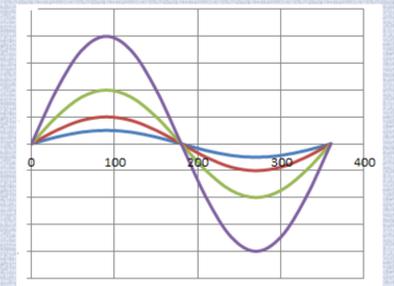


The Effects on Student Academic Achievement and Student Self-Confidence of a Course-Specific Textbook Written for Applied Electronics Math 2



Background: Madison Area Technical College, part of the Wisconsin Technical College System, is a two-year post-secondary institution located in Madison, Wisconsin. The school offers online, compressed (6 to 8 week) and hybrid courses in addition to traditional semester-long courses, in a wide variety of fields. Applied Electronics Mathematics 2 is the second 8-week course in a semester-long compressed sequence. Participants in this study are first-year students in the Electrical Engineering Technology and Electronics programs. This research project was inspired by the difficulty of teaching a college-level mathematics course without an affordable textbook.

Focus Question:

What is the effect on student achievement of using a course-specific textbook for Math 2?

Sub-questions:

1. Does the additional emphasis on understanding basic concepts enhance self-confidence in field-related applications?
2. Do the computer simulations relate to and enhance text material?
3. Do students believe this text has contributed to their mastery of course content?

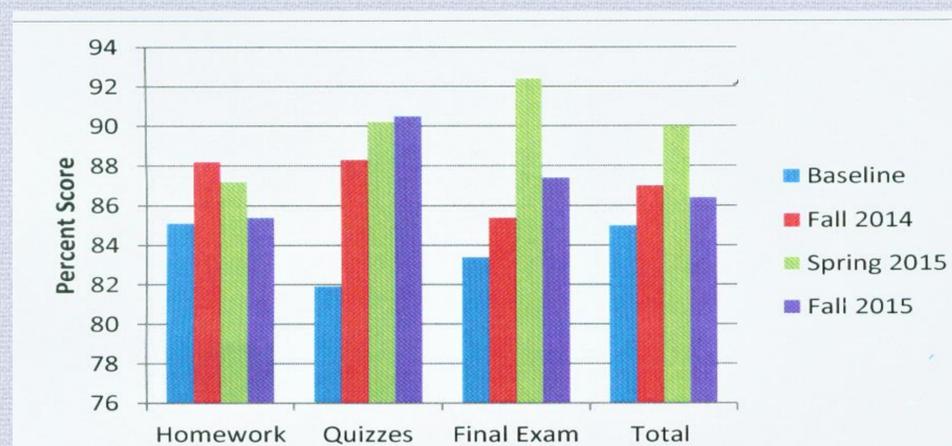
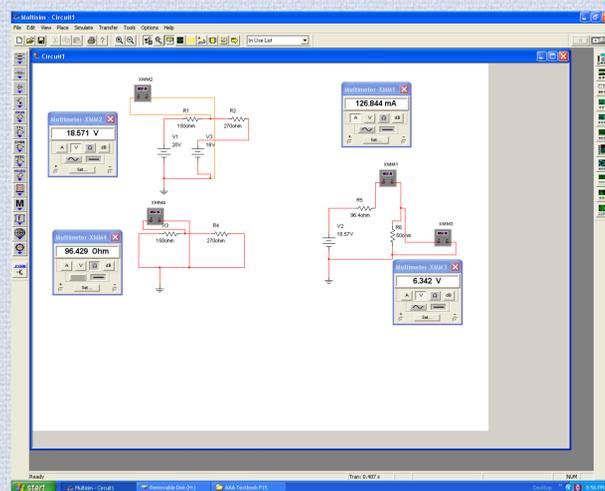


Methodology:

This project involved the writing and testing of a course-specific textbook over a period of three terms. Three chapters of the textbook were printed and used as treatment units for the fall 2014 class while four units were taught without a text. The treatment chapters covered the topics of imaginary and complex numbers, AC voltages and currents as sine waves, and the Thevenin, Norton and Superposition circuit theorems. A fourth unit, logarithms, was added for the spring 2015 and fall 2015 classes. Data was obtained for this study using homework, quizzes, a computer assignment, the course final exam, and student surveys.

Theoretical Background

Studies show a strong relationship between students' performance in math and their ability to succeed in their engineering courses (Tolley, et al., 2012). Students must learn to identify problems, carry out the necessary analysis or calculations, and interpret the results within an engineering context (Flegg, et al., 2012). Through the use of a textbook that is closely connected to the students' current electronics classes and to their future professional concerns, students will remain motivated to learn (Ginsberg, 2012).



Comparison of Baseline and Treatment Classes



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