Influences of teaching approaches and class size on undergraduate mathematical learning.


Summary: An issue for many mathematics departments is the success rate of precalculus students. In an effort to increase the success rate, this quantitative study investigated how class size and teaching approach influenced student achievement and students’ attitudes towards learning mathematics. Students’ achievement and their attitudes toward learning mathematics were compared across four treatments of a precalculus course. The four treatments were (a) traditional lecture-based structure, (b) traditional lecture-based structure with a reduced class size, (c) instruction that engaged students in problem solving, and (d) instruction that included opportunities for small collaborative groups. The achievement of students engaged in problem-based learning (PBL) was significantly higher than the other treatments. These findings suggest that undergraduates benefit from instruction that encourages reflection on prior knowledge while developing new ideas through problem solving. Surprisingly, students in the PBE treatment did not continue to outperform students in the other treatments in calculus. These findings suggest the need for longitudinal studies that investigate the long-term effect of teaching approach and small class size on student learning and student success in advanced mathematics courses.

Classification: C75

Keywords: class size; student attitudes; problem based learning; prior learning; problem solving; longitudinal studies; calculus; lecture method; college mathematics; undergraduate study; teaching methods; attitude measures; achievement; small classes; learner engagement; cooperative learning; research needs

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