

Multiple Measures Assessment Project (MMAP) Summary of Methodology for English and Math Phase II Rule Sets and AB 705 Adjustments

MMAP

The goal of MMAP was to identify students that were highly likely to succeed at any given level of an English and Math course.

The research found that a higher rate of students were likely to succeed in transfer-level courses when placed by MMAP than by traditional placement systems, and large numbers of students were being substantially underplaced statewide by traditional placement systems, with underrepresented minority and female students

placed disproportionately lower than their non-minority and male peers, especially in math.



AB 705 requires colleges to maximize the probability that students will complete transfer-level coursework in math and English within one year of their initial attempt.

It also requires colleges to use high school performance data to conduct research to determine if they are maximizing throughput.

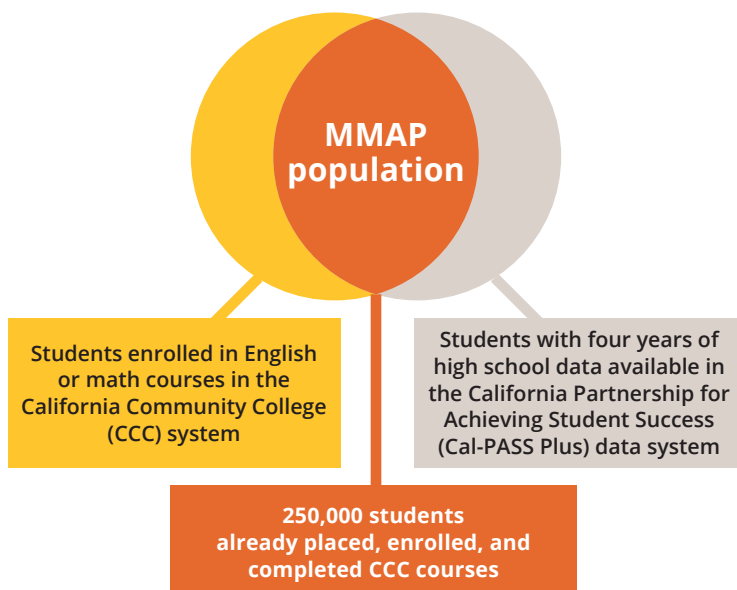
MMAP research compared the throughput for groups of students with similar high school performance profiles (deriving those groups from the MMAP decision trees) who are placed directly in transfer-level versus those placed one-level below. This comparison allowed MMAP researchers to determine which placement maximizes throughput for specific groups of students with similar high school performance levels.

AB 705

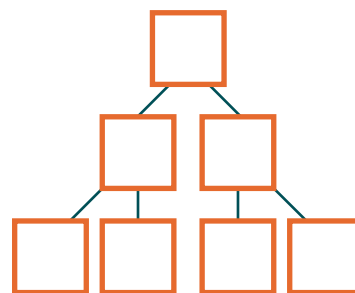
Throughput Rate = % of students who begin math or English in a given term and complete the transfer-level class within two semesters (or three quarters).

Throughput rate for students beginning one-level below = % of students who (1) pass the initial basic skills course they are placed in and (2) enroll in and successfully complete the first transfer-level course in the sequence within two semesters (or three quarters).

MMAP Methodology



Decision trees used machine learning to create groups of students with similar success rates in their first English or math class at the CCC. Algorithms parsed high school coursework, grades, and GPA to derive distinct groups of students with probabilities of success that ranged from low to very high, depending on their record of success in high school (i.e., rule sets).



Decision trees are a form of data modeling that results in a set of "if-then" statements or rules, referred to as nodes of the tree.

AB 705 Adjustments to the Rule Sets

The decision tree algorithm divides the data into groups or “nodes” of students with similar success rates based on differences in their high school achievement.

Transfer-level Subject	Node	HSGPA
Statistics	Highest	–
	Lowest	< 2.3
	Highest	≥ 3.0
Pre-Calculus [†]	Lowest	< 2.6*
	Highest	> 3.4

* <2.6 and no Pre-calculus in HS

† Pre-calculus was chosen as it is the most difficult entry-level transfer-level math course in the STEM track.

To meet AB 705 compliance, the MMAP research team focused on the lowest nodes with the lowest likelihood of success. As a result, these students theoretically

should be the most likely to benefit from placement into basic skills courses, and thus were the group used to determine throughput if placed into basic skills.

Estimating the Impact of Selection Bias

To estimate and control for possible selection bias, using the same data set that was used to form the rule sets, researchers focused on transfer-level English, statistics, and pre-calculus and characteristics of students in the lowest node.

Researchers obtained ACCUPLACER scores for a subset of English and math students and applied multiple approaches to estimate direct placement success rates for students in the lowest node.

These multiple approaches included fitting a regression model that predicts success in target courses based on high school GPA and ACCUPLACER scores. The result was a set of regression-adjusted success rates for each course.

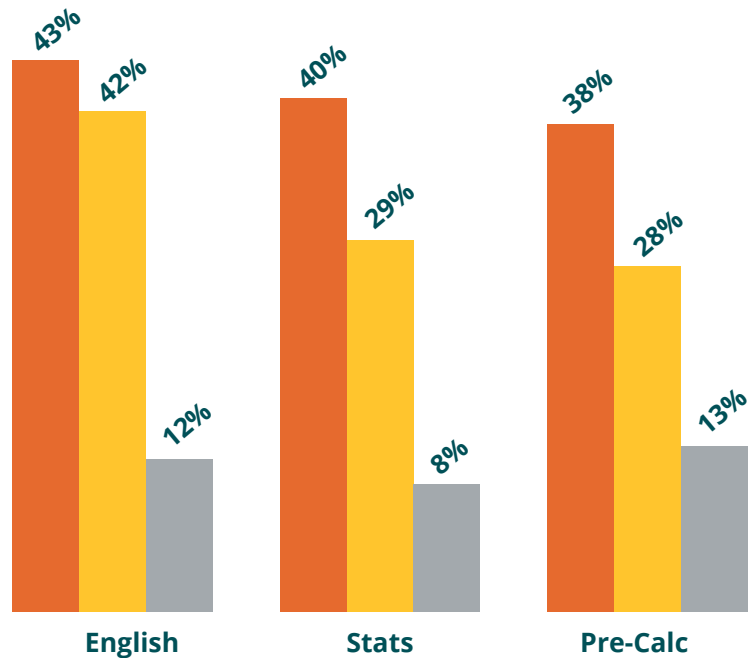
Conclusion

Students who started directly at transfer-level completed the transfer-level course at a higher rate than students who started below transfer-level, regardless of HSGPA and even when controlling for selection bias.

No groups of students, not even the lowest performing students in high school, were more likely to complete transfer-level courses if placed below transfer-level nor were any of them highly unlikely to succeed.

The MMAP team recommends each college conduct its own analyses to compare throughput rates for students at similar levels of high school achievement placed directly into transfer-level courses or below transfer-level. Further, in order to meet AB 705 requirements of completion of transfer-level math and English within one year, colleges are encouraged to evaluate and assess their placement process, curricular design, concurrent supports, and non-curricular supports as well as determine and address disproportionate outcomes for underserved populations.

Completion Rate for Students in the Lowest Node



- Direct transfer-level[‡]
- Direct transfer-level with regression adjusted model^{‡§}
- One level below transfer-level

[‡] Completion rate based on HSGPA of students in the lowest node. See the table above for HSGPA for each subject.

[§] The regression adjusted model predicts student success in target courses based on HSGPA and ACCUPLACER scores.

Colleges are encouraged to do their own analyses to compare their placement success rates to the AB 705 adjusted rates.

Learn more about MMAP: <https://bit.ly/2mnZyxd>

Learn more about AB 705: <https://assessment.cccco.edu/ab-705-implementation/>

Learn more about the MMAP decision trees: <https://bit.ly/2mNytEU>

Read the technical report on regression-adjustments here (available September 2018): <https://bit.ly/2NNly04>