Community College Study of Mathematical Concepts and Skills Retention in Elementary Algebra: The Role of Distributed Practice and Problem-Centered Learning

Principal Investigators:
Madelaine Bates, Professor, Dept of Mathematics and Computer Science, Bronx Community College,
Susan L. Forman, Professor, Dept of Mathematics and Computer Science, Bronx Community College

Target Course: Elementary algebra (MTH05)

Intervention: distributed practice and problem-centered learning

Abstract:
Community college students enrolled in remedial mathematics courses often struggle with retention of the course material. Distributed practice and problem-centered learning are two instructional approaches that may improve student performance. Distributed practice is a method in which homework exercises on one topic are spread across several assignments, rather than being assigned all at once. The problem-centered approach uses real-life problems to motivate a topic and leads to a rationale for learning the related skills and concepts. The project attempted to answer two questions: (1) does distributed practice of homework assignments lead to higher passing rates in the course; (2) does a problem-centered approach with distributed practice lead to higher passing rates in the course. The experimental design was quasi-experimental in nature. In Spring 2010 the PI and Co-PI each taught one section of Elementary Algebra using the departmental syllabus as written, assigning the homework exercises as specified on the syllabus. This was the control group. In Fall 2010 the same instructors each taught a section using distributed practice. In Spring 2011, they each taught a section using a problem-centered approach with distributed practice. Data gathered were the results on each of the unit exams, the departmental final, and attendance. It appears that both experimental treatments, distributed practice and problem-centered learning, had a significant impact on learning and retention of concepts and skills as evidenced in the final examination results. Distributed practice contributed to students’ retention of the material and problem-centered learning contributed to their increased ability to work with word problems.