Using Creative Inquiry Modules to Advance Undergraduate Students’ Success in Calculus

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Summary
The purpose of this project is to replicate, with adjustments as appropriate for the GSU environment, the Creative Inquiry model employed for teaching core Calculus courses at Clemson University to supplement their existing Calculus courses and improve the success of their instruction. We propose to run a pilot of this project during the summer semester 2012 to test the applicability of this model to the instruction of Calculus at Georgia State University. The ultimate goal of this project is to design a new series of courses that will support the instruction of mathematics, and Calculus in particular, through engaging students in hands-on activities on applications of mathematics to real life and natural sciences.

The study involves one type of intervention: engaging Calculus students in inquiry-based projects using explorations adapted from medical and scientific fields in order to motivate students to be engaged in learning Calculus concepts in more effective ways by relating the content of the course to meaningful contexts. The creative inquiry modules will be embedded within the regular Calculus syllabus as an integrated part of the class instruction. Four instruments will be employed to test the impact of these modules on students’ retention, achievement, and attitude towards mathematics in general and Calculus in particular: tests, pre- and post attitude surveys, informal interviews, and registration and grade distribution data. To analyze quantitative data three techniques will be employed: ANOVA, t-tests, and reliability analysis. Qualitative data will be analyzed by screening for emerging patterns in students’ responses. Results of the project will provide feedback on the applicability of the creative inquiry model for teaching Calculus and its impact on students’ success in Calculus courses at Georgia State University and beyond. A website will be designed to provide regular updates on the progress of the project and to share findings of the study. The research findings will be published in refereed journals and reported on conferences.

As mentioned above, the motivation for this project came from our learning about the Creative Inquiry courses as being currently implemented at Clemson University with support from the NSF. Our interest was further sparked by their report of significant improvement of ABC vs DFW rates in Calculus. We have started communication with the Clemson University team working on their project, and we expect significant support from and collaboration with them.