



Challenges and Problem-Solving Competencies in Grade 7 Mathematics

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Abstract - This study examined the challenges and problem-solving competencies of Grade 7 students in Mathematics at Vicente D. Alburo High School, San Pascual North District, during the 2023–2024 school year. It aimed to identify key difficulties affecting students' problem-solving skills and to develop an intervention program to enhance these competencies. Specifically, the research investigated (1) challenges in reading comprehension, instructional materials, and home involvement; (2) students' problem-solving competencies across ordering, comparing, contrasting, selecting, and evaluating; (3) differences in challenges by aspect; (4) strengths and weaknesses in problem-solving; (5) the relationship between encountered challenges and competencies; (6) the extent of influence of these challenges on competencies; and (7) the formulation of a targeted enhancement intervention. Employing a descriptive-comparative-correlational design, data were collected from 70 respondents through a teacher-made test and questionnaire. Statistical analyses included mean, standard deviation, ANOVA, Pearson correlation, and coefficient of determination. Results revealed that students faced significant challenges (mean=3.56) and demonstrated beginning-level problem-solving proficiency (28.75%). No statistically significant differences were found across challenge aspects. Strengths were noted in ordering and evaluation, while weaknesses were identified in reading comprehension, equation transformation, and home involvement. A significant positive relationship existed between challenges in reading comprehension and home involvement and problem-solving skills, especially in selecting tasks. Reading comprehension and home involvement showed strong influence (r^2 up to 81%) on competencies, while instructional materials had a weaker effect. The crafted intervention program addresses these challenges through targeted strategies and collaborative efforts aimed at improving problem-solving skills and academic outcomes.

Keywords - Problem-Solving, Competencies in Mathematics 7

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INTRODUCTION

Grade 7 students often face challenges in developing problem-solving competencies in mathematics due to gaps in foundational knowledge. Limited engagement in learning activities further hinders their ability to grasp and apply mathematical concepts effectively. Inadequate instructional methods contribute to these difficulties, reducing students' overall proficiency in math. Addressing these barriers is vital to enhancing their problem-solving skills and fostering academic success.

struggle with it. This struggle can be attributed to several factors, including limited exposure to diverse problem-solving strategies and a focus on rote learning over conceptual understanding. Additionally, anxiety or lack of confidence when faced with complex problems can hinder students' performance. Enhancing problem-solving competencies requires developing critical thinking, encouraging persistence, and providing opportunities for students to practice and apply different strategies in various contexts.

Problem-solving is a core component of mathematics education, yet many Grade 7 students

Students encounter difficulties in mathematics problem-solving, which involves

navigating complex concepts, applying logical reasoning, and adapting to various strategies. A structured learning approach incorporating interactive activities and differentiated instruction can address diverse learning needs. Emphasizing a growth mindset—where challenges are seen as opportunities for learning—plays a key role in shaping problem-solving abilities. Targeted instructional strategies and sustained support contribute to developing mathematical confidence and motivation, thereby influencing students' engagement and understanding.

The importance of mathematics extends beyond the classroom. Dhersin et al. (2022) highlight its role in addressing global challenges by providing tools for understanding natural phenomena and supporting science-based decision-making crucial for sustainable development and disaster preparedness. Similarly, Zhang et al. (2024), through a meta-analysis of interventions enhancing mathematical problem-posing competence, identified nine key components that significantly improve problem-solving skills and creativity. Their findings emphasize that well-designed instructional support leads to better mathematical understanding.

This focus aligns with the United Nations Sustainable Development Goals (SDGs), particularly Quality Education (SDG 4). The OECD's "Global Scenarios 2035" underscores the imperative that "all girls and boys complete free, equitable, and quality primary and secondary education by 2030." SDG 4 emphasizes ensuring "equal access to quality early childhood development, care, and pre-primary education," as well as increasing "the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship." Mathematics education, with its critical thinking and problem-solving focus, is integral to achieving these objectives.

In line with these priorities, Soso (2020) investigated Grade 7 students' competency in solving polynomial functions and equations. Using a descriptive research design, the study found that effective use of diverse teaching strategies significantly enhances students' problem-solving abilities. It recommended continuous application of such strategies and capacity-building activities for teachers to improve both instructional quality and student outcomes.

Supporting this, the Department of Education (DepEd) issued DepEd Order No. 34, s. 2022, which outlines the "School Calendar and Activities for School Year 2022-2023" and includes the Most Essential Learning Competencies (MELCs) for various grades, including Grade 7. The MELCs emphasize the importance of developing critical thinking and problem-solving skills in mathematics education, stating that:

"The Most Essential Learning Competencies (MELCs) for Grade 7 Mathematics focus on developing problem-solving competencies among learners. These competencies aim to enhance students' critical thinking and analytical skills by engaging them in solving real-world problems. The MELCs emphasize the application of mathematical concepts to practical situations, encouraging students to think creatively and persistently when faced with challenges. This approach helps students build a strong foundation in mathematics and prepares them for higher-level learning and everyday problem-solving tasks."

In practical classroom settings, Grade 7 students are often presented with tasks such as ordering equations by degree, yet they struggle to identify the highest exponent, leading to errors. When comparing and contrasting methods for solving equations, they find it difficult to evaluate efficiency and appropriateness. Anxiety and loss of confidence also emerge when selecting the best method to apply. These challenges highlight the need for explicit instruction and practice in appropriate problem-solving strategies to improve mathematical understanding and student confidence.

It is within this context that the present study investigates the challenges and problem-solving competencies of Grade 7 students in mathematics. The research aims to identify specific difficulties, explore underlying causes—whether due to limited strategy exposure, reliance on routine learning, or affective factors like anxiety—and inform the design of targeted intervention programs. Such programs seek to enhance critical thinking, persistence, and overall mathematical proficiency. Findings will provide valuable insights for educators and administrators to develop effective professional development and teaching strategies, ultimately improving student performance in mathematics.

OBJECTIVES OF THE STUDY

This study aimed to examine the influence of challenges on the problem-solving competencies of Grade 7 Mathematics students and to develop an enhancement intervention program at Vicente D. Alburo High School, San Pascual North District, Division of Masbate, for the School Year 2023-2024. Specifically, it sought to identify students' challenges in problem-solving related to reading comprehension, instructional materials, and home involvement. It also assessed students' problem-solving competencies in ordering, comparing, contrasting, selecting, and evaluating mathematical problems.

The study further investigated whether significant differences existed in the challenges encountered among students and across the different aspects. It aimed to pinpoint students' strengths and weaknesses in problem-solving to inform targeted interventions. Additionally, the research explored the relationship between the challenges faced and problem-solving competencies, determining the extent to which these challenges affect students' skills.

Ultimately, the study intended to craft an intervention program based on the findings to address the identified challenges and enhance students' problem-solving abilities through focused strategies and support.

METHODS

This study employed a descriptive-comparative-correlational design to examine the challenges faced by Grade 7 students in Mathematics problem-solving and their competencies, using the findings to develop an enhancement intervention program at Vicente D. Alburo High School, San Pascual North District, Division of Masbate, during the 2023-2024 school year. The descriptive component identified challenges in reading comprehension, instructional materials, and home involvement while assessing problem-solving skills in ordering, comparing, contrasting, selecting, and evaluating. The comparative method analyzed differences in competencies across respondents and aspects, and the correlational method explored the relationship and influence of challenges on problem-solving abilities.

The study involved all 77 Grade 7 Mathematics students at Vicente D. Alburo High School, employing total enumeration. Data were gathered through a teacher-made test aligned with the K to 12 Mathematics Curriculum and a questionnaire on problem-solving challenges. The test underwent validation via a Table of Specifications, item analysis, test-retest reliability, expert review, and pilot testing with former students from a nearby school. The questionnaire followed similar validation and piloting procedures to ensure clarity and relevance.

The research process included problem conceptualization, proposal approval, securing permissions, tool preparation, validation, pilot testing, data collection, and statistical analysis. Data analysis involved computing means to assess central tendencies, standard deviations to evaluate score variability, and proficiency levels to categorize competencies. Weighted means measured the extent of challenges. ANOVA tested significant differences, while Pearson's correlation and the coefficient of determination evaluated the relationship and impact of challenges on problem-solving skills.

Results informed the design of an intervention program tailored to address identified challenges and improve competencies. The study concluded with reporting, thesis defense, revisions, and final submission, providing a thorough investigation of the factors influencing Grade 7 students' problem-solving competencies and actionable recommendations for instructional enhancement.

RESULTS AND DISCUSSION

Grade 7 students at Vicente D. Alburo High School face significant challenges in developing problem-solving competencies in Mathematics. As shown in Table 1, the overall average weighted mean of 3.56 indicates they are *very much challenged* in three key areas: instructional materials, reading comprehension, and home involvement.

Table 1. Summary of the Challenges Encountered by Students in Problem Solving

Challenges	AWM	Int.	Rank
Instructional Materials	3.61	VMC	1
Reading Comprehension	3.54	VMC	2.5

Home Involvement	3.54	VMC	2.5
Overall Average Weighted Mean	3.56	Very Much Challenged	

Instructional materials ranked highest with an AWM of 3.61, indicating that students find available learning resources inadequate or difficult to use effectively for problem-solving. This limitation can obstruct students' ability to grasp and apply mathematical concepts.

Reading comprehension and home involvement were equally challenging, both with an AWM of 3.54. Difficulties in reading comprehension reflect students' struggles to understand problem statements, which is essential for solving word problems. Meanwhile, low home involvement suggests limited parental support, which can hinder students' motivation and reinforcement of learning outside the classroom.

These findings reveal that challenges in resources, comprehension, and support collectively hinder students' problem-solving abilities. Addressing these areas is crucial to enhancing their mathematical skills and confidence.

The assessment of Grade 7 students' problem-solving competencies in Mathematics shown in Table 2, revealed generally *developing* proficiency across five key areas: ordering, comparing, contrasting, selecting, and evaluating.

For ordering, the average mean was 1.39 with a 27.8% proficiency level, classified as *developing*. This indicates limited ability to sequence steps or data logically. Both comparing and contrasting recorded identical average means of 1.44 and a proficiency level of 28.8%, also under the *developing* category, showing that students can identify similarities and differences but struggle with deeper analysis.

In selecting, the overall mean was 1.43 with a 28.6% proficiency level. Notably, Set A (mean = 0.90) fell under *beginning*, while Set B (mean = 1.95) reached *developing*, suggesting inconsistency in choosing appropriate strategies depending on task complexity.

Table 2. Summary of the Level of Students' Problem-Solving Competencies

Competencies	Proficiency	Set A	Set B	Ave.
Ordering	Mean	1.74	1.05	1.39
	sd	1.12	0.71	1.02
	PL	34.8%	21.0%	27.8%
	Interpretation	Developing	Beginning	Developing
Comparing	Mean	1.60	1.30	1.44
	sd	1.03	0.97	1.01
	PL	32.0%	26.0%	28.8%
	Interpretation	Developing	Developing	Developing
Contrasting	Mean	1.60	1.30	1.44
	sd	1.03	0.97	1.01
	PL	32.0%	26.0%	28.8%
	Interpretation	Developing	Developing	Developing
Selecting	Mean	0.90	1.95	1.43
	sd	0.87	1.11	1.13
	PL	18%	39%	28.6%
	Interpretation	Beginning	Developing	Developing
Evaluating	Mean	1.49	1.49	1.49
	sd	1.83	1.03	1.49
	PL	29.8%	29.8%	29.8%
	Interpretation	Developing	Developing	Developing

Evaluating scored a consistent mean of 1.49 across both sets, with a 29.8% proficiency level, indicating developing skills in judging the relevance or correctness of solutions. Overall, students show emerging problem-solving abilities, but require targeted support to move beyond basic analytical thinking.

Table 3 presents the analysis of variance examining differences in the challenges encountered across three aspects of problem-solving: instructional materials, reading comprehension, and home involvement. The results ($F = 1.88024$, $df = 2,12$, $p = 0.194$) indicate no statistically significant differences among these aspects, as the p-value exceeds the 0.05 threshold.

This suggests that students experienced similar levels of difficulty across all domains, with no single area emerging as notably more or less challenging. The uniformity points to widespread issues affecting problem-solving, rather than isolated weaknesses.

Table 3. Differences in the Challenges Encountered by the Students' Aspects

Statistical Measure	Statistical Value
df	2,12
F-value	1.88024
p-value	0.194

Interpretation	Not Significant
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Given this consistency, broad instructional strategies are recommended. Approaches that integrate critical thinking, collaborative learning, and reflective practice may help address challenges more effectively than targeting individual areas. Future research could explore other influencing factors—such as teaching styles or learner traits—to better understand subtle variations and inform more tailored interventions.

Problem-solving is a vital academic skill, and the findings reveal both emerging strengths and persistent weaknesses. Students show developing proficiency in ordering tasks, particularly in Set A, indicating a growing ability to sequence information logically—an essential foundation for effective problem-solving. However, performance varies, suggesting the need for structured practice to reinforce this skill. Evaluation skills also appear at a consistent developing level across Sets A and B, reflecting a basic but steady grasp of assessing solutions. While this consistency shows potential, students still need support in applying deeper reasoning and verifying outputs with confidence.

A notable strength lies in students' awareness of instructional materials as a key challenge. Recognizing this as a primary concern demonstrates metacognitive insight and suggests readiness to engage with solutions, especially if schools improve access to quality materials. Additionally, students consistently employ coping strategies, showing resilience and adaptability. Their use of both problem- and emotion-focused approaches—shaped by factors like academic track and sex—reveals resourcefulness and a willingness to manage academic demands.

Despite these strengths, significant weaknesses remain. Reading comprehension is a major barrier, with students struggling to interpret problem statements accurately. This limits their ability to approach tasks systematically and leads to frequent errors. Addressing this gap through vocabulary development and targeted reading exercises is essential. Another core weakness is the difficulty in transforming verbal problems into mathematical equations (D1), which highlights a disconnect between understanding and application. Focused instruction on mathematical modeling and symbolic translation is crucial.

Limited home involvement also hinders progress. Many students lack academic support at home, affecting their confidence and consistency. Strengthening school-home partnerships can help address this deficiency. Finally, students struggle with selecting appropriate tasks, averaging between beginning and developing levels. This inconsistency in logical decision-making suggests a need for activities that build strategic thinking and encourage reflective choices.

Overall, while students demonstrate awareness, resilience, and emerging problem-solving competencies, foundational issues in comprehension, transformation, and decision-making remain. Targeted interventions and sustained support are critical to converting potential into consistent performance.

Table 4. Relationship between Challenges Encountered and Problem-Solving Competencies

Challenges	Competencies	r-value	Degree of Correlation	p-value	Interpretation
Reading Comprehension	Ordering	0.71	High	0.183	Not Significant
	Comparing	0.73	High	0.164	Not Significant
	Contrasting	0.60	Moderate	0.289	Not Significant
	Selecting	0.90	Very High	0.036	Significant
	Evaluating	0.87	High	0.055	Not Significant
Instructional Materials	Ordering	0.59	Moderate	0.297	Not Significant
	Comparing	0.81	High	0.097	Not Significant
	Contrasting	0.56	Moderate	0.324	Not Significant
	Selecting	0.86	High	0.063	Not Significant
	Evaluating	0.79	High	0.109	Not Significant
Home Involvement	Ordering	0.67	Moderate	0.211	Not Significant
	Comparing	0.75	High	0.145	Not Significant
	Contrasting	0.58	Moderate	0.301	Not Significant
	Selecting	0.90	Very High	0.036	Significant
	Evaluating	0.82	High	0.084	Not Significant

Legend

r-value

Less than ± 0.20
 ± 0.20 to ± 0.39
 ± 0.40 to ± 0.69
 ± 0.70 to ± 0.89
 ± 0.90 to ± 1.00

Interpretation

Negligible Correlation
Low Correlation
Moderate Correlation
High Correlation
Very High (Perfect) Correlation

The data in Table 4 reveal that reading comprehension strongly correlates with the selecting phase ($r = 0.90$, $p = 0.036$) and highly with evaluating

(r =

Challenges	Competencies	r-value	r ² -value	Interpretation
Reading Comprehension	Ordering	0.71	50%	Moderate
	Comparing	0.73	53%	Moderate
	Contrasting	0.60	35%	Weak
	Selecting	0.90	81%	Very Strong
	Evaluating	0.87	75%	Strong
Instructional Materials	Ordering	0.59	35%	Weak
	Comparing	0.81	65%	Strong
	Contrasting	0.56	32%	Weak
	Selecting	0.86	73%	Strong
	Evaluating	0.79	63%	Strong
Home Involvement	Ordering	0.67	46%	Moderate
	Comparing	0.75	56%	Moderate
	Contrasting	0.58	34%	Weak
	Selecting	0.90	81%	Very Strong
	Evaluating	0.82	68%	Strong

0.87), showing that reading difficulties significantly impair students' problem-solving decisions. While correlations with other phases were moderate to high, they were not significant. Instructional materials and home involvement showed high correlations with selecting ($r = 0.86$ and 0.90 , respectively), but only home involvement was statistically significant ($p = 0.036$), underscoring the importance of family support in decision-making. These findings highlight the need to improve reading skills and foster home engagement to enhance students' logical choices in problem-solving. Though other correlations were not significant, their strength suggests that addressing these challenges comprehensively through skill-building, resource access, and family involvement can boost overall problem-solving competence.

This analysis shown in Table 5 explores how challenges—reading comprehension, instructional materials, and home involvement—affect students' problem-solving competencies. Reading comprehension strongly impacts the selecting phase ($r = 0.90$, $r^2 = 81\%$), with moderate effects on ordering (50%) and comparing (53%), and weaker influence on contrasting (35%). Instructional materials strongly influence comparing ($r = 0.81$, $r^2 = 65\%$) and selecting ($r = 0.86$, $r^2 = 73\%$), but have less effect on contrasting (32%). Home involvement mirrors reading comprehension, showing very strong impact on selecting ($r = 0.90$, $r^2 = 81\%$) and moderate influence on comparing (56%) and ordering (46%).

Selecting is the most affected competency, highlighting the need to improve reading skills and family support to enhance decision-making. The importance of quality instructional materials for

comparing is also clear. Weaker effects on contrasting suggest other factors may play a role. Overall, addressing both internal skills and external support is key to improving problem-solving competencies.

Table 5. Influence of Challenges Encountered on Problem-Solving Competencies

Legend

r ² -value	Interpretation
81% - 100%	Very Strong
61% - 80%	Strong
41% - 60%	Moderate
21% - 40%	Weak
00% - 20%	Very Weak

Based on the study's results, the Enhancement Intervention Program targets the main challenges—reading comprehension, instructional materials, and home involvement—that affect students' problem-solving skills. It includes guided reading, cross-subject comprehension tasks, and vocabulary workshops to boost reading; upgrades to interactive materials and teacher training to improve resource use; and parent workshops, regular communication, and take-home kits to increase home support.

To strengthen problem-solving, the program offers sequencing drills, flowcharts, and gamification for ordering; real-world tasks, group activities, and graphical tools for comparing; guided exercises and case studies for contrasting; decision-making drills and peer evaluations for selecting; and error analysis, reflection, and rubric use for evaluating. Each strategy has clear timelines, responsible staff, and measurable goals.

This program aligns with the study's findings, fostering critical thinking and collaboration to enhance students' problem-solving competencies.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the study, several conclusions and recommendations can be drawn. First, students encounter significant challenges in problem-solving, particularly in the areas of instructional materials, reading comprehension, and home involvement, with the highest challenge

reported in instructional materials. These challenges collectively impact their ability to perform effectively in problem-solving tasks. To address these issues, it is recommended to enhance the quality and accessibility of instructional materials through innovative tools and platforms, integrate targeted reading comprehension exercises responsive to mathematical word problems, and actively involve parents by providing them with guidance resources. Additionally, professional development for teachers and collaborative learning strategies such as peer tutoring should be regularly conducted to support students' competencies.

Regarding students' problem-solving competencies in Grade 7 Mathematics, the findings indicate that students are at a developing stage across all domains—ordering, comparing, contrasting, selecting, and evaluating—with varying proficiency levels. Performance disparities between groups highlight the need for differentiated and targeted instructional strategies. Consequently, recommendations include providing focused support tailored to each competency, strengthening instructional materials to address specific weaknesses, and integrating collaborative tasks to foster peer learning. Implementing regular assessments and feedback mechanisms will allow for monitoring progress and timely adjustment of interventions.

The study also reveals no statistically significant differences in the challenges encountered across respondents and problem-solving aspects, suggesting a uniform distribution of difficulties among students. This implies that teachers should adopt comprehensive support programs addressing all aspects of problem-solving consistently. Improving instructional materials, providing engaging learning activities, and maintaining collaborative learning environments are essential strategies. Regular progress monitoring and adaptive teaching approaches will further enhance uniform skill development.

Students demonstrate strengths in ordering and evaluation skills, yet face notable weaknesses in reading comprehension, equation transformation, home involvement, and task selection. This imbalance underscores the need for targeted interventions focused on foundational skills through structured exercises and guided practice. To mitigate the home involvement gap, parental workshops and

resources should be prioritized. Modifying instructional materials to reinforce logical decision-making and providing hands-on activities will address variability in task selection. Emphasizing collaborative learning and sustained teacher support is vital to fostering comprehensive and consistent development.

A significant relationship was found between specific challenges—particularly reading comprehension and home involvement—and problem-solving competencies, notably in selecting and evaluating tasks. Instructional materials also showed a significant relationship with competencies in comparing and selecting. Therefore, enhancing problem-solving skills requires focused efforts on improving reading comprehension through specialized exercises, increasing parental engagement, and aligning instructional materials with effective teaching practices. Providing structured decision-making tasks with feedback will further strengthen students' systematic problem-solving abilities.

Finally, the influence of challenges on problem-solving competencies is strongest with reading comprehension and home involvement, which account for a large percentage of variance in student performance. Instructional materials, however, exert a weaker influence. Based on this, interventions should prioritize reinforcing foundational reading skills and fostering collaborative relationships between schools and families to maximize home involvement. Instructional materials must be paired with effective teaching strategies to improve their impact, and guided exercises should target weaknesses in contrasting skills to promote consistency in decision-making. Tailored support focusing on these areas is crucial to effectively address the challenges and elevate students' problem-solving competencies.

In response to these findings, the study proposes an enhancement intervention program that targets identified challenges and promotes problem-solving skills development. This program focuses on strengthening reading comprehension, improving the accessibility and utilization of instructional materials, and encouraging active home involvement. It incorporates structured activities to develop competencies in ordering, comparing, contrasting, selecting, and evaluating, fostering systematic thinking and critical assessment. The program

advocates collaboration among educators, parents, and administrators, with clear performance indicators to monitor progress and ensure the program's effectiveness in enriching students' problem-solving abilities.

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