

Adding Courses: Increasing Options

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In 2004, the National Science Foundation concluded that finishing a course beyond algebra II in high school more than doubled the odds that a student who entered postsecondary education would complete a bachelor's degree. Among students who successfully completed rigorous mathematics courses, race/ethnicity and socioeconomic status had little or no impact on their likelihood of completing college.¹

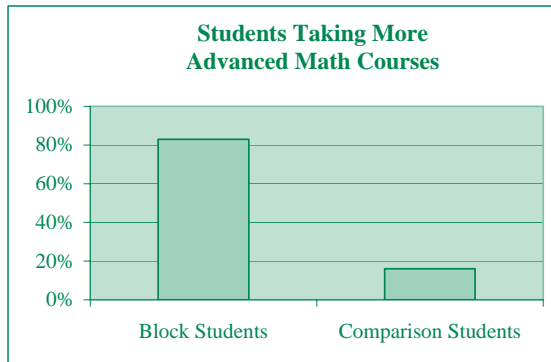
The Problem The significance of courses and programs to students' academic preparation and future is great. The math courses students take affect the future courses they can take, the college majors they can pursue, their SAT Math and SAT Verbal scores and the probability that they will complete college.

In middle and high school, consistently fewer under-represented minority students than white students are in high-ability, college preparation, and advanced placement programs. The problem starts early. If students are not placed in the advanced track by middle school, their chances of taking more advanced math courses in high school are almost nonexistent. This is a particular problem in engineering because so many engineering courses have a calculus prerequisite. Those not enrolled in calculus or pre calculus as first-year students will find it difficult to complete an engineering degree in four or even five years.

Solution 1: Integrate Two Years of High School Math into One. To provide students with more opportunities to take advanced math courses, the Lynchburg (VA) City Public Schools, under a GE Foundation Math Excellence grant, added two new high school math courses. These double-period "block" courses integrate two years of traditional math courses into one. Students beginning algebra can choose to take a block course covering both algebra and geometry in a year. Students going into geometry can choose to take a one-year block course covering both geometry and trigonometry.

The Results Sixty-five students, two thirds of whom are African American, have taken one of the two block math courses. These block students were matched with other students of the same race in the same grade. Almost all block students (97%) and only 55% of the comparison students have taken at least seven semesters of math. Not only are the block students taking more math; they are taking higher-level math. Eighty-three percent of the

¹National Science Board. (2004). Science and engineering indicators 2004. Arlington VA: Author



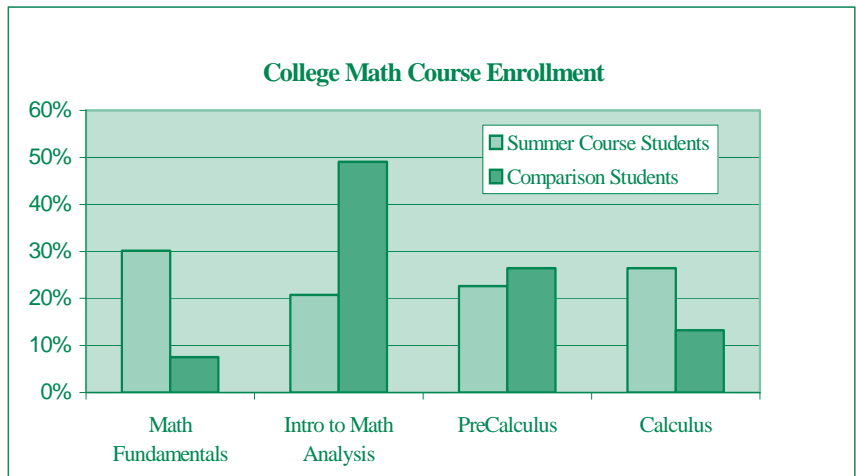
block students, but only 16% of the comparison students, have taken math courses beyond geometry.

Similar results were found when algebra/geometry block students were compared to students who took algebra in eighth grade, matched by race, grade and high school. Since students who take algebra in eighth grade tend to be more advanced, it is particularly impressive that the algebra/geometry block students are more than twice as likely to be taking more advanced math courses (83% vs 40%).

Solution 2: Add a Post High School Summer Review Math Course. To improve the math skills of recent high school graduates, Morgan State University, an historically Black university, developed a free online summer math review course for entering engineering students. Developed as part of a GE Foundation Math Excellence grant, the course is taken by about 20% of entering engineering students. It reviews the essentials of high school math and includes opportunities for students to come to the campus to work with a math professor.

The Results Students who took the summer course were matched with other incoming engineering students by sex and SAT: Math scores. The 53 students who enrolled in the summer course were twice as apt to enroll in calculus (26% vs. 13%) their freshman year.

Results broken out for the two-thirds of the students who completed the summer course vs. those who dropped it were particularly dramatic. Seventy percent of those who completed the summer course enrolled in calculus or pre calculus compared to 10% of those who dropped the course.



In Closing At Lynchburg, the block courses give under-represented students an additional chance to excel and to accelerate their college preparation. At Morgan State, the summer review course gives their predominately African American engineering students a better chance of taking calculus their first year of college. Adding courses is an important first step. Combined with more directed recruitment and specific retention efforts, adding courses means more students get more chances to continue on in mathematics and the sciences.