

Cooperative Learning and its Impact in Developmental Mathematics Courses: A Case Study in a Minority-Serving Institution

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In this poster, we report on the evolution of developmental students' mathematics background knowledge after a four-week long course that emphasized active learning. The research took place at a large Hispanic serving institution in the state of California. Students' progress or lack thereof was measured using a diagnostic test developed by the Mathematics Diagnostic Testing Project (MDTP). These students were initially considered not ready for college level mathematics course work and were subsequently enrolled, in a four-week summer course which is designed to prepare them for a college level math course. During each class, students would spend at least 30 minutes engaging in cooperative learning that utilizes active learning strategies such as think-pair share, peer lesson, and wait time. A pre/posttest analysis of SYART showed that these students showed a statistically significant growth, leading us to conclude that the four-week intervention in math remediation had a considerable impact.

Key words: Developmental Mathematics, Cooperative Learning, College Algebra.

Far too many students began their postsecondary mathematics education in remedial mathematics (Bailey, 2009, Schwartz, 2007). Within the California State University (CSU) System, approximately a third of incoming freshmen are considered unprepared for college level mathematics courses (CSU, 2012). For some CSU students, a year will elapse before they can enroll in a college level mathematics course. Across the CSUs, unless exempted, every admitted student is required to take the Entry Level Mathematics (ELM) test, which aims to measure proficiency in basic skills need to succeed in a college level mathematics course. 50 on the ELM is a cutoff score that determines whether a student needs mathematics remediation or not.

It is important to note that the ELM is not a diagnostic test; as such, it does not shed light on specific contents that students are struggling with. To that end, in this study, we used Second Year Algebra Readiness Test (SYART) to understand the mathematical background knowledge of 1100 students who received a score below 50 on their ELM test. These students were enrolled in a two, four-week courses designed to prepare them for a college math course: beginning algebra and intermediate algebra. In both classes, students met their instructor five times a week, and every class, except exam days, they would spend approximately 30 minutes in cooperative learning that utilizes active learning strategies such as *think-pair share*, *peer lesson*, and *wait time*. A pre/posttest analysis of SYART showed that students' overall score improved significantly. On average, beginning algebra students' SYART score improved by approximately 39.5%. Using a two-sample t-test, session one witnessed a statistically significant growth with a *p-value* of $3.3 * 10^{-63}$.

To summarize, students improved their performance in several topics of the test. However, the biggest growth were observed in the following topics: Exponents and square roots; Scientific notation, Linear equations and inequalities, Polynomial and quadratic equations. However, several students were still below a critical level in some topics. Specifically, students continue to struggle in graphical representation of solution of equations and inequalities. Still, there is a strong evidence to conclude that the four-week intervention in math remediation has a considerable impact.

References

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