BRIDGES TO SUCCESS

Math Gateways and Coremediation Framing Paper

Ohio | Department of Higher Education

General overview

The premise is very simple: The sooner students take courses that count toward a college degree, the greater the chance that they will earn a degree[1]. Yet, for many students, access to credit-bearing courses is delayed. Traditional remediation models in which some students take a series of remedial classes to acquire the skills needed to move forward to college-level mathematics courses generally do not result in students progressing to graduation[2]. Remedial courses carry a stigma and research has shown that as many as half of the students placed in developmental education courses could succeed in college-level gateway courses if they were provided additional support.

The barriers to student success in the traditional developmental education sequence are not because of poor teaching and learning; many developmental courses have high pass rates[3]. Rather, the breakdown is a systemic one that increases time to graduation and disconnects developmental courses from degree paths, as most students who take remedial courses in mathematics and/or English never even attempt to take the gateway college-level course for which they are preparing[4].

However, in a corequisite remediation model (coremediation), students assessed as not college-ready in mathematics, reading and/or writing are enrolled in entry-level college courses simultaneous to additional academic support. A key component of corequisite remediation involves maximizing a student's opportunity to complete college-level gateway courses within their first academic year.

Nationwide, more students need developmental coursework in mathematics than any other subject; moreover, more students are likely to experience barriers to academic success because of the mathematics sequence than other general education requirements[5]. College algebra has traditionally been the default gateway mathematics course for all college students. Mathematicians, however, view algebra primarily as a preparatory course for programs (typically in STEM disciplines) that require pre-calculus or calculus. Rather than continuing to place all students in traditional mathematics pathways, there is a movement to match the right mathematics course to different majors; many programs of study (such as health sciences, social sciences, liberal arts, education and business) do not require calculus and students can be suitably prepared with alternative gateway math courses in quantitative reasoning or statistics. Redesigned options in mathematics gateway courses, particularly those with just-in-time academic support for students who are underprepared

1 Jenkins, D., Cho, S.W. 2012. Get With the Program: Accelerating Community College Students' Entry Into and Completion of Programs of Study. Community College Research Center, Teachers College, Working Paper No. 32.

2 U.S. Department of Education, National Center for Education Statistics. 2002. The Condition of Education 2001, Indicator 29, Remediation and Degree Completion. NCES 2001-072. Washington, DC; Government Printing Office.

3 Lonergan, T., Snyder, S., Rinker, L. 2014. Increased Pass Rates for Developmental Courses Resulting from Organizational Changes. Higher Learning Commission Annual Conference Collection of Papers. **http://cop.hlcommission.org/Learning-Environments/lonergan.html#results**

4 Jenkins, D., Jaggars, S.S., Roksa, J. 2009. Promoting Gatekeeper Course Success Among Community College Students Needing Remediation: Findings and Recommendations from a Virginia Study (Summary Report). Community College Research Center, Teachers College, Columbia University, pp. 2-3.

5 math barriers to success citation

for college level courses, have the potential to increase student success in gateway courses as well as help students to more quickly begin credit-bearing courses on their degree pathway. These approaches require effective connection and collaboration between faculty, advisors and administrators to build new systems that enhance student success.

Coremediation successes

In coremediation models, students enroll directly into college-level courses and participate in mandatory class periods or customized support in a lab (often taught by the same instructor as the college-level course) that provide just-in-time academic support within a college-level course. Corequisite remediation makes gateway courses the default placement for more students. In the corequisite model, students taking the gateway course and receiving just-in-time academic support succeed at the same rates as students without developmental needs who are placed into the gateway course.

In 2012-13, only 12.3 percent of students in the Tennessee State system who began in a traditional remediation course completed a credit-bearing mathematics class within an academic year. A corequisite model of instruction for mathematics was run as a pilot study in 2013-2014 in a Tennessee community college setting. Students who would otherwise have been placed into traditional mathematics remediation courses were enrolled directly into a college-credit statistics class and were required to attend supplementary instruction. Completion of a credit-bearing mathematics class within an academic year dramatically rose to 63.3 percent. Significant improvements were observed across all incoming ACT mathematics sub-scores (even those with ACT scores as low as 13 had a completion rate of 58.3 percent, up from only 2.7 percent with traditional remediation).

As seen in the table below, four other states have seen similar increases in student success through coremediation in both mathematics and English courses. A majority of students who would have spent at least one semester (if not several) taking courses that had a stigma associated with them, delayed their time to a degree, contributed to their student debt and instead earned college credit that counted toward their degrees. Benefits of corequisite remediation are typically seen across a very wide spectrum of student preparedness suggesting that it is a promising intervention that could benefit a larger number of students.

	Mathematics Success		English Success	
State	**w/o coreq.**	**with coreq.**	**w/o coreq.**	**with coreq.**
Georgia	21%	63%	21%	71%
West Virginia	14%	62%	27%	68%
Tennessee	12%	61%	31%	64%
Indiana	29%	64%	37%	55%
Colorado	31%	64%	37%	55%

Data from Complete College America. "Success" is defined as completing the corresponding introductory/gateway mathematics or English course. For Georgia and West Virginia, success was within two academic years. For Tennessee, success without corequisite remediation was within two years but within one semester with corequisite remediation. For Indiana and Colorado, success was within one academic year.

Several colleges and universities in Ohio have demonstrated similarly significant improvements in student success through corequisite remediation in English. For example, a pilot of an Accelerated Learning Program (ALP), a corequisite model for developmental writing and college-level composition, was administered at Wright State University in fall 2015 and spring 2016. While only 58 percent of students passed a traditional remediation course, 74 percent of students passed a college-credit writing and reading course with corequisite remediation. The ALP model—where 12 students that would have been placed in a traditional remediation course are instead enrolled in an English gateway course with 12 students who had placed at the college-level and a single instructor teaches both the college course and a section that that offers additional academic support—will be fully implemented at Wright State in fall 2016.

Right math for the right major

In addition to increasing the success for students with developmental needs, Ohio has been a leader in working to increase student success in mathematics. Beginning in 2013, Ohio launched the **Ohio Mathematics Initiative** (OMI). This process was borne out of the recognition that success in mathematics is critical to degree completion, but our existing mathematics pathways created inadvertent challenges to student success. The other major driver that emerged was the implementation of **Uniform Statewide Standards for Remediation-Free Status**, which established a clear standard for which students must be placed into credit-bearing coursework. Many colleges and universities in Ohio were challenged because the established standards were below what they had required for success in mathematics in STEM-based fields. In response to these challenges, the Ohio Department of Higher Education (ODHE – formerly the Ohio Board of Regents), convened the **Ohio Mathematics Summit** for mathematics faculty to discuss the issues.

One of the outcomes of the Summit was the recommendation that a steering committee of mathematics faculty be formed to study national trends, current initiatives and available statewide and national data – and then make recommendations for future mathematics curricula in Ohio. An **OMI committee** was empaneled and charged with developing expectations and processes that result in each campus offering pathways in mathematics that yield (a) increased success for students in the study of mathematics; (b) a higher percentage of students completing degree programs; and (c) effective transferability of credits for students moving from one institution to another. The OMI committee did a significant amount of work resulting in the release of **Rethinking Postsecondary Mathematics: Final Report of the Ohio Mathematics Steering Committee** in 2014.

The *Rethinking Postsecondary Mathematics* report was released widely throughout the field and was followed by meetings with the chairs of the mathematics departments of

Ohio's public colleges and universities. The report[6] made 10 recommendations across five major areas. Among these recommendations were the following:

- Recommendation 1.1: Improve student success in entry-level courses by aligning mathematics to academic programs of study and by improving instructional delivery mechanisms.
- Recommendation 1.2: Develop, implement and evaluate co-requisite strategies to support underprepared students.

Subcommittees of mathematics faculty have made significant progress toward Recommendation 1.1 by developing outcome standards in three mathematics pathways (STEM, statistics and quantitative reasoning) that have been approved for guaranteed statewide transferability. Establishment of these learning outcomes is the first step; providing time and opportunities for faculty to redesign their courses to align with these outcomes is the second.

Importance of degree pathways

Behavioral economics studies have suggested that limiting course choices helps students make better strategic decisions[7]. Highly structured programs (e.g. cohort-based career technical education programs, graduate programs, STEM pathways) have historically contributed to student success. Yet in less structured programs, a broad array of course choices can create student confusion, leading to course selection that unnecessarily extends their time to graduation.

Structured degree pathways provide a roadmap for what students need to take and when they need to take it. Shifting the focus from course selection to program selection has the added benefit of seamlessly integrating career planning early in the higher education experience. Many institutions are encouraging students who are relatively undecided to choose from a limited set of pathways that lead to many other majors downstream in a course of study.

It has been suggested that the ability to monitor and improve student achievement of general education outcomes (communication, computation, critical thinking and citizenship) improves under a guided pathways approach[8]. Presently, most students are expected to select with limited guidance 10 to 14 courses from a long list of possibilities. Sinclair Community College has pioneered a backward design approach in which program faculty have generated a short list of general education electives that would be best for students in that discipline. A similar approach at Arizona State University has reduced the fraction of students "off-path" from as high as 48 percent to less than 6 percent.

6 Rethinking Postsecondary Mathematics: Final Report of the Ohio Mathematics Steering Committee, March 2014. Page 12.
7 Thaler, R., Sunstein, C. 2008. *Nudge.* New York, NY: Penguin Books.
8 Johnstone, R. 2015. Guided Pathways Demystified: Exploring Ten Commonly Asked Questions about Implementing Pathways. National Center for Inquiry & Improvement.

Setting students up for success

Placement exams, even when augmented with high school grade point average (GPA) and transcript information, have proven to be poor predictors of success in gateway courses[9]. As a result, many colleges are shifting toward a strategy in which most incoming students are placed directly into either gateway courses or gateway courses with corequisite support. Placement ranges shift the purpose of assessments from whether or not a student should be placed in college-level courses to how best to support them while they are enrolled in college-level courses.

Corequisite remediation approaches leverage placement ranges as key components of a scaled academic support system for students. Strategies such as pre-college bootcamps can be reserved for students with skills well below high school levels to prepare them for corequisite courses as quickly as possible.

Need for systemic action

Connecting redesigned mathematics courses to the appropriate major, developing structured degree pathways, reshaping advising, and implementing corequisite approaches to developmental education require coordinated, systemic action. While each component of programmatic approaches results in some improvements in student success, results from institutions that have implemented multiple components suggest that systemic implementation is likely to yield the greatest dividends in student success. These systemic approaches also help to reduce duplication of administrative efforts as they focus on moving forward in comprehensive manner. Finally, with the advent of performance-based funding for the State Share of Instruction in Ohio, the incentives to increase persistence/retention and credit accumulation in pursuit of timely graduation are significant.

Request for proposals: Pilots to begin to build the systemic approaches

The Ohio Department of Higher Education has secured support from the Leona M. and Harry B. Helmsley Charitable Trust to provide resources to help faculty, advisors and colleges and universities address Recommendations 1.1 and 1.2 of the OMI Committee's report. Colleges and universities of higher education in Ohio that send teams to the convenings to be held on April 20 and 21, 2016 will be eligible to submit a response to a call for proposals that link faculty from mathematics, developmental education and selected disciplines to explore implementation of corequisite approaches to mathematics with academic programs. Eight to 10 campuses will be awarded $20,000 grants that identify high-value mathematics course and degree pathways to pilot corequisite models.

9 Scott-Clayton, J. 2012. Do High-Stakes Placement Exams Predict College Success? CCRC Working Paper no. 41.

Funding will support a faculty-driven planning process to develop curriculum and identify implementation needs in three to five degree pathways. Funds will support incidental costs, shifting faculty course loads and release time. Degree pathways should be selected on the basis of an analysis of student outcomes in current developmental programs and subsequent success in academic programs.

Preference will be given to programs demonstrating particular needs for improvements to student outcomes. Partnerships with public and private institutions are encouraged, and opportunities to collaborate will also be viewed favorably. The fiscal agent of collaborative proposals must be an Ohio college or university.

Webinars, additional support

Webinars will be conducted at the end of summer and during the fall 2016 semester with experts on bridging mathematics with corequisites and bridging mathematics with programs of study. Institutions supported with a pilot grant will be expected to attend one additional convening in September 2016 and to have completed at least one pathway in December 2016, with an attempted launch in January 2017.

Definitions

- **Corequisite remediation/coremediation**. Students enroll directly into college-level, credit-bearing courses and receive simultaneous academic support. Rather than facing a long sequence of prerequisite, non-credit courses, students get up to speed while working toward their degree. Additional, mandatory class periods or customized support in a lab provide just-in-time academic support within a college-level course.
- **Degree pathway**. A set of courses that leads to a college degree.
- **Gateway course**. A college-credit bearing course foundational to a program of study that counts toward a degree.
- **Mathematics pathways**. College algebra is primarily a preparatory course for programs (such as STEM disciplines) that require pre-calculus or calculus. Alternative gateway mathematics courses (such as quantitative reasoning or statistics) prepare students for programs of study that do not require calculus (such as health sciences, social sciences, liberal arts, education and business).
- **Remedial courses**. Instruction for students determined to be underprepared for education at an institution of higher education. Students are taught skills that are necessary for them to successfully complete gateway courses and enter into a program of study.