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Prior Work

1. Two manuscripts on the results of the Conceptions of Mathematics and Study Process Questionnaire surveys I sent to students in the Winter semester have been completed. One is under review in *Higher Education* and the other in *Research in Higher Education*.
2. I attended two conferences this summer: The Canadian Mathematics Education Study Group and the Psychology of Mathematics Education.
3. I have submitted five presentation proposals for the Joint Mathematics Meetings in January, four based on work I have completed, or is underway, here.

Current Work

1. Math 102 Flipping Study.
 - i. Four of the seven sections of this course are being taught as “flipped”. I am, along with two other instructors, producing short videos and pre-lecture quizzes to be completed before class. Class time in the flipped sections will be devoted to further, deeper questions presented with interactive-engagement methods. The non-flipped classes are using a variety of methods: one is a traditional lecture with weekly assignments, one is a traditional lecture with pre-lecture quizzes, and the other is a lecture with some interactivity (mainly in the form of clicker questions) with pre-lecture quizzes.
 - ii. A variety of measures will be used to evaluate the effectiveness of this flipped implementation: the Calculus Concept Inventory, Math Attitudes and Perceptions Survey, a Basic Skills Test in the form of the students' Assignment 1, classroom observations, and the course grades.
2. Developing Flexible Derivative Procedures study.
 - i. I conjecture that calculus students seldom deviate from canonical procedures to solve certain problems. For example, when asked to differentiate a rational function, students will use the quotient rule first, even though it may be advantageous to first simplify. This rigidity of procedures limits their effectiveness and may cause extraneous cognitive demands when solving richer problems.
 - ii. This study is designed to improve students' flexibility in executing procedures. Two courses, two sections from each course, have agreed to participate. One section from each course will be a treatment section and the other a control. All students will complete a pop-quiz in class where they will solve a list of five derivatives; three rational functions and two products. Each function is chosen so that there is one approach, that may or may not be the canonical approach, that takes less steps than others. Post-quiz, the instructors in the control sections will re-solve the quiz in front of the students using the canonical procedures. Treatment section instructors will resolve, but will solicit multiple solution methods from the students. Post-class, treatment students will complete an assignment where they will find derivatives of rational and product functions and will be prompted to re-solve the problems using different methods. Control students will complete a similar assignment, just without the prompts. Questions on derivatives of rational and product functions will then appear on all students midterms.