Increasing Student Success and Retention in Mathematics through Student-Centered Instruction and Collaborative Learning

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Target Course: Intermediate algebra (MAT056)

Intervention: student-centered instruction and collaborative learning

Abstract:
This project tested the hypothesis that a change in instructional format from a traditional lecture-based class to a more student-centered and collaborative one would increase student success in Intermediate Algebra and Trigonometry at the Borough of Manhattan Community College at the City University of New York (BMCC/CUNY), and that it would improve student attitudes toward mathematics, thus also leading to better recruitment, retention, and progress toward graduation in the mathematics major. The study was conducted by running pilot experimental sections each semester, each with a comparable control section. Experimental and control sections were matched: They were taught by the same instructors, offered at a similar day/time, and contained similar exams and other assignments. Pilot instructors underwent training to ensure effective and consistent use of techniques. The intervention’s effectiveness was evaluated using data on student pass rates in the course, changes in student attitudes toward mathematics, and scores on departmental exams. The statistical analysis suggested that specific collaborative learning projects used as a part of a comprehensive course structure can have a significant effect on student success. However, this success is contingent upon a suitable period of instructor practice, training, and revision of course structures and assignments. Collaborative learning can potentially work very effectively, but there is a learning curve for both instructors and curriculum developers. However, collaborative group work in stable base groups can lead to increases in student performance on exams of approximately two-thirds of a letter grade and about a 13 percentage point gain in successful course completion compared to standard courses using a lecture format as the primary course structure.