Preparing the Underprepared: Bridging the Gaps in Core Mathematics

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Abstract

In an effort to meet the needs of underprepared students and reduce the numbers of auditors and repeaters in basic study math courses, an introductory math course called Preparatory Algebra was developed. The course was created as a partnership between the Department of Basic Studies and the Mathematics Department. This article examines the research supporting the development of this course as well as the data highlighting its success. This course has led to improvement in students' success in College Algebra and will hopefully contribute to retention and graduation rates.

What happens to high school graduates who complete all their core requirements in mathematics but still are not ready for their core math courses in college? What if they know enough math to be ineligible for Basic Studies courses but still fall short of the requirements for a college core math course? Could a course be developed to bridge this gap for these students?

In the fall of 2006, Columbus State University introduced a math course called Preparatory Algebra, or MATH 0195, to address this need. This four hour, non-degree, baccalaureate credit course was created through a collaborative effort between the Department of Basic Studies and the Mathematics Department for students ineligible for Basic Studies math but not yet ready for a core math course (either College Algebra or Mathematical Modeling). MATH 0195 was initially created as a "volunteer" course to reduce the number of auditors in Basic Studies math classes. However, financial aid concerns and a lack of available seats in Basic Studies meant that auditing remedial classes was no

longer an option. The success of the course was immediate, and it has become a required course for underprepared math students since 2006 when the Columbus State University Math Department began requiring all entering students to take a math placement test.

A major impetus in the creation of MATH 0195 was the poor performance of many students in their core math courses. Students' results in college algebra became the biggest concern. According to data collected by the Columbus Sate University Math Department, by the fall of 2005, the percentage of students making a C or better had fallen below 50%. Columbus State University was suffering from what might be called a "revolving door" syndrome that forced the Math Department to offer many sections of college algebra just to handle the repeaters. In the spring of 2006, the university's vice president commissioned a task force to examine the shortage in all core course seats. An audit of the enrollment in core classes for the fall 2005 semester revealed that over 50 sections of core classes were occupied by students repeating a class

one or more times. Students repeating a class two or more times took up 10 sections. A large number of these repeaters were those struggling to pass College Algebra. The percentage of students making a C or better in Mathematical Modeling stayed between 75 to 80% during the same time frame.

The Basic Studies math faculty and the Math Department hypothesized as to why students were having so much difficulty with College Algebra. This is a challenging question since approximately one-half of all high school students are enrolled in a college preparatory curriculum (Boylan, 1999b). Who are these students? They are, for the most part, typical college students. Some are gifted artists who have trouble with math. Others are proficient at math but have difficulty writing, and many are good students who have been away from school for a long time (Boylan, 1999b). The first thought was that many students were improperly placed and were getting into College Algebra without a sufficient foundation in mathematics. It was also pointed out that professors of College Algebra had to spend too much time on review at the beginning of the course. The students' lack of a solid background in math meant more class time was spent on topics they should already know and less on the subject matter to be taught in College Algebra. Other reasons include students' increased reliance on calculators, their lack of mental stamina, and the idea that many students do not take the placement test seriously (Hassani, Gable, & Casleton, 2007).

There are many other theories being proposed for the increasing number of underprepared math students entering college. One idea is that many students stop taking math once they fulfill their high school graduation requirements, and do not take a math course their senior year. It is also asserted by some that many students have problems making the transition from concrete arithmetic to the more abstract and symbolic algebra (Blair, 2008). For these reasons and others, almost one-third of all students entering colleges and universities are underprepared (Boylan, 1999b). In a study of 85,894 students enrolled in 107 different California community colleges, seventy-five percent of these students who enrolled in remedial math did not pass or complete the required course (Bahr, 2008). Furthermore, more than eighty percent of them did not transfer to a four-year school or earn a credit. However, Bahr's study showed that students who successfully completed remediation in math achieved results similar to students in college who needed no remediation.

Beginning in the fall of 2006, the Columbus State University Math Department made the math placement test a requirement for all students, regardless of the catalog year in which the student began. Prerequisites were established for all math courses. Students satisfy these prerequisites with either a particular college math course or a satisfactory score on the math placement test.

Students who score a 36 or below on the placement test are placed in a Basic Studies math course. A score of 37 to 40 requires enrollment in MATH 0195. Students scoring between 41 and 49 are allowed to enroll in Mathematical Modeling or MATH 0195 (depending on their major). Finally, a score of 50 to 64 allows the student to register for College Algebra. Students taking MATH 0195 must make a C or better to be eligible to take College Algebra. A grade of D or better will allow them to enroll in Mathematical Modeling.

Thus far, MATH 0195 has made a significant impact on the success rate (C or better) of students taking College Algebra. According to data from the CSU Office of

Institutional Research, in 2007, 54% of all students taking College Algebra earned a C or better. Of those who took MATH 0195 first, 64% earned a C or better. In 2008, 59.7% of all students earned a C or better in College Algebra while 59.1% of students who took a MATH 0195 first earned a C or better. Due in large part to MATH 0195, the success rate of students taking College Algebra is on the rise again after decreasing every year from 2003 to 2005. The National Center for Education Statistics (1996) found that only 30% of those who scored in the bottom half on achievement tests would ever obtain a baccalaureate degree. However, information from the National Study of Developmental Education (Boylan & Bonham, 1992) asserts that, of those who scored in the bottom half of the distribution list and took some developmental education, roughly 40% went on to obtain baccalaureate degrees. The national average for all students entering universities during the same time frame was 45.6% (National Center for Education Statistics, 1996).

Although MATH 0195 is not a developmental course, the data suggest that underprepared students can achieve the same success in higher education as their better prepared classmates with the appropriate help (Boylan, 1999b). Hopefully, a class like MATH 0195 will be a case of "better late than never" in that some students would be better off to delay graduation for a semester than to risk not receiving a degree and the job that may come with it (Boylan, 1999a). After sharing the instruction of MATH 0195 with the CSU Math Department for the first few years of its existence, the Basic Studies Math Department assumed responsibility for all sections of MATH 0195 beginning in the fall of 2009. In order for Columbus State University to continue improving students' success in College Algebra, steps will need to be taken to implement successful instructional strategies that improve student learning in these courses and allow them to move on to a four-year institution (Bahr, 2008).

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