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Course Redesign and Effects of Simultaneously Implemented Flipped Classroom and Supplemental Instruction on Students' Learning in Gateway Chemistry Courses

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Abstract

In gateway courses students learn the foundational skills and knowledge to succeed in upper division courses. Unfortunately, the rate of student success in gateway courses is low. Our research evaluates the course redesign in favor of a high-structure course and effects of the simultaneously implemented evidence-based teaching approaches - the flipped-classroom teaching/learning model in conjunction with the two forms of Supplemental Instruction: (1) instructor-facilitated tutoring and (2) peer-facilitated academic support system (MavPASS). Using a logistic regression analysis, the positive effects of the course redesign on student performance in two general chemistry courses were examined using students' final grades. It was also shown that the improved student learning outcomes are attributed to prerequisite quizzes in pre-class learning phase due to improved students' preparedness for the active learning in flipped classrooms and useful feedback to students about their mastery of learning objectives. This research advocates for the adoption of high-structure learning environments and robust supplemental instruction programs as effective strategies to foster educational achievement in challenging gateway courses.

Keywords: Evidence-Based Teaching; High-Structure Course; Instructor-Facilitated Tutoring; Peer-Facilitated Tutoring