Strengthening Middle School Mathematics Through an AMC 8 Workshop: A Study of Student Learning Gains

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This study examined the impact of a student-designed AMC 8 preparatory workshop on middle school students' mathematical problem-solving skills and confidence. Many students have limited exposure to creative, multi-step mathematical reasoning problems, even though these skills are essential for future success in advanced mathematics and STEM fields. To address this gap, the researcher analyzed AMC 8 examinations from 2015–2025, identified key topic areas, and developed instructional lessons, practice sets, and GeoGebra applets targeting composite shapes, angles, number sense, and sequences. The program was implemented over eight weeks, with students participating in two 1.5-hour sessions per week. Lessons included guided instruction, collaborative problem-solving, hands-on manipulatives, and short formative assessments. A pre-assessment and post-assessment were administered to measure learning gains, and students completed attitude surveys to evaluate changes in confidence and perceptions of problem-solving. Data will be analyzed using a two-tailed paired t-test to measure overall improvement and a two-way repeated measures ANOVA to examine differences in learning gains across topic areas. It is hypothesized that students will demonstrate overall improvement from pre- to post-assessment and increased confidence with challenging mathematics. Because all AMC 8 topics were taught in the workshops, the study predicts that learning gains will vary by topic, with the greatest improvement occurring in areas where students showed the lowest initial performance. This project aims to contribute evidence supporting the value of structured math-outreach programs in improving problem-solving skills and expanding equitable access to advanced mathematics experiences.

Awards Won: