problems and solutions. As a result, the researchers highlighted the importance of reinforcing conceptual knowledge and consistently integrating problem-solving strategies into daily instruction to help students develop both confidence and competence in mathematics.

Research Question No.2: What is the level of students' problem-solving skills after the A.C.T.S Strategy intervention on the mathematical performance of the elementary grade pupils?

Table 3 shows the post-test on the problem-solving skills of grade 4 learners. 25 students participated in A.C.T.S Strategy implementation. It revealed that it has a standard deviation of 7.81, and an average percentage score of 70.52% indicating a high performance by the pupils in post-test. The highest score achieved was 90, achieved by 1 student, while the lowest is 58 by 1 student. The most frequent score was 65 and 70, with a frequency of 4.

Table 3. *Frequency of the Post-Test Scores*

Post-Test Score	***Frequency***	***Percentage***
58	1	4.0%
60	2	8.0%
64	1	4.0%
65	4	16.0%
67	1	4.0%
68	3	12.0%
70	4	16.0%
73	2	8.0%
75	1	4.0%
76	1	4.0%
78	1	4.0%
80	2	8.0%
85	1	4.0%
90	1	4.0%
Total	25	100%
Average Percentage Score (%)		70.52%
Standard Deviation		7.81
Description		Average

To support the findings, there are previous and recent research regarding mathematical problem-solving. One case is the study of Febrianti et al. (2023) on the relationship between learning activities and mathematical problem-solving abilities in elementary school. The result showed that there is a positive and direct correlation between student engagement in learning activities and their problem-solving abilities. This means that the more actively students participate in learning, the better they become at solving problems. Conversely, when students are not fully engaged in learning tasks, their capacity to tackle and resolve problems tends to decline.

Similarly, according to a study by Sambo and Makgakga (2024), students can become more interested in solving problems if they get the right help and support. With time and practice, they can learn how to solve real-life problems on their own. Teaching them to find key information and important words in a problem makes it easier for them to understand the question. Using pictures also helps them see what the problem is about. These steps make students feel more comfortable with solving math questions.

Further, Yosa et al. (2022) emphasized that a significant number of students perceive mathematical word problems as difficult, often resulting in reduced interest and engagement in mathematics learning. However, their study highlights that the implementation of effective coping strategies, such as modeling problem-solving steps demonstrated by the teacher, can significantly improve students' participation. When guided through structured approaches, students tend to become more confident and actively involved in tackling mathematical word problems.

Research Question No.3: What was the quantitative difference in elementary students' problem-solving skills before and after the intervention?

Table 4. *Significant Difference Between the Pre-Test and Post-Test Scores*

Type of Test	*N*	*Mean*	*SD*	*t-value*	*P-value*	*Mean difference*	*SE difference*	*Cohen's d*	*Decision α=0.05*
Pre-Test	25	35.2	11.1	30.9	<.001	11.1	1.14	6.19	Significant
Post-Test	25	70.5	7.81			7.81			

A paired-samples t-test was conducted to compare pre-test and post-test scores. Results showed a statistically significant difference between the two conditions, t (24) = 30.90, p <.001, d = 6.19. Since the p-value was well below the significance level of α = 0.05, the null hypothesis was rejected. The effect size (d = 6.19) indicates an extremely large effect, suggesting that the intervention had a substantial impact on learners' performance. These findings highlight the effectiveness of the A.C.T.S Strategy in

significantly improving students' problem-solving abilities.

Furthermore, Fülöp (2021) confirms that integrating problem-solving strategies into math instruction enhances student performance. The study shows that consistent exposure to structured approaches, such as those offered by A.C.T.S Strategy intervention, they not only perform better academically but also develop stronger critical thinking abilities, greater perseverance, and a more positive attitude toward mathematics as a whole.

Additionally, the study's findings align with Febrianti et al. (2023), who highlight a strong link between the nature of learning activities and students' mathematical problem-solving abilities. Their research suggests that active engagement through exploration, collaboration, and critical thinking significantly enhances students' capacity to analyze and solve problems. Strategies like A.C.T.S., which foster active participation and structured learning, further support this, emphasizing that dynamic, student-centered approaches are key to developing higher-order thinking skills essential for effective problem-solving.

Similarly, Porwokerto et al. (2023) highlight that an interactive approach enhances critical thinking by encouraging students to explore problems from multiple angles rather than relying on memorization. Its interactive nature strengthens reasoning skills, reduces anxiety, and fosters a more engaging, student-friendly environment. This method supports diverse learning styles, promotes collaboration, and offers immediate feedback, helping learners reflect and improve their strategies in real time.

Research Question No.4: What are the insights of the students about A.C.T.S Strategy as an intervention in enhancing their problem-solving skills in mathematics?

To answer this research question, in-depth interviews were conducted with the participants. Probing questions were asked to elicit their responses regarding their insights about the A.C.T.S Strategy as an intervention in enhancing their problem-solving skills in mathematics. The major themes and supporting statements are presented in Table 5. Participants shared their responses about their own experiences and observation of the intervention. From the answers of the participants, five major themes emerged: (1) enhanced understanding of math problems; (2) structured approach for problem solving; (3) increased confidence and reduced math anxiety; (4) improved analytical and operational skills; and (5) learner-centered pedagogical improvements.

Table 3. *Themes and Supporting Statements on the insights of the students about A.C.T.S Strategy as an intervention in enhancing their problem-solving skills in mathematics*

Emerging themes	***Sample statements***
Enhanced Understanding of Math Problems	✓ The ACTS strategy helped me understand how to answer the questions." – IDI-01 ✓ "It is easier for me to understand the problem now because I know what to do first and next." – IDI-02 ✓ "The ACTS strategy helped me because I now know how to solve the problem and understand it better." – IDI-03 ✓ "It helps, teacher. Before, it was hard, but now it is easy because of the strategy." – IDI-06 ✓ "Using the ACTS strategy really helped me understand the problems in Math better." – IDI-01

Structured Approach for Problem-Solving	✓ "I learned the correct way to solve math problems because before, I would just guess. Now, there is a step-by-step process." – IDI-04 ✓ "It is easier for me to answer now because there is step-by-step process." – IDI-07 ✓ "I like it more because there is a step-by-step guide." – IDI-07 ✓ "If I solve math, I use the step-by-step method, the ACTS." – IDI-05 ✓ "Before, we had a hard time answering, but now I enjoy solving math problems." – IDI-06
Increased Confidence and Reduced Math Anxiety	✓ "I am not shy anymore, because I have the ACTS. I know what to do now." – IDI-01 ✓ "I am not afraid to answer anymore because I now know how to solve it." – IDI-02 ✓ "I know how to answer now." – IDI-03 ✓ "I am not shy to raise my hand to answer because I know how to solve it using the strategy." – IDI-05 ✓ "Before, we are shy to answer. But now, I like to participate and answer." – IDI-06 ✓ "I am not shy anymore because there is a strategy." – IDI-07 ✓ "Before, I was scared of Math, but now I like it. It is easier to understand." – IDI-03 ✓ "I like it now. I do not get confused anymore." – IDI-04
Improved Analytical and Operational Skills	✓ "I know how to analyze the situation and look at all the possible solutions." – IDI-02 ✓ "We use it. It helps us analyze the given information and choose the right operations." – IDI-04 ✓ "When we answer math now, we can solve it quickly because we already know what operation to use." – IDI-06 ✓ "The ACTS strategy is used to better understand which operation to use." – IDI-07 ✓ "Because of this strategy, I now understand better which operation to use." – IDI-04
Learner-Centered Pedagogical Improvements	✓ "I hope videos will be used more so we kids can understand better." – IDI-01 ✓ "I hope you tell us about our performance right away." – IDI-02 ✓ "Add more fun games or activities." – IDI-03 ✓ "I suggest that the question be made shorter because we usually feel tired." – IDI-04 ✓ "I hope there will be more individual activity because in a group, some just rely on the leader." – IDI-05 ✓ "More individual activity because some in the group activity rely on the leader." – IDI-06 ✓ "I suggest, teacher, not to make the numbers in the problem bigger." – IDI-07

First, the intervention was found to significantly enhance learners' understanding of mathematical concepts. Through structured guidance and scaffolded activities, students were better able to comprehend problem statements and apply appropriate strategies. This finding aligns with Serin (2023), who emphasizes the importance of personalized teaching approaches in addressing learners' diverse needs—particularly in mathematics, where students often encounter varying levels of difficulty with abstract concepts. Similarly, Yosa et al. (2022) highlight that implementing effective strategies in the

mathematics classroom helps demystify complex tasks, enabling students to develop deeper conceptual understanding and build confidence in their problem-solving abilities.

Second, the study revealed that the intervention equipped learners with a more structured and organized approach to problem-solving. Students moved away from guesswork and began to use clear, systematic steps supported by guided practice. This result supports Szabo et al. (2020), who assert that teaching mathematical problem-solving strategies not only strengthens 21st-century skills but also fosters meaningful, cross-curricular learning grounded in real-world contexts. By engaging students in structured methods for tackling problems, they develop a strategic mindset, learning how to analyze, plan, and execute solutions. In addition, Syaf (2024) underscores the value of structured yet adaptive learning approaches, emphasizing that targeted exercises help students improve their planning, evaluation, and execution skills in problem-solving tasks.

Third, the intervention had a substantial positive impact on learners' self-confidence and significantly reduced their math anxiety. Through consistent exposure to structured support and guided practice, students began to view mathematics as less intimidating and more approachable. This shift in mindset is supported by Palmer (2020), who emphasizes that structured support and scaffolded activities boost students' self-confidence and resilience in mathematics. Furthermore, Pizzie and Kraemer (2023) demonstrate that interventions focusing on structured study strategies not only help reduce math anxiety but also enhance comprehension and promote overall academic success in mathematics.

Fourth, the findings indicated that the intervention improved the learners' analytical and operational skills. Students showed improved abilities to analyze problems, select appropriate strategies, and execute solutions effectively—skills essential for both mathematical proficiency and broader problem-solving contexts. This finding reinforces the conclusions of Topal and Yenmez (2024), whose study demonstrated that explicit instruction in problem-solving strategies significantly enhances mathematical competence, particularly in terms of analysis and concept application. Zhou and Cayaban (2024) further highlight that structured problem-solving strategies foster the development of analytical and operational skills, enabling students to break down complex tasks, recognize patterns, and implement step-by-step solutions more effectively.

Lastly, the study found that learners advocated for more learner-centered pedagogical approaches, teaching methods that are responsive to their developmental needs, attention spans, learning preferences, and personal interests. Qadri et al. (2023) support this by demonstrating that video-assisted Problem-Based Learning (PBL) in mathematics enhances students' numeracy skills, critical thinking, and engagement by catering to diverse learning styles. By combining the visual and auditory appeal of videos with the critical thinking and collaboration fostered by PBL, students are more engaged and better able to grasp abstract mathematical concepts. Additionally, Tümkaya and Ulum (2020) emphasize that student-centered strategies such as Realistic Mathematics Education, Computer-Assisted Teaching, and Collaborative Learning not only improve academic performance but also cultivate essential problem-solving skills through active engagement, exploration of real-world contexts, and peer collaboration.

CONCLUSION

The findings of this study revealed that the Grade 4 students at Clementa F. Royo Elementary School initially exhibited considerable difficulty in solving mathematical word problems. This was clearly reflected in their pre-test results, where the average score was only 35.2%. Such a low level of performance indicated that many learners struggled with key problem-solving skills, including identifying relevant information, choosing appropriate operations, and applying logical reasoning. The pre-test scores highlighted the urgent need for an intervention that could support students in developing a more systematic and confident approach to tackling math problems.

Following the implementation of the A.C.T.S Strategy—Analyze, Clue Hunt, Translate, and Solve—students demonstrated a remarkable improvement in their problem-solving abilities. The post-test results showed an average score of 70.5%, reflecting significant growth in their capacity to analyze and solve mathematical tasks. This notable increase suggested that the strategy's structured steps helped students better understand the problem statements, select appropriate strategies, and follow through with accurate solutions. The post-test outcomes affirmed that guided, scaffolded instruction can greatly enhance students' mathematical performance.

The quantitative difference between the pre-test and post-test results was both substantial and statistically meaningful. The students' average scores nearly doubled after the intervention, with a large effect size (Cohen's $d = 6.19$), providing strong evidence of the strategy's effectiveness. Moreover, there was a noticeable decrease in score variability among students, indicating that the intervention helped not only high performers but also those who previously struggled, leading to a more consistent and equitable level of achievement across the class.

In addition to the quantitative results, qualitative feedback from the students revealed meaningful insights. Learners expressed that the A.C.T.S Strategy helped them understand math problems more clearly, reduced their anxiety towards the subject, and increased their confidence in solving mathematical tasks. They appreciated the structured, step-by-step approach and recognized how it guided them through analyzing and solving problems. These findings affirm that a well-designed, learner-centered intervention not only improves academic performance but also positively influences students' attitudes and engagement in learning mathematics.

RECOMMENDATION

Based on the results and conclusions of the study, the following recommendations are proposed:

First, it is recommended that the A.C.T.S Strategy be adopted more widely across grade levels, particularly in classes where students demonstrate difficulties in mathematical problem-solving. Its structured and interactive nature makes it suitable for young learners who require clear guidance and engagement in learning activities.

Second, integrating more interactive and gamified components, such as educational videos, group challenges, and hands-on tasks, can further enhance the effectiveness of the strategy. These additions may improve motivation, attention, and retention, especially among students with varied learning styles.

Third, while group collaboration has proven effective, student feedback highlighted the importance of incorporating individual tasks to ensure personal accountability and discourage reliance on group leaders. A balanced combination of group and independent activities should therefore be implemented.

Fourth, to ensure the successful replication of the intervention, teachers should receive adequate training in applying the A.C.T.S Strategy. Professional development programs can support educators in effectively facilitating structured problem-solving instruction tailored to their learners' needs.

Lastly, future researchers are encouraged to replicate and expand this study in different contexts, including other grade levels, subject areas, and with larger participant groups. Additionally, incorporating student feedback when designing instructional strategies should be prioritized, as learners provide valuable perspectives on what works best for their development.

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