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 State 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
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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
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).

References

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