



ENROLLMENT AND RETENTION IN UNDERGRADUATE MATHEMATICS

The number of undergraduate mathematics majors has held steady at best, but continues to decline as a percentage of the college population, despite widespread discussion and focus on improving STEM education. Minority students remain seriously underrepresented among college students studying mathematics and women do not persist in the study of mathematics beyond the bachelors degree. Small colleges and comprehensive universities that prepare the majority of our nation's teachers have seen the largest decline in mathematics enrollment. Further, over half the students earning advanced and doctoral degrees mathematics are not US citizens or residents. The following policy recommendations are provided to address these alarming statistics.

Build on Programs that Recruit and Retain Mathematics Majors, with Increased Emphasis on Diversity.

There are several successful federal initiatives aimed at recruiting students at the undergraduate level into mathematics and advanced learning in mathematics, especially for minority students and women. Women math majors not only do not go onto graduate school, they are less likely take jobs in business and industry using mathematics. The National Science Foundation and the U.S. Department of Education are taking the lead in providing talented individuals with the opportunity to study mathematics, understanding the obstacles that confront minority populations and women, and providing support to overcome them. Programs such as Proactive Recruitment in Introductory Science and Mathematics (PRISM), Enhancing the Mathematical Sciences Workforce in the 21st Century, Undergraduate Biology and Mathematics, and Research and Evaluation on Education in Science and Engineering recruit talented individuals into the mathematics discipline at the undergraduate level and beyond. The success of these programs must be scaled up with an increased emphasis on diversity to reach minority populations and women.

Increase Quality and Effectiveness of Dual Enrollment Programs.

While dual enrollment presents a money-saving strategy by allowing students to earn college credit for high school courses, there is a lack of oversight and accountability in many if not most of these programs. Especially in mathematics, many students receive college credit without attaining college-level mastery. As a result, students are blocked from the further pursuit of college-level mathematics. Support of dual enrollment programs should be cautious and require strict mechanisms for monitoring instruction and assessing student achievement.



Design and Implement Programs to Address the Transition from High School to College Mathematics.

Many students enter college with a calculus course on their high school transcript but are under-prepared for calculus in college. The result is very poor articulation between their high school and college mathematics. This creates significant obstacles to the further study of mathematically intensive disciplines. Schools need clear and respected guidelines on what preparation is needed before a student begins the study of calculus and what it takes to offer a college-level calculus program within a high school. Incentives must be provided for collaborative ventures between high school and college teachers to prepare students to meet the expectations of college-level mathematics.

Study the Impact of Advanced Placement on Mathematics Enrollment.

Advanced Placement (AP) Calculus in high school has increased almost fivefold over the past twenty years to over 400,000 students per year. These students constitute the preponderance of our nation's best candidates for demanding STEM careers. However, the growth of high school calculus has not resulted in greater numbers of students majoring in STEM. It may, in fact, discourage many who do well in AP Calculus but see it as a terminal course, rather than as a gateway into college mathematics. This growing crisis requires analysis and documentation of what happens to students who study calculus in high school.