

The Leaky Pipeline Between Mathematics Courses

Gateway course completion data reveal that students placed into developmental mathematics are more likely to drop out of the pipeline to degree completion during the transition between mathematics courses than they are to fail any individual math course (Bailey, Jeong, & Cho, 2010; Jenkins, Jaggars, & Roksa, 2009). Even for students who successfully complete all developmental course requirements, college-level course completion rates remain low because institutions do not guide students to enroll in a college-level math course. Research indicates that the best strategy to address attrition between courses is co-requisite remediation, which yields double and even triple the success rates of a traditional sequence of developmental courses (Bailey et al., 2010; California Acceleration Project, 2015; Complete College America, 2016; Rutschow & Diamond, 2015; Sowers & Yamada, 2015).

However, institutions that have not made the shift to co-requisite remediation and are still operating with a one-year model should consider using continuous enrollment strategies. Institutions can adopt policies on successive enrollment in mathematics courses that have been shown to increase course and degree completion.

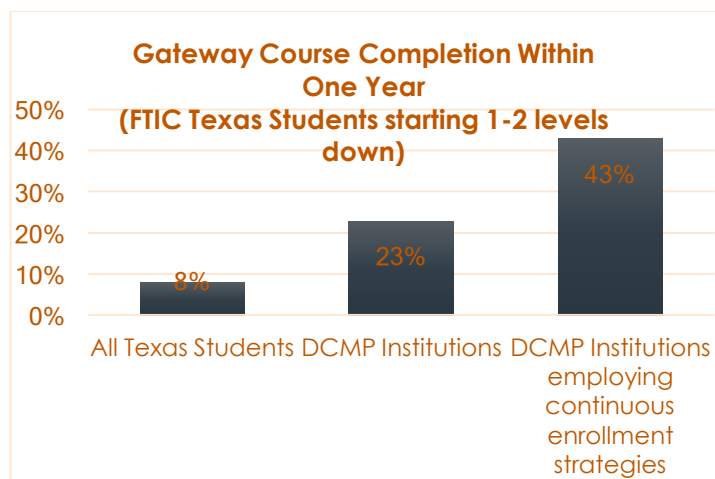
Nationally, 70 percent of students placed into remediation fail to enroll in a gateway math course within two academic years, and only 1 in 10 developmental students ever graduate (Vandal, 2015).

This brief summarizes findings on the relationship between course completion and persistence between courses, and describes strategies that encourage students to continuously enroll in their next mathematics course.

Strengthening the Pipeline to Degree Completion

The Dana Center Mathematics Pathways (DCMP) model encourages accelerated coursework by replacing two to three levels of developmental math with one semester, preferably in a co-requisite structure. This evidence-based approach reduces leaks in the pipeline to completion by decreasing the number of transition points that a student must overcome to progress from developmental to credit-bearing coursework (Charles A. Dana Center, 2014).

Initial research by the DCMP found that coherent, accelerated pathways significantly improved gateway course completion rates for developmental students. Underprepared students who complete their first gateway level mathematics course during their first year of enrollment have a higher probability of receiving a college credential.



Data from the Texas Higher Education Coordinating Board (THECB, 2014) show that just 8 percent of all developmental students completed a college-level course in one year. Comparatively, 23 percent of DCMP students received college-level math credit in the same amount of time. *Gateway completion rates were even higher (43%) at institutions that encouraged successive semester enrollment in a yearlong pathway.*

The data suggest that increasing student success in individual courses is necessary but not sufficient. Institutions must plug the leaks between mathematics course sequences.

Continuous Mathematics Enrollment Strategies: Solutions from the Field

Many institutions have addressed between-semester attrition by implementing continuous math enrollment strategies that encourage students to enroll in their next course until all of their mathematics requirements have been completed. These institutions use student incentives, intentional course planning, and positive messaging to propel students towards the crucial momentum point of mathematics course completion.

The Dana Center conducted interviews at colleges that encourage continuous math enrollment strategies and identified several promising practices across campuses:

1. *Establish a culture of successive semester enrollment with clear, timely, and consistent communication.* Colleges should consider a variety of methods to normalize successive enrollment in math courses. This process should include sharing data with faculty, advisors, and students about how enrollment choices affect the likelihood of course completion.
2. *Make successive semester enrollment easy and appealing.* Incentivize continuous math enrollment by removing barriers, offering guidance and support, and broadly disseminating information about why and how to enroll in successive semesters.
3. *Encourage students to enroll as a cohort.* The active, collaborative learning strategies associated with DCMP courses promote development of strong social bonds among students, as they become partners in learning. Build on the strength of these relationships by encouraging students to enroll with their classmates.

The Dana Center also found that the colleges use creative approaches to increase student persistence between semesters. Advisors, faculty, and administrators should consider the following successful strategies:

Advisors

- *Make math enrollment the default.* Advisors at The University of Texas at Arlington automatically enroll students in math courses. Students can choose scheduling details, but they are required to enroll in a math course.
- *Communicate to establish the expectation of continuous math enrollment.* Advisors at Kilgore College inform students registered in an accelerated developmental math course that it is part of a two-semester experience that allows them to complete math requirements in one year. At Temple College, students enrolling in 8-week compressed courses are encouraged by advisors to register for both courses at the same time.

Faculty

- *Use class time to provide information about successive semester enrollment.* Professors who teach mathematics and student success courses in the Alamo Colleges encourage continuous math enrollment by telling students enrolled in developmental math to register for a college-level course. They discuss college-level math course options and how those courses align to students' majors. Professors also offer in-class time to assist students with the registration process.
- *Incentivize early student enrollment in college-level courses.* Professors at El Paso Community College offer extra credit to students who show proof of registration in the next required mathematics course.
- *Reinforce messages about continuous math enrollment.* Consider putting information about expectations for the yearlong pathway in course syllabi and using informal student contracts.
- *Collaborate with student support services to promote continuous math enrollment.* At Northeast Texas Community College, faculty members work with advisors to follow-up with developmental students who have not registered for a college-level course. They coordinate with students to make the college-level course fit into their class schedules.

Administrators

- *Prioritize the use of parallel and "prime-time" scheduling.* Consistency in class days and times increases the likelihood that students can continue to accommodate work or family schedules. A professor at South Texas College offers his math students the opportunity to enroll in the next math class in the sequence at the same time in the following semester. The majority of his students accept the offer.
- *Provide early enrollment for developmental students.* Trinity Valley Community College permits DCMP students to register early for college-level math. This strategy incentivizes students to continue to make progress towards completion and allows them more flexibility when creating their schedules.
- *Use institutional policy to require continuous enrollment.* Some institutions require continuous enrollment in math until students satisfy their developmental math requirements. Consider extending this policy to require continuous enrollment until all mathematics requirements have been completed.

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