



A MIXED-METHODS STUDY ON THE USE OF THE BAR MODEL TECHNIQUE IN PROMOTING PROBLEM-SOLVING SKILLS IN UNDERSTANDING ALGEBRA

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ABSTRACT

This study aims to enhance the problem-solving skills of Grade 8 students at Core Science Academy, Inc. in Balayan, Batangas using the Bar Model Technique, while also exploring their perceptions and challenges in applying it. This study employed a mixed-methods design to examine the effects of the Bar Model Technique on the problem-solving skills and conceptual understanding of Grade 8 students in Algebra. Using a one-group pretest-posttest design, students underwent a week-long intervention where they were taught to apply the Bar Model Technique to algebraic equations and word problems, with the same assessment administered before and after to measure learning gains. Guided interviews explored students' perceptions and challenges, and triangulation of quantitative and qualitative data enhanced the validity of the findings.

The results suggest that incorporating Bar Model Technique in algebra instructions can effectively support students' comprehension and problem-solving abilities. The post-intervention data strongly indicates that it significantly improved students' problem-solving

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proficiency, shifting their performance from predominantly low-proficiency in the pre-test to a majority achieving high mastery in the post-test. It demonstrates the technique's dual role as both a remedial and enrichment tool in enhancing problem-solving skills. The post-test showed a notable improvement compared to pretest results, indicating enhanced performance in translating verbal problems into algebraic expressions and solving the unknowns. Statistical analysis revealed a significant increase in mean scores ($p < 0.05$), suggesting that it contributed positively to students' problem-solving skills. Thematic analysis revealed that it enhances conceptual visualization, algebraic thinking, and problem-solving efficiency while also fostering clearer communication and collaboration among students. Students reported increased confidence, motivation, and clarity, highlighting the technique's cognitive, and social benefits in supporting both individual understanding and collective learning. The study recommends the inclusion of visual strategies like Bar Model Technique in early algebra instruction to foster deeper mathematical thinking.

Keywords: *Bar Model Technique, Problem-Solving, Algebra, Conceptual Visualization*

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