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THE FLIPPED CLASSROOM MODEL FOR COLLEGE ALGEBRA: EFFECTS ON STUDENT ACHIEVEMENT

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The past few years have seen a substantial rise in the use and interest in a teaching and learning paradigm most commonly known as the flipped classroom. It is called the flipped class model because the whole classroom/homework paradigm is "flipped". In its simplest terms, what used to be classwork (the lecture) is done at home via teacher-created videos and what used to be homework (assigned problems) is now done in class.

This quantitative research compares 5 sections (N=144) of college algebra using the flipped classroom methods with 6 sections (N=181) of traditional college algebra and its effect on student achievement as measured through a common final exam. In the traditional sections, students spent class time receiving lecture and reviewing homework and exams. In the flipped sections, students viewed short video lectures and submitted basic homework solutions online. Students then completed their homework assignments in class with the instructor either in small-groups or active whole-class discussions. All sections took a common final exam and a pre/post algebra readiness exam.

Because the learning of mathematics is built upon a foundation of a student’s prior knowledge, it is imperative that students understand the foundations before progressing in the subject. In a hierarchically-organized subject, such as mathematics, failure to learn prerequisite skills is likely to interfere with students' learning of later skills. The traditional framework of most college algebra classes includes lectures provided by the instructor and homework completed by the student. Because the flipped model does not alter the student-teacher interaction times and maintains an institutions course scheduling, a change to a flipped model is practical and reasonable. The flipped model allows constructivist learning and allows instructors to discover new ways to learn about students, provide instant feedback, adapt instruction, and provide students with anytime lectures. Screencasting of lectures in a flipped model creates a permanent archive for students to pause, rewind and review lectures.

The data were analyzed using multiple regressions and mixed ANOVA with interactions of the intervention measured with gender and ACT mathematics scores. The main independent variable is learning environment (flipped vs. traditional) with secondary independent variables of gender and ACT mathematics scores. The dependent variable is score on common final exam and differences in a pre/post algebra inventory. Regression and ANOVA are appropriate because this tells us how these independent variables interact with each other and what effects these interactions have on the dependent variables.

This research of the effects of a flipped classroom using teacher created online videos on student achievement in college algebra may provide valuable insight into the best-practices of technology in mathematics education.