Math Pathways in the Florida College System

Center for Postsecondary Success
Florida State University

In February 2018, researchers at the Center for Postsecondary Success (CPS) at Florida State University were invited to collaborate with the Florida College System (FCS) leadership in an investigation of math pathways in the FCS. This executive report examines a series of related topics concerning student pathways through Intermediate Algebra (MAT1033), College Algebra (MAC1105), and degree completion. Specifically, we examined Intermediate Algebra and attempted to identify whether taking this prerequisite increases the likelihood of student success in College Algebra.

Main Findings Include:

1. Nearly one-fifth (19.2%) of students did not enroll in a math course during their first three years in college. When they did enroll, it was common for students to enroll in developmental education (DE), MAT1033, or MAC1105 in the fall semester and then never enroll in another math class[1].

2. We found no evidence that taking MAT1033 as a prerequisite increased the likelihood of passing the gateway course.

3. For some students, taking MAT1033 as a prerequisite to one of the gateway courses may actually *decrease* the likelihood of passing the gateway course.

4. For some students, enrolling in MAT1033 was associated with a *lower* likelihood of earning a degree within two years.

Author Contact Information:

Toby Park
Associate Director, Center for Postsecondary Success
Assistant Professor of Economics of Education & Education Policy
Florida State University
tjpark@fsu.edu
(850) 644-8168

Shouping Hu
Director, Center for Postsecondary Success
Professor of Higher Education
shu@fsu.edu
(850) 644-6721

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[1] An analysis of math enrollment patterns was conducted by CPS, but is not included in this executive summary.

College Algebra (MAC1105), Intermediate Algebra (MAT1033), and Developmental Education

All FCS Institutions

Sample
Data for this analysis consisted of Fall 2014 FTIC, Associate in Arts (AA) degree-seeking students with complete high school records who enrolled in MAC1105 at one of the FCS campuses, a total of 13,151 students. In terms of prior MAT1033 exposure, 1,512 students first took MAT1033 and developmental education (DE), 4,742 students did not take MAT1033 prior to enrolling in MAC1105, and the remaining 6,897 students enrolled in MAT1033 without DE.

Analysis
A series of regression analyses were conducted predicting MAC1105 passing rates as a function of MAT1033 and DE exposure controlling for student demographic characteristics. To account for the potential influence of pre-college academic performance we also controlled for specific high school math courses and placement test scores, if available. For those students with valid placement scores, we repeated the analysis separately for students who would have been placed below MAC1105 prior to SB1720, and those who would have specifically been placed in MAT1033. Additionally, we explored whether there were differential results for students who took MAT1033 and passed MAT1033, compared to those who took MAT1033 and failed.

Results
On average, students who enrolled in MAT1033 (without DE) had predicted probabilities of passing MAC1105 26.78 percentage points *lower* than students who did not enrolled in MAT1033 ($p<.001$). Of the students who had PERT scores that placed them below the gateway course cut score, students who enrolled in MAT1033 had predicted probabilities of passing MAC1105 that were 21.85 percentage points lower than students who did not enroll in MAT1033. Of students who had PERT scores that specifically placed them into MAT1033, students who enrolled in MAT1033 had predicted probabilities about 28 percentage points lower than students who did not enroll in MAT1033 ($p<.001$). Interestingly, students within this PERT score range who enrolled in MAT1033 and a developmental math course were predicted to pass MAC1105 at similar rates to those who did not enroll in MAT1033 (Table 1).

Additionally, among all students, those students who enrolled in MAT1033 and passed 1033 were still less likely to pass MAT1105, compared students without any MAT1033 exposure. Perhaps unsurprisingly, students who took MAT1033 and failed were the least likely to pass MAC1105. We observed similar patterns when examining specifically those students placing below MAC1105 and those placing into MAT1033 in particular (Table 2)

Table 1: Predicted Probability of Passing MAC1105

	No Pre-req.	MAT1033	MAT1033 and DE
All students	62.34%	41.85***	33.64%***
Students below gateway placement	54.52%	39.43%***	33.97%***
Students placing into MAT1033	62.50%	43.55%***	n/a

Note. Stars indicate whether changes in MAT1033 exposure are statistically significant compared to taking no prerequisites. *** p< .001.

Table 2: Predicted Probability of Passing MAC1105

	No Pre-req.	Took/Passed MAT1033	Took/Failed MAT1033
All students	62.92%	58.21%***	41.38%***
Students below gateway placement	53.88%	n/a	38.31%***
Students placing into MAT1033	62.52%	n/a	44.15%***

Note. Stars indicate whether changes in MAT1033 exposure are statistically significant compared to taking no prerequisites. *** p< .001.

Math Prerequisites and Degree Completion

Research Question

What are the relationships between enrolling in MAT1033 (either with or without DE), as a prerequisite for the gateway math course, and earning a degree after two years, compared to those who did not take either prerequisite course?

Sample

Data consisted of Fall 2014 FTIC, AA degree-seeking students with complete high school records who were associate degree-seeking. For those students with valid placement scores, we repeated the analysis separately for students who would have been placed below the gateway course prior to SB1720, and those who would have specifically been placed in MAT1033.

Analysis

A regression analysis was conducted predicting degree attainment rates as a function of MAT1033 and DE exposure controlling for student demographic characteristics. To account for the potential influence of pre-college academic performance we also controlled for specific high school math courses and placement test scores, if available. Additionally, we explored whether there were differential results for students who took MAT1033 and passed MAT1033, compared to those who took MAT1033 and failed.

Results

Overall, predicted probabilities of earning a degree after two years were 8.3% for students who took no math prerequisite course, 4.67% for students who enrolled in MAT1033, and 2.20% for students who enrolled in both MAT1033 and a DE math course (Table 3).

When exploring degree completion by comparing those who took MAT1033 and passed compared to those who failed, we observed similar results. Students without any MAT1033 exposure had the highest predicted probability of earning a degree, followed by students who took and passed MAT1033, with students who took, but failed, MAT1033 having the lowest predicted probability of earning a degree (Table 4).

Table 3: Predicted Probability of Earning a Degree within Two Years and Exposure to MAT1033 as a Prerequisite

	No Pre-req.	MAT1033	MAT1033 and DE
Earned Degree	8.3%	4.67%***	2.20%***

Note. Stars indicate whether changes in MAT1033 exposure are statistically significant compared to taking no prerequisites. *** p< .001.

Table 4: Predicted Probability of Earning a Degree within Two Years and Exposure to MAT1033 as a Prerequisite

	No Pre-req.	Took/Passed MAT1033	Took/Failed MAT1033
Earned Degree	7.67%	5.52%***	4.52%***

Note. Stars indicate whether changes in MAT1033 exposure are statistically significant compared to taking no prerequisites. *** p< .001.