Evaluation of COM Math Placement Methods, Fall 2017-2020

Assembly Bill 705 (Title 5, § 55003 and 55522) requires all California Community Colleges to design placement methods that maximize the probability that students will enter and complete transfer-level coursework in English and math/quantitative reasoning within one year of their first enrollment in the discipline. Colleges are allowed two years to pilot placement methods, starting in fall 2019, and are required to evaluate placement in pre-transfer level courses compared to direct placement in transfer-level courses.

To evaluate the first year of AB705 implementation, this analysis provides data on course success and one-year throughput through transfer-level math/quantitative reason for COM students enrolling in their first math course in fall 2019 and tracked through summer 2020. To gauge the initial impact of AB705 against previous placement methods, these outcomes from the fall 2019 cohort are also compared to previous fall cohorts when students were placed via multiple measures (MMAP, fall 2018), and placement testing (fall 2017).

Students included in this analysis are those whose first enrollment in a math/quantitative reasoning course at COM, including courses in COM's developmental math sequence (MATH103), in the required transfer-level gateway math/quantitative reasoning course for the SLAM pathway (MATH/STAT115), or in gateway courses on the BSTEM pathway (MATH104, 105, 109, 121, 123). In addition, this analysis validates placement in corequisite courses for gateway math/quantitative reasoning courses (MATH115C, 104C, 105C, 109C, 121C). Students whose initial enrollment was at a higher level than gateway math are excluded. Only students whose informed educational goal is AA/AS degree or transfer to a 4-year institution are included.

Key findings:

- Students whose initial math enrollment was at transfer-level increased from 22% in fall 2017 to 88% in fall 2019.
- The number of students with initial enrollment in math courses decreased 27%, from 485 in fall 2017 to 355 in fall 2019.
- One-year throughput through transfer-level math increased each year, from 29% among students starting math in fall 2017 to 53% in fall 2019.
- In both the SLAM and BSTEM pathways, for every placement band, enrolling directly in transfer-level math yielded higher throughput rates than enrolling in pre-transfer courses.
- In both the SLAM and BSTEM pathways, course success was higher for students enrolling transfer-level courses with corequisite support than in standalone courses, though for those in the lowest GPA band, one-year throughput was slightly lower.
- Initial enrollment in transfer-level math courses increased significantly for all groups under AB705. From fall 2017 to 2019, direct transfer-level enrollment increased from 42% to 85% among Asian students; from 16% to 71% among African American/Black students; from 10% to 83% among Hispanic/Latinx students; from 24% to 87% among multiracial students; and from 32% to 92% among White students.

- Between fall 2017 and fall 2019, one-year throughput through transfer-level math improved from 18% to 37% among students identifying as Hispanic/Latinx; from 29% to 61% among multi-racial students; and 38% to 69% among White students.
- In all years, White students had significantly higher course success and one-year throughput rates than Hispanic/Latinx and Black/African-American students.

Enrollment, Course Success and One-Year Throughout through Transfer-Level Math, Fall 2017-2019

Impact of MMAP Placement (fall 2018)

In fall 2018, the first fall term students were placed using multiple measures, the proportion of students whose first enrollment was in transfer-level math and one-year throughput both increased by two percentage points from fall 2017 (when standard placement testing was in place). Among students whose initial enrollment was in transfer level courses, course success increased from 68% to 72% and one-year throughput increased from 74% to 85% (Table 1).

Impact of AB705 Placement (fall 2019)

Under AB705, the proportion of students whose first math enrollment was in transfer level more than tripled, to 88% in fall 2019 from 24% in fall 2018. At the same time, course success in transfer-level math decreased from 72% to 50%, and one-year throughput decreased from 85% to 59%. Similarly, course success and throughput fell for students enrolling in MATH103 (one-level below transfer). However, because of the increase in initial transfer-level enrollment, throughput volume rose from 126 students in fall 2018 to 187 students in fall 2019, even as the total number of students with initial enrollment in math courses decreased, from 455 in fall 2018 to 355 in fall 2019.

Table 1. Enrollment, Course Success and One-Year Throughput through Transfer Math by Level of First Math Enrollment at COM, Fall 2017-2019

	Fall 2017				Fall 2018				Fall 2019						
	# enro ll ed	% at level	Course success	# 1-year through put	% 1-year through put	# enrolled	% at level	Course success	#1-year through put	% 1-year through put	# enrolled	% at level	Course success	# 1-year through put	% 1-year through put
Transfer-level	109	22%	68%	81	74%	111	24%	72%	93	85%	311	88%	50%	181	59%
One level below transfer	209	43%	51%	54	27%	200	44%	45%	32	18%	44	12%	18%	6	14%
Two levels below transfer	97	20%	42%	0	0%	74	16%	36%	0	0%					
Three levels below transfer	71	15%	51%	0	0%	71	16%	49%	1	2%					
Unduplicated Total	485	100%	53%	135	29%	455	100%	51%	126	31%	355	100%	46%	187	53%

SLAM and BSTEM Math Pathways

MATH 103

Under COM's AB705 plan, only students entering the BSTEM pathway and wish to "refresh and build math skills" are encouraged to take MATH103; those on the SLAM pathway are recommended to enroll directly into MATH/STAT115, with the corequisite course for those with a high school GPA of 2.9 or lower. This was a change from previous placement methods, when MATH103 was degree-applicable and listed a prerequisite for MATH115. Analysis completed in fall 2019 showed that some students intending to complete the SLAM pathway were unnecessarily enrolled in MATH103. In fall 2019, 44 students enrolled in MATH 103; just 7 (16%) continued to enroll in a transfer-level course within 1 year, and 5 of the 7 enrolled in MATH115. For analysis of the SLAM and BSTEM pathways, students with initial enrollments in MATH103 were included in each pathway according to their declared major at the time of their first math enrollment and whether they attempted a transfer-level course within the pathway within one year of initial enrollment.

SLAM Pathway

Table 2 shows the outcomes for students with initial enrollment in the SLAM pathway in fall 2017, 2018 and 2019. Initial enrollments in SLAM math decreased 18%, from 313 in fall 2017 to 257 in fall 2019. Overall, the one-year throughput rate increased from 24% in fall 2017 and 2018 to 51% in fall 2019. The number of students completing transfer-level SLAM math within one year of initial enrollment (throughput volume) in the SLAM pathway increased 71% under AB705, from 76 students in fall 2017 to 130 in fall 2019.

Among students with no GPA information, fall 2019 course success and throughput were highest for direct enrollment in MATH115 without corequisite support. Initial enrollment in MATH115 increased with AB705 placement, but course success and throughput rate decreased from 80%-82% to 49% (combined throughput for MATH115 and 115C). Throughput volume, however, increased from 31 in fall 2017 to 49 in fall 2019. For those who started in MATH103, the number completing MATH115 within 1 year went from 17 to just 4 in fall 2018 and 2019.

For students in the lower GPA band (0.0-2.9), the recommendation is direct enrollment in MATH115 with corequisite support (115C). Course success was highest in MATH115/C, though the cell size for those taking MATH115 alone was just 10. Throughput was comparable for MATH115/C and MATH115. The overall throughput rate for this GPA band increased substantially under AB705 due to the shift to direct enrollment in transfer-level math with corequisite support rather than MATH103.

For students in the 3.0+ GPA band, the AB705 recommendation is enrollment in MATH115 or STAT115. In fall 2019, the highest course success and throughput among this group was for those enrolling in MATH115/C. Throughput for those taking MATH115/C was significantly higher than those in MATH115 without corequisite support.

Table 2. SLAM Pathway: Enrollment, Course Success and One-Year Throughput through MATH 115 by High School GPA Band and First Math Course at COM, Fall Semesters 2017-2019

				Fall 2017					Fall 2018					Fall 2019		
SLAM GPA	First Math		% of enr	Course		% 1-year	#	% of enr	Course		% 1-year	#	% of enr	Course		% 1-year
Band	Course at COM	# enrolled	ollments	success	put	through- put	enrolled	ollments	success	put	through- put	enrolled	ollments	success	through put	through- put
No GPA	Below MATH103	68	22%	51%	0	0%	38	13%	61%	1	3%					
	MATH103	54	17%	57%	17	31%	22	8%	48%	4	18%	19	7%	16%	4	21%
	MATH115	17	5%	82%	14	82%	20	7%	80%	16	80%	35	14%	47%	18	51%
	MATH115/C											60	23%	40%	27	45%
	Total	139	44%	57%	31	22%	80	28%	62%	21	26%	114	44%	38%	49	43%
0.0-2.9	Below MATH103	34	11%	21%	0	0%	59	21%	27%	0	0%					
	MATH103	45	14%	33%	8	18%	33	12%	21%	3	9%	3	1%	0%	0	0%
	MATH115	7	2%	57%	4	57%	5	2%	40%	2	40%	10	4%	20%	4	40%
	MATH115/C											33	13%	27%	12	36%
	Total	86	27%	30%	12	14%	97	34%	26%	5	5%	46	18%	24%	16	35%
3.0-4.0+	Below MATH103	25	8%	44%	0	0%	13	5%	38%	0	0%					
	MATH103	40	13%	65%	14	35%	64	22%	50%	11	17%	5	2%	20%	0	0%
	MATH115	24	8%	79%	19	79%	32	11%	81%	28	88%	52	20%	58%	33	63%
	MATH115/C											40	16%	67%	32	80%
	Total	88	28%	63%	33	38%	109	38%	58%	39	36%	97	38%	59%	65	67%
Unduplicate	d Total	313	100%	51%	76	24%	286	100%	48%	65	23%	257	100%	43%	130	51%

Excludes students with a BSTEM major in their initial math enrollment term who started below transfer-level and did not attempt a transfer-level course, and those with initial enrollment below transfer-level who subsequently enrolled in a transfer-level BSTEM course.

BSTEM Pathway

Table 3 shows the three-year trend of enrollment and throughput in BSTEM pathway courses by AB705 BSTEM GPA placement information. Overall, initial enrollment in the BSTEM pathway decreased by 41% between fall 2017 and fall 2019, while the one-year throughput rate increased from 35% to 54%. Because of the decrease in initial enrollments, completions (throughput volume) dropped 10%, from 50 in fall 2017 to 45 in fall 2019. Many students are self-placing in courses other than those recommended for their placement band.

Course-level cell sizes are small, particularly in fall 2019, so Table 3 shows combined statistics for 104/105/109/121 courses. The same information disaggregated by course is shown in Appendix A at the end of this report.

For students in the lower BSTEM placement band, the recommended placement under AB705 is direct enrollment in MATH104/105/109/121 along with corequisite support. In fall 2019, 7 of the 25 students in this placement band enrolled in the corequisite course, and 10 enrolled in the standalone course. Seven enrolled in MATH103, and the throughput rate was zero. Initial enrollment in math among this placement group dropped by 60% from fall 2017 and fall 2018, from 62 to 25 students, almost entirely from below transfer level courses. While overall throughput increased from 21% in fall 2017 to 32% in fall 2019, throughput volume decreased from 13 to 8.

For students enrolled in high school calculus and with a GPA of >=2.7, the recommendation is direct enrollment in MATH104/105/109/121. Enrollment in these courses increased under multiple measures and AB705, as well as enrollment in MATH123. The throughput rate and volume were highest in fall 2019, when no students from this band enrolled in MATH103.

For students with high school GPA >= 3.4 and no high school calculus enrollment, the recommendation is also direct enrollment in MATH104/105/109/121. Enrollment in these courses increased in fall 2019, though course success was lower than in fall 2017 or 2018. The one-year throughput rate was lower for this placement band than in fall 2017 or 2018, when success in MATH103 was high. One-year throughput was just 50% for those starting in MATH103 in fall 2018 and 2019, lower than direct transfer-level placement. According to AB705, students enrolling in pre-transfer courses should have throughput rates at or above those in standalone or corequisite courses, so MATH103 would not be a valid recommendation.

Only one student met the criteria for placement in MATH123 in fall 2019. That student enrolled in a lower math course and completed.

Students with no high school information self-place. The overall number of students in this group is decreasing since new applicants have reported high school GPA information since 2017. The number of initial math enrollments in this group decreased in fall 2019, largely in enrollment in below-transfer math courses. The number of transfer-level enrollments increased from fall 2018, and throughput volume declined slightly in fall 2017 and 2018.

Table 3. BSTEM Pathway: Enrollment, Course Success and One-Year Throughput through Transfer-Level BSTEM Math by Level of First Math Course at COM, Fall 2017-2019

			Fall	2017			Fall	2018			Fall	2019	
				#	%			#	%			#	%
		#	Course	through-	through-	#	Course	through-	through-	#	Course	through-	through-
BSTEM Placement Band		enrolled	success	put	put		success	put	put	enrolled	success	put	put
0.0 - 3.3 and no HS	Below MATH103	14	50%			16	38%	0	0%				
calculus course	MATH103	30	39%	3	10%	38	47%	3	8%	7	14%	0	0%
	104/105/109/121 + coreq									10	40%	4	40%
	104/105/109/121 alone	15	40%	9	60%	7	29%	2	29%	7	29%	3	43%
	MATH123	3	33%	1	33%	2	50%	1	50%	1	100%	1	100%
	Total within placement ba	62	41%	13	21%	62	43%	6	10%	25	32%	8	32%
2.7 – 4.0+ and enrolled in HS calculus course	Below MATH103	1	100%	0	0%								
	MATH103					1	0%	0	0%				
	104/105/109/121 + coreq									3	100%	3	100%
	104/105/109/121 alone	3	100%	3	100%	9	67%	6	67%	4	50%	3	75%
	MATH123	3	67%	2	67%	2	50%	2	100%	4	75%	4	100%
	Total within placement ba	7	86%	5	71%	12	58%	8	67%	11	73%	10	91%
3.4 - 4.0+	Below MATH103	3	33%	0	0%	1	100%						
	MATH103	6	86%	5	83%	14	80%	7	50%	2	100%	1	50%
	104/105/109/121 + coreq									5	60%	3	60%
	104/105/109/121 alone	12	92%	12	100%	9	67%	8	89%	9	56%	6	67%
	MATH123	1	100%	1	100%	3	100%	3	100%	1	100%	1	100%
	Total within placement ba	22	83%	18	82%	27	79%	18	67%	17	65%	11	65%
3.7 - 4.0+ and passed	104/105/109/121 alone									1	100%	1	100%
HS pre-calculus course	Total within placement ba									1	100%	1	100%
No GPA	Below MATH103	14	57%	0	0%	10	50%	0	0%				
	MATH103	16	56%	2	13%	13	38%	3	23%	7	0%	0	0%
	104/105/109/121 + coreq									12	42%	6	50%
	104/105/109/121 alone	18	56%	11	61%	10	73%	9	90%	9	78%	8	89%
	MATH123	4	25%	1	25%	5	80%	4	80%	2	50%	1	50%
	Total within placement ba	52	54%	14	27%	38	56%	16	42%	30	43%	15	50%
Total		143	55%	50	35%	139	55%	48	35%	84	49%	45	54%

Students starting in MATH103 or below include those with a declared BSTEM major in the term of initial math enrollment and those with no declared major who subsequently attempted a transfer-level BSTEM course within one year of initial enrollment.

Enrollment and One-Year Throughput by Race/Ethnicity

Initial enrollment in transfer-level math courses increased significantly for all groups under AB705. From fall 2017 to 2019, direct transfer-level enrollment increased from 42% to 85% among Asian students; from 16% to 71% among African American/Black students; from 10% to 83% among Hispanic/Latinx students; from 24% to 87% among multiracial students; and from 32% to 92% among White students (Table 4). In fall 2017, there was a large gap in transfer-level enrollment, with Asian and White students far more likely than Hispanic/Latinx and African-American/Black students to enroll directly in transfer-level math. In fall 2019, this gap disappeared for Asian and Hispanic/Latinx students, and though the percentage gap was much narrower, White students were still more likely to start at transfer-level than Hispanic/Latinx or African-American/Black students.

Table 4. Enrollment and Level of First Math Course at COM by Race/Ethnicity, Fall 2017-2019

		Fall 2	017	Fall 2	018	Fall 2	019
D /F.I	Level of First COM Math	#	0/	#	0/	#	0/
Race/Ethnicity Asian		enrolled 10	42%	enrolled 11	46%	enrolled 17	%
ASIAN	Transfer-level	10	46%	11	46%	3	85% 15%
	One level below transfer					3	15%
	Two levels below transfer	1	4%	1	4%		
	Three levels below transfer	3	13%	1	4%		1000/
	Total within Race/Ethnicity	24	100%	24	100%	20	100%
Black or African	Transfer-level	4	16%	2	17%	5	71%
American	One level below transfer	8	32%	7	58%	2	29%
American	Two levels below transfer	6	24%	1	8%		
	Three levels below transfer	7	28%	2	17%		
	Total within Race/Ethnicity	25	100%	12	100%	7	100%
Hispanic	Transfer-level	17	10%	22	12%	94	83%
	One level below transfer	76	46%	80	45%	19	17%
	Two levels below transfer	44	26%	40	22%		
	Three levels below transfer	30	18%	37	21%		
	Total within Race/Ethnicity	167	100%	178	100%	113	100%
Multi-Racial	Transfer-level	6	24%	10	34%	20	87%
	One level below transfer	12	48%	15	52%	3	13%
	Two levels below transfer	4	16%	2	7%		
	Three levels below transfer	3	12%	2	7%		
	Total within Race/Ethnicity	25	100%	29	100%	23	100%
White	Transfer-level	56	32%	54	33%	129	92%
	One level below transfer	79	45%	66	40%	11	8%
	Two levels below transfer	26	15%	25	15%		
	Three levels below transfer	16	9%	21	13%		
	Total within Race/Ethnicity	177	100%	166	100%	140	100%

Between fall 2017 and fall 2019, one-year throughput through transfer-level math improved from 18% to 37% among students identifying as Hispanic/Latinx; from 29% to 61% among multi-racial students; and 38% to 69% among White students (Table 5). Though the numbers are small in fall 2019, one-year throughput increased from 16% to 29% among African-American/Black students. Among Asian students, throughput dropped somewhat under multiple measures but did not change substantially from fall 2017-2019. In all years, White students had significantly higher course success and one-year throughput rates than Hispanic/Latinx and Black/African-American students. Success and throughput by course is not shown due to small cell sizes.

Table 5. Enrollment and One-Year Throughput though Transfer-Level Math by Race/Ethnicity, Fall 2017-2019

	Fall 2017				Fall 2018				Fall 2019			
				% 1-				% 1-				% 1-
			#1-year	year			#1-year	year			#1-year	year
	#	Course	through	through-	#	Course	through	through-	#	Course	through	through-
Race/Ethnicity	enrolled	success	put	put	enrolled	success	put	put	enrolled	success	put	put
Asian	24	72%	14	58%	24	58%	12	50%	20	55%	12	60%
Black or African American	25	42%	4	16%	12	25%	1	8%	7	29%	2	29%
Hispanic	167	46%	28	17%	178	45%	24	13%	113	29%	41	36%
Multi-Racial	25	56%	7	28%	29	46%	11	38%	23	48%	14	61%
White	177	60%	65	37%	166	60%	67	40%	140	65%	95	68%

Spring 2020 Withdrawal Rates due to the COVID-19 Pandemic

In spring 2020, due to the COVID-19 pandemic and transition to remote instruction, emergency approval was offered to all students wishing to withdraw from their courses and receive a grade of "EW" (early withdrawal). The deadline to withdraw with a "W" grade fell after the date of transition to remote learning (3/16/20), so "W" grades may have increased due to the shutdown as well.

To assess whether course withdrawals impacted the one-year throughput rate for the fall 2019 cohort, the spring 2020 grades in transfer-level math for students in the fall 2019 cohort who did not complete transfer-level math in fall 2019 and enrolled in transfer-level math the following spring are compared to students with the same enrollment pattern in the previous two years. The proportion of no-pass grades was not significantly different in spring 2020, suggesting that few students who would have received a no-pass grade elected to withdraw instead. Withdrawal rates were actually lower in spring 2020 than in spring 2019, including just 2 EW grades. These numbers suggest that disruption from the pandemic did not impact throughput rates for the fall 2019 cohort. (See Table 6, next page).

Table 6. Grade Distribution in Transfer-level Math

	(Spring 20	67 76% 11 13%		2018 cohort 019 enrollment in nsfer math)	Fall 2019 cohort (Spring 2020 enrollment in transfer math)		
	#	%	#	%	#	%	
C or higher	67	76%	51	65%	33	67%	
Did not pass	11	13%	9	11%	7	14%	
W	10	11%	18	23%	7	14%	
EW					2	4%	
IX			1	1%			

Students with initial math enrollment in fall who didn't complete transfer-level math in the fall and enrolled in transfer-level math the following spring

Appendix A. BSTEM Pathway: Enrollment, Course Success and One-Year Throughput through Transfer-Level BSTEM Math by First BSTEM Math Course at COM, Fall 2019

BSTEM Placement Band	First Math Course BSTEM	# enrolled	% of enrollments	Course success	# 1-year throughput	% 1-year throughput
0.0 – 3.3 and no HS	MATH104/C	4	6%	25%	1	25%
calculus course	MATH105	2	3%	50%	1	50%
	MATH105/C	2	3%	50%	1	50%
	MATH109	4	6%	25%	2	50%
	MATH109/C	2	3%	50%	1	50%
	MATH121	1	1%	0%	0	0%
	MATH121/C	2	3%	50%	1	50%
	MATH123	1	1%	100%	1	100%
	Total within band	18	26%	39%	8	44%
2.7 – 4.0+ and enrolled	MATH104/C	1	1%	100%	1	100%
in HS calculus course	MATH109	2	3%	0%	1	50%
	MATH121	2	3%	100%	2	100%
	MATH121/C	2	3%	100%	2	100%
	MATH123	4	6%	75%	4	100%
	Total within band	11	16%	73%	10	91%
3.4 – 4.0+	MATH104	1	1%	100%	1	100%
	MATH104/C	1	1%	0%	0	0%
	MATH105	3	4%	33%	1	33%
	MATH105/C	1	1%	100%	1	100%
	MATH109	3	4%	33%	2	67%
	MATH109/C	2	3%	50%	1	50%
	MATH121	2	3%	100%	2	100%
	MATH121/C	1	1%	100%	1	100%
	MATH123	1	1%	100%	1	100%
	Total within band	15	22%	60%	10	67%
3.7 – 4.0+ and passed	MATH109	1	1%	100%	1	100%
HS pre-calculus course	Total within band	1	1%	100%	1	100%
No GPA	MATH104	3	4%	100%	3	100%
	MATH104/C	1	1%	0%	1	100%
	MATH105	1	1%	0%	0	0%
	MATH105/C	2	3%	0%	0	0%
	MATH109	3	4%	67%	3	100%
	MATH109/C	7	10%	43%	3	43%
	MATH121	2	3%	100%	2	100%
	MATH121/C	2	3%	100%	2	100%
	MATH123	2	3%	50%	1	50%
	Total within band	23	34%	57%	15	65%