

## MAA to Probe Calculus I

By David M. Bressoud

I am pleased to announce that the MAA anticipates funding from the National Science Foundation to support a five-year study, *Characteristics of Successful Programs in College Calculus*, that will investigate the instruction of mainstream Calculus I courses in order to:

1. improve our understanding of the demographics of students who enroll in calculus,
2. measure the impact of the various characteristics of calculus classes that are believed to influence student success, and
3. conduct explanatory case studies of exemplary programs in order to identify why and how these programs succeed.

The principal and co-principal investigators for this project are myself, Marilyn Carlson, Michael Pearson, and Chris Rasmussen. To accomplish our goals, we will need help from and the cooperation of the mathematical community in the United States.

This project will be conducted in two phases. Phase I will entail a large-scale web-based survey to identify factors that are correlated with success in Calculus I. Phase II will identify eight highly successful calculus programs at various types of institutions. During fall term 2012, we will send teams to explore what is happening at these institutions and to conduct explanatory case studies for the purpose of understanding what it takes to create a successful program of calculus instruction. An important component of this project is the dissemination through publications, presentations, and workshops of the information gathered in both phases. The ultimate goal is to help math departments determine what use of resources will have the greatest impact on student performance and retention.

The Phase I survey will be conducted in the fall term of 2010. Late in spring 2010 we will use stratified random sampling to choose approximately 600 colleges and universities whose mainstream Calculus I classes will be surveyed. Both instructors and students will be asked to respond to the survey, both at the beginning and end of the term. We have begun to identify basic demographic questions as well as the variables for which we will need to control. These include type of institution, socio-economic status of students, reasons for studying calculus, year in college, and prior

mathematical experience. We have also begun to specify the factors that may promote student success or, in the other direction, contribute to a decision to leave mathematics. Potential factors include class size, use of technology, instructor's status and number of years

teaching, instructor's pedagogical content knowledge base, means of instruction including the mix of lecture and peer instruction or other active learning, and type and frequency of assessment including how homework is handled. Most of these are broad categories that will need to be refined. The intent of the Phase I study is not just to discover what is effective. We also want to learn whether there are practices that are commonly believed to be helpful but in fact do not correlate with improved performance.

This coming academic year will be spent deciding what we want to measure and how we will measure it, keeping in mind that this must be done within the constraints of web-based surveys of reasonable length. I ask for your help in identifying factors that we should measure and questions that will help us to measure them. A survey has been posted at <http://www.maa.org/Surveys/TakeSurvey.aspx?SurveyID=86L1672>.

Your suggestions will be very much appreciated. We are engaged in a literature review as preparation, and we also request that you list references to studies that you believe may be relevant to our work.

Additional information on this project can be found in my July *Launchings* column at [http://www.maa.org/columns/launchings/launchings\\_07\\_09.html](http://www.maa.org/columns/launchings/launchings_07_09.html). 🌱

