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Research, Planning & Professional Development
for California Community Colleges SM

The Math Default Placement Rules Post AB 705

Predicted vs. Actual Transfer-level Math Success for Students in the Lowest Placement Band

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Introduction

This report examines the success of students with lower levels of high school performance who began in transfer-level math as a result of Assembly Bill 705 (Irwin 2017). AB 705 is historic legislation that transformed placement and eventually ended developmental education in California's community colleges.

Since community colleges are open access institutions, it is particularly important to monitor the impact of such reforms on students who are perceived to be underprepared–particularly in math, which has historically been a persistent barrier to academic progress for many students.

In this report, we focus on students in the lowest placement band of the placement rules (i.e., *default placement rules)*, that were developed by the Multiple Measures Assessment Project (MMAP) to support colleges in operationalizing AB 705. We compare the predicted versus actual success rates of students in the lowest placement band who were placed into, and began in, transfer-level math courses post-AB 705. If the predictions overestimated the success of these students, California community colleges may have grounds to revisit the efficacy of developmental education as a means for meeting AB 705's mandates.

Multiple Measures Assessment Project (MMAP) Overview

The RP Group launched MMAP in 2014 to support the advancement of developmental education reform in the California Community Colleges. MMAP now supports the California Community Colleges Chancellor's Office with the implementation of AB 705 and AB 1705, which seek to improve equitable placement into and completion of gateway transfer-level English and math courses.

Learn more about this work at **www.rpgroup.org/mmap**.

Background

The 2017 passage of AB 705 resulted in major shifts in California community college placement and remediation policies and practices. The law requires colleges to use high school coursework, grades, and grade point average (GPA) as the primary measures for determining a student's starting point in English and math. Importantly, the legislation also directs colleges to meet two standards: (1) ensure access to transfer-level English and math unless the student is highly unlikely to succeed in those courses, and (2) maximize the probability that the student completes transfer-level English and math within one year of enrolling in the discipline (commonly known as one-year throughput.)

These new placement standards shifted the focus from identifying students most likely to succeed in transfer-level courses to identifying placement practices for students *least* likely to succeed. For those students with the lowest probability of success at the transfer level, colleges had to determine whether a developmental course would improve students' likelihood of persisting to and successfully completing a transfer-level course.

To operationalize these legislative mandates into a new placement system, the Multiple Measures Assessment Project team (MMAP) used cumulative high school grade point average (HSGPA), which previous MMAP studies found to be a strong and consistent predictor of student performance across all levels of English and math, both for students coming directly from high school and students who delayed starting college (Bahr, et al., 2019).

To address the two AB 705 standards, MMAP conducted additional research based on earlier placement recommendations (The RP Group, 2018b; see also Appendix A). MMAP's analysis found that students with lower HSGPAs, had lower success rates in transfer-level courses than students with higher HSGPAs; however, they succeeded at rates above common thresholds associated with "highly unlikely" outcomes. In addition, students – regardless of HSGPA – were more likely to complete transfer-level math and English if they began in a transfer-level course instead of a developmental course. Since placement testing was prevalent at the time, the success of students with lower HSGPAs could be attributable to skills demonstrated through placement testing. For this reason, success rates for students in the lowest placement band were regression-adjusted downward using Accuplacer test scores. Even with these adjustments, the original findings held true. Therefore, in adherence to AB 705 standards, a new set of placement rules, known as the *default placement rules*, gave all students access to college-level Composition, Precalculus, and Statistics courses. Colleges were strongly encouraged to provide concurrent support for students in the lowest placement band.

This report revisits the default placement rules for math and seeks to validate regression predictions made in 2018 when the rules were developed. In this validation, we examine the actual versus the predicted performance of students in the lowest placement band who were placed into Statistics or Precalculus post-AB 705. This validation is important because the predicted transfer-level course success rates of students with low HSGPAs served as a benchmark against which developmental education outcomes were evaluated. If the predictions overestimate the success of these students in transfer-level math, the state may need to reconsider the efficacy of developmental education as a means of satisfying AB 705 placement standards.

Methodology

Consistent with the research underlying the default placement rules in math, this report investigates the performance of students whose first math course at a community college was Statistics or Precalculus and who had a high school achievement profile described by the lowest placement band for those courses in the default placement rules. **We calculated one-term success rates for students in the lowest placement band whose first math course enrollment was in Precalculus or Statistics any term between fall 2010 and spring 2022.** A success rate is the percentage of students who successfully complete the transfer-level course with an A, B, C (including +/- grades where allowable), P, and CR grade, as well as incomplete grades equivalent to a passing grade (e.g., IA, IB, IC), out of all students enrolled at first census in the course in the same term.

Enrollments and completions were counted at the system level and were not duplicated at the college level if a student was enrolled at more than one institution. We tracked student outcomes anywhere within the system.

The RP Group obtained data for this analysis from the Ed Results Partnership's Cal-PASS (Partnership for Achieving Student Success) Plus data system, which included all California community colleges submitting to the Management Information System (MIS) (*N* = 116). These data were comprised of all California community college students enrolled in one or more credit math courses between summer 2010 and spring 2022 (*N* = 3,272,497). The Cal-PASS Plus data also included students' high school transcript information for participating high schools, specifically students' unweighted HSGPA. Ultimately, 64-66% of student records had both MIS data and a valid and available HSGPA. The analytical file used for this report consisted of the subset of N=497,671 students whose first math enrollment was Precalculus or Statistics during this time period who met the definitions of lowest high school preparation for each course as defined by the default placement rules. Statistics courses also include those taught in other departments such as psychology, sociology, and business.

Findings and Discussion

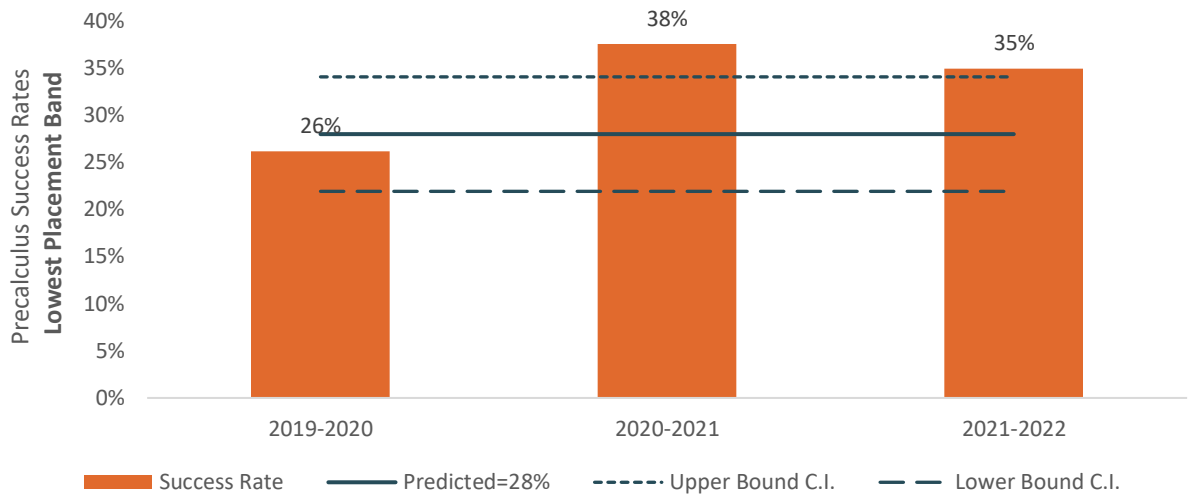
Finding 1: Post AB 705, Precalculus students in the lowest placement band of the default placement rules performed as predicted.

Validation of Predicted Success for Precalculus Students in Lowest Placement Band

For Precalculus, students in the lowest placement band of the default rules have HSGPAs of less than 2.6. In the development of the default placement rules, their success rate in Precalculus was regression-adjusted downward using Accuplacer scores to produce a predicted success rate for students post-AB 705 who would not be placed based on assessment testing. The predicted Precalculus success rate for this group was 28%, with a 95% confidence interval of 21.9% to 34.1% (RP Group, 2018b).

Figure 1 shows the statewide Precalculus success rate for students in the lowest Precalculus placement band who took Precalculus as their first math course post-AB 705. The lines mark the predicted success rate of 28% and the upper and lower bounds of the associated 95% confidence interval.

Figure 1. Precalculus Success for Lowest Precalculus Placement Band



Note: Cohorts are students in the lowest placement band who enroll in Precalculus as their first math course post AB 705. Success rate is one-term success for students starting in any term within the academic year.

In all three post-AB 705 cohorts, Precalculus success rates for students in the lowest Precalculus placement band were either within or above the 95% confidence interval for the predicted rate. In 2019-2020, the first year of implementation, the success rate of 26.1% was below the predicted rate by about two percentage points, an amount less than the standard error of three percentage points. In the next two years, success rates were 37.6% in 2020-2021 and 35.0% in 2021-2022, which exceeded the upper bound of the 95% confidence interval by 3.5 and 0.9 percentage points, respectively.

This analysis validates the accuracy of the regression-adjusted prediction for the Precalculus success rate for students in the lowest placement band of the default placement rules.

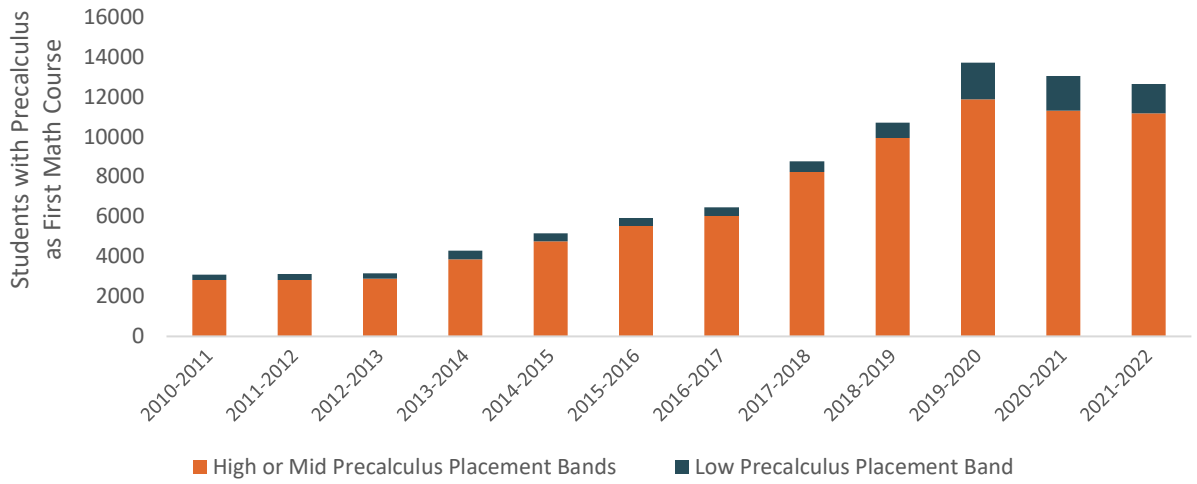
Despite low success rates, it is important to remember that students with lower high school performance are more likely to complete Precalculus if they start in Precalculus instead of in intermediate algebra or another developmental math course. After adjusting for STEM intent, only 13% of students in the lowest band of Precalculus placement, who began in intermediate algebra at a community college, successfully passed, progressed to, and completed Precalculus within a year (The RP Group, 2018b). Direct access to Precalculus improved their likelihood of completing Precalculus two-fold in 2019-2020 (26%) and nearly three-fold in 2020-2021 (38%) and 2021-2022 (35%).

Nevertheless, Precalculus success rates are predictably low for this group, which is why the default placement rules strongly recommend that colleges provide concurrent support for students in the lowest placement band while they are enrolled in Precalculus. Yet, colleges have been slow to follow this recommendation. In fall 2020, only 25 community colleges offered corequisite support for Precalculus (PPIC, 2021a).

Additional Discussion

The number of students taking Precalculus as their first community college math course has increased over time. Figure 2 shows Precalculus enrollments for first-time math students disaggregated by placement band. In 2019-2020, 2.3 times as many students (an additional 7,786) began math in Precalculus compared to 2015-2016.

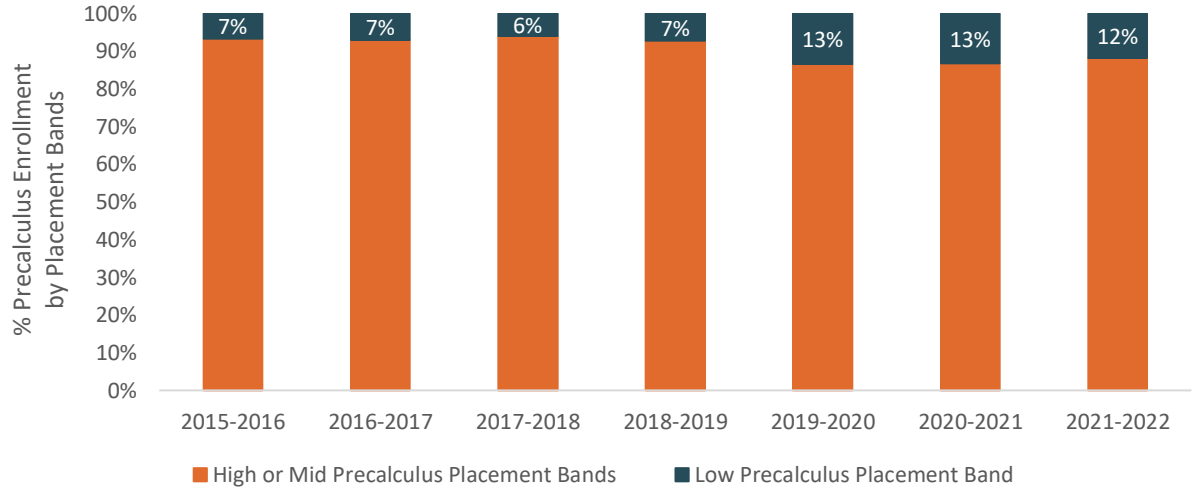
Figure 2. Number with Precalculus as First Math Course, Disaggregated by Placement Bands



Note: See Appendix B, Table B.1 for enrollment counts disaggregated by placement bands.

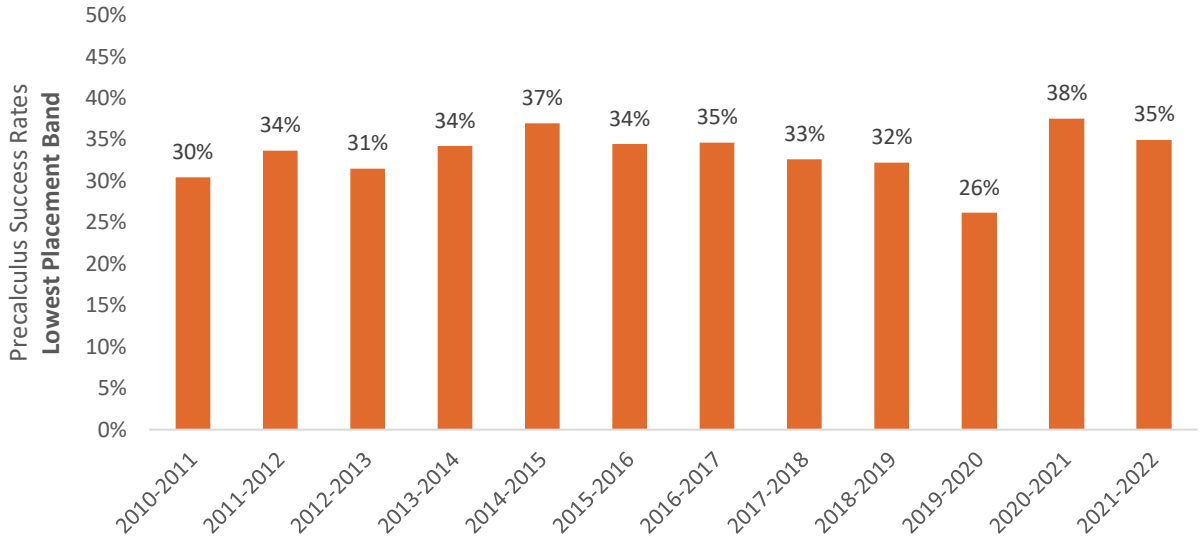
With the fall 2019 implementation of AB 705, a larger percentage of students starting in Precalculus were in the lowest placement band, as shown in Figure 3. For example, of the students enrolling in Precalculus as their first math course, the percentage in the lowest placement band increased from 7% in 2015-2016 to 13% in 2019-2020 – an additional 1,452 students.

Figure 3. Percent with Precalculus as First Math Course, Disaggregated by Placement Bands



Despite the increase in access to Precalculus both before and after AB 705, students in the lowest placement band have performed somewhat consistently. Figure 4 shows Precalculus success rates over time for students with high school performance described by the lowest placement band. In the years prior to 2019-2020, most students gained access to Precalculus by passing a placement test, but skills demonstrated on a placement test did not translate into higher success rates for students with lower high school GPAs. These students have always struggled in Precalculus and clearly need additional academic support.

Figure 4. Precalculus Success on First Attempt for Students in Lowest Placement Band



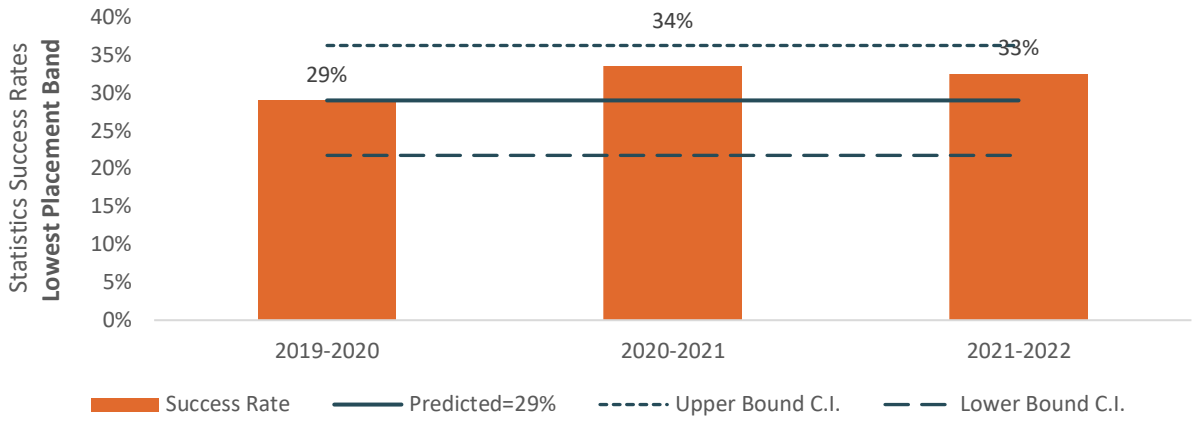
Note: Cohorts are students in the lowest placement band who enroll in Precalculus as their first community college math course. Success rate is one-term success for students starting in any term within the academic year.

Finding 2: Post AB 705, Statistics students in the lowest placement band of the default placement rules performed as predicted.

Validation of Predicted Success for Statistics Students in Lowest Placement Band

Figure 5 shows the Statistics success rate for students in the lowest placement band (high school GPA < 2.3) who took Statistics as their first math course post-AB 705. In Figure 5, the lines mark the predicted success rate of 29% and the upper and lower bounds of the associated 95% confidence interval, 21.8% to 36.3% (The RP Group, 2018b).

Figure 5. Statistics Success for Lowest Statistics Placement Band



Note: Cohorts are students in the lowest placement band who enroll post-AB 705 in Statistics as their first community college math course across all disciplines offering introductory statistics. Success rate is one-term success for students starting in any term within the academic year.

Post AB 705, Statistics success rates for students in the lowest Statistics placement band were within the 95% confidence interval for the predicted rate. In 2019-2020, the first year of implementation, the success rate was the predicted rate. In the next two years, success rates exceeded the predicted rate, by 4.5 percentage points in 2020-2021 and 3.5 percentage points in 2021-2022, an amount less than two standard errors. **This analysis validates the accuracy of the regression-adjusted prediction for the Statistics success rate for students in the lowest placement band of the default placement rules.**

Despite lower success rates in Statistics, it is important to remember that students with lower high school performance are more likely to complete Statistics if they start in Statistics instead of taking developmental education courses. AB 705 research underlying the default placement rules found that the Statistics throughput rate from developmental courses one level below transfer was 8%, after adjusting for transfer-intent (The RP Group, 2018b). Direct access to Statistics substantially improved their likelihood of successfully completing Statistics by a factor of more than 3.6 in 2019-2020 (29%) and over four-fold in 2020-2021 (33.5%) and 2021-2022 (32.5%).

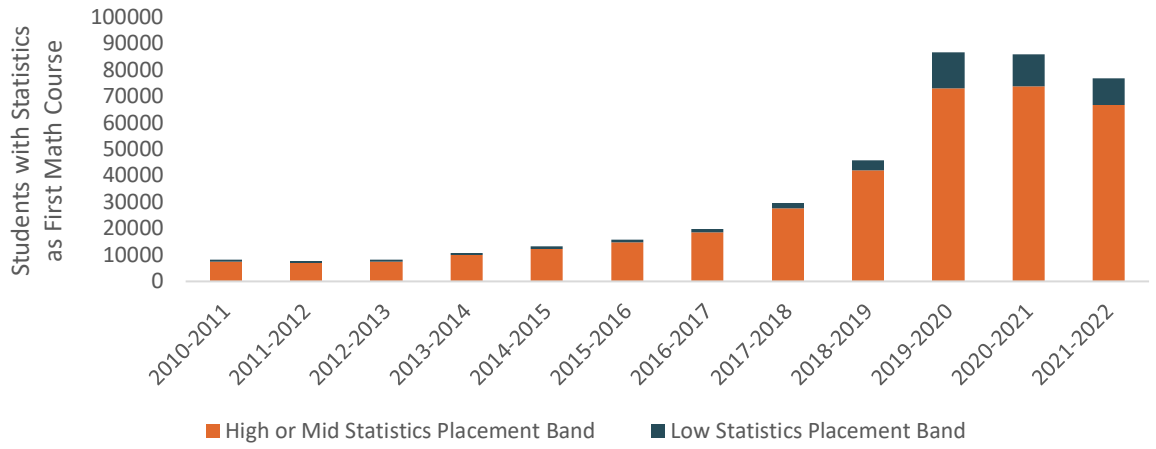
Nevertheless, Statistics success rates are predictably low for this group, which is why the default placement rules strongly recommend that colleges provide concurrent support to students in the lowest placement band. Many colleges acted on this recommendation. In fall 2020, 92 of the 115 colleges that offered Statistics had at least one corequisite-supported section (PPIC, 2021a).

Additional Discussion

By the AB 705 implementation deadline of fall 2019, 5.5 times as many students (an additional 70,914) enrolled in Statistics as their first math course compared to 2015-2016. As expected, a noticeably larger proportion of these students were in the lowest placement band. Figure 6

shows the volume of students with Statistics as their first community college math course, disaggregated by placement band.

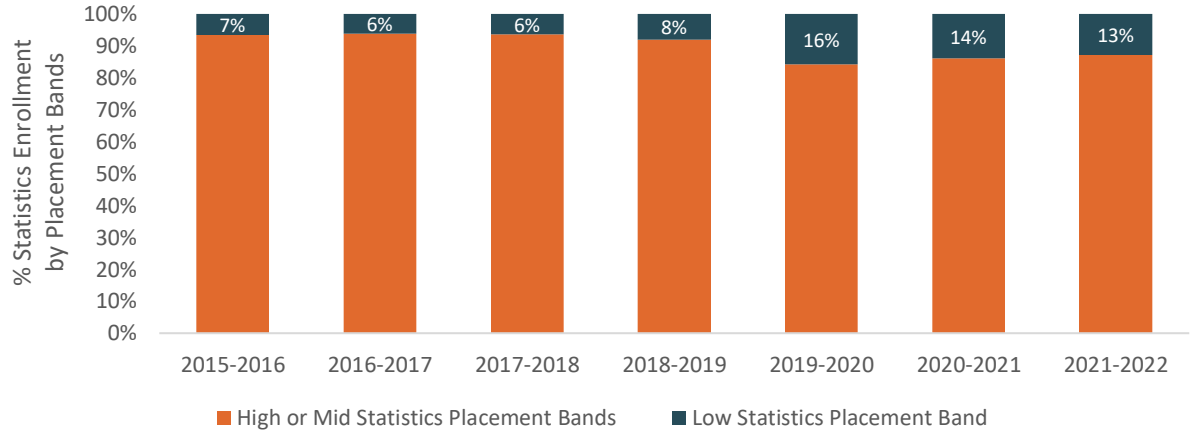
Figure 6. Number with Statistics as First Math Course, Disaggregated by Placement Ba***nds***



Note: Cohorts are students enrolling in Statistics as their first community college math course. Enrollments include Statistics taught across multiple disciplines. See Appendix B, Table B.2 for enrollment counts.

In the years prior to AB 705, the percentage of students starting math in a Statistics course who were in the lowest placement band was fairly constant, around 7%, as shown in Figure 7. This percentage doubled in 2019-2020 to 16%, the deadline for AB 705 implementation, and remained almost as high in subsequent years.

Figure 7. Percent with Statistics as First Math Course, Disaggregated by Placement Bands

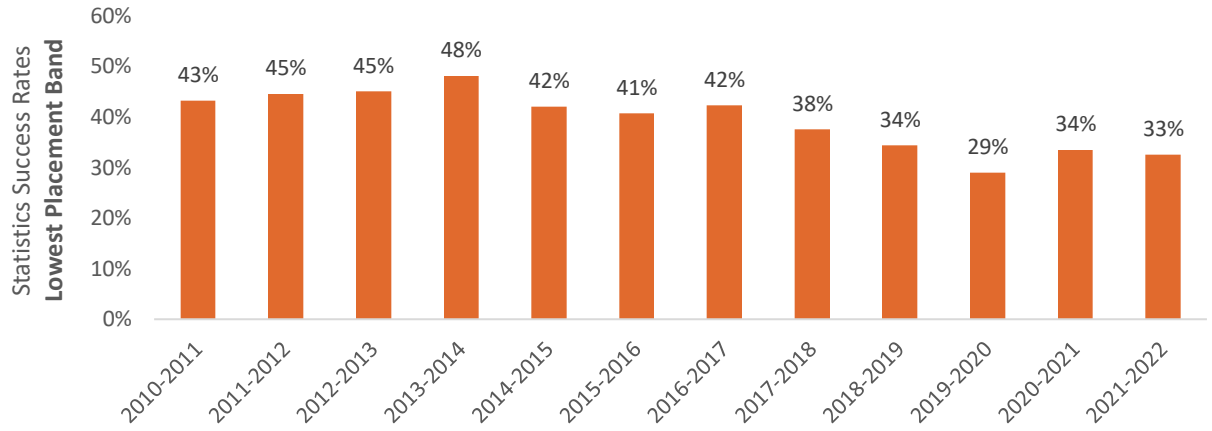


Note: Cohorts are students enrolling in Statistics as their first community college math course. Enrollments include introductory, college-level Statistics taught across all disciplines.

With the increase in access to Statistics, the performance of students in the lowest placement band declined to levels predicted by the regression adjustments. Figure 8 gives Statistics success rates over time for lowest placement band students (high school GPA < 2.3). Statewide placement policies did not ensure concurrent support for these students. Approximately 25% of

students who took Statistics as their first math course also enrolled in a concurrent support course, but we do not know the percentage in the lowest placement band who did so. In addition, 20% of colleges did not offer corequisite support for Statistics at all, and those that did often did not make it a requirement for any student (PPIC, 2021a).

Figure 8. Statistics Success on First Attempt for Students in the Lowest Placement Band



Note: Cohorts are students in the lowest placement band taking Statistics, offered in any discipline, as their first community college math course. Success rate is one-term success for students starting in any term within the academic year.

Conclusion

Research conducted by MMAP to inform the development of AB 705 default placement rules forecasted that **students with lower high school performance are much more likely to complete Precalculus or Statistics when they began in those courses than if they start in developmental education**. Our current analyses confirms that this research accurately predicted the success of students in the lowest placement bands for Statistics and Precalculus in the years after AB 705 implementation. These findings reaffirm the conclusions drawn from the original research, which led to the end of student placement into developmental education under AB 705 standards.

While student access to and completion of Precalculus and Statistics has improved, students in the lowest placement bands continue to have predictably low success rates in these courses. **These outcomes underscore the strong recommendation in the default placement rules that colleges provide concurrent support for these students.** In addition to academic support in math, these students may also need a wider range of support services to progress in college. Post-AB 705 research shows that students who started in a transfer-level math course and did not complete it on their first attempt also struggled in college coursework outside of math: 36% earned fewer than half of the non-math units they attempted and 65% had a non-math GPA < 3.0 (PPIC 2021b). Our report **validates the research underlying the default placement rules and underscores the work that remains to be done to holistically support students with lower high school performance**.

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Appendix A Development of the Default Placement Rules

Predicting Course Success Using High School GPA

The AB 705 default placement rules were based on MMAP decision tree algorithms that parsed hundreds of thousands of student records using high school coursework, grades, and GPA to identify students who had similar success rates when starting in a specified English or math course (MMAP, 2018a). From the decision tree analysis, the high school achievement profiles for students with high, middle, and low probabilities of success when starting directly in each transfer-level course became three bands in the default placement rules for the courses. Table A1 gives the specific high school performance metrics and values delineating the bands for the three courses in the default placement rules– English Composition, Precalculus, and Statistics.

Table A1. Bands in the Default Placement Rules

Transfer-level Course	High School Performance Metrics from Decision Tree Analysis	
	Lowest Probability of Success	Highest Probability of Success
English	HSGPA < 1.9	HSGPA >=2.6
Precalculus	HSGPA < 2.6	HSGPA >=3.4
Statistics	HSGPA < 2.3	HSGPA >=3.0

Applying AB 705 Standards

Students with the lowest HSGPAs had the lowest probability of success when placed directly into these transfer-level courses. These students were the only possible candidates for whom the "highly unlikely to succeed" AB 705 placement standard might apply. These students were examined further in light of the "maximize the probability of completion" standard to determine if starting in a course one level below transfer level improved their chances of completing a transfer-level course within a year of their initial enrollment in the discipline. To be precise, researchers examined students in the lowest placement band who started in the transfer-level course and determined the percentage who earned a grade of C or better on their first attempt (one-term success rate). The researchers then examined students in the lowest placement band who started in a course one level below transfer level and determined the percentage who completed the transfer-level course within a year of their initial enrollment in the discipline (one-year throughput rate).

Adjusting for Future Cohort Differences

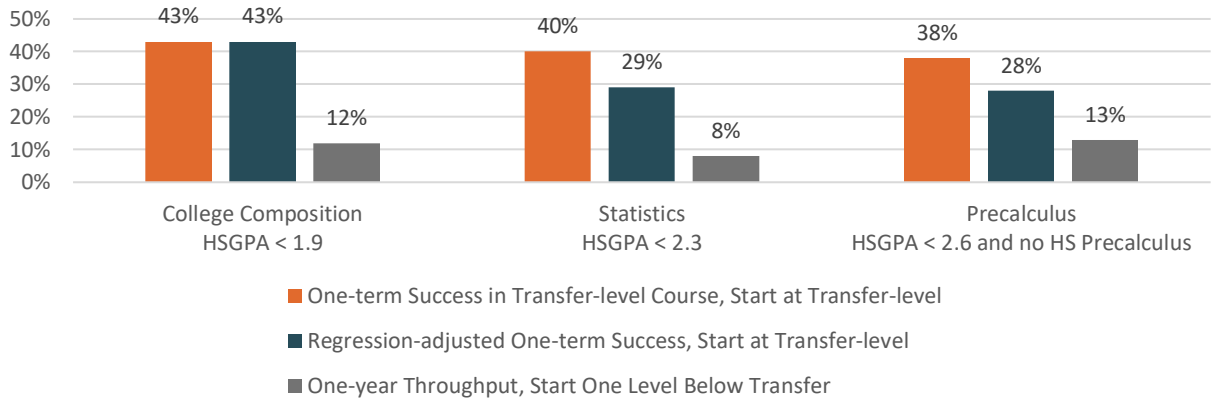
Finally, success rates were adjusted to control for the effects of placement testing. Specifically, course success rates for students in the lowest placement band were regression-adjusted using Accuplacer scores (MMAP 2018b). This adjustment was made because before the implementation of AB 705, students with lower HSGPAs who started in transfer-level courses

may have demonstrated skills through placement testing that contributed to their success. After the implementation of AB 705, students did not take placement tests.

Determining the Placement That Meets AB 705 Standards

Figure A1 shows the results of this analysis for students in the lowest placement band for College Composition, Statistics, and Precalculus. For these students, Figure A1 compares (1) the one-term success rates for students taking the transfer-level course as their first course in the discipline, (2) the regression-adjusted one-term success rates, and (3) the one-year transfer-level course throughput rates for students starting one-level below. For example, among students in the lowest placement band for Statistics (high school GPA < 2.3), 40% who started directly in a transfer-level Statistics course successfully completed Statistics with a C or better within one term. With regression adjustments using Accuplacer scores, the estimated one-term success rate for this group was 29%. For those students indicating transfer-intent who started in a math course one level below transfer, 8% completed the Statistics within a year.

Figure A1. Comparison of Transfer-level Completion Outcomes for Students in the Lowest Placement Band by Starting Level with Regression Adjustments



To develop the default placement rules, AB 705 placement standards were applied to these findings. Students in the lowest placement band had the lowest probability of success when starting in transfer-level courses but succeeded at rates above common thresholds associated with "highly unlikely" outcomes, even after regression adjustments based on Accuplacer scores. Furthermore, starting in pre-transfer-level courses did not produce higher completion of the transfer-level course. Students starting below transfer level were much less likely to eventually complete a transfer-level course compared to students with similar high school achievement profiles starting directly in transfer-level courses, even with regression adjustments, as shown in Figure A1 (MMAP, 2018a). Therefore, to meet AB 705 standards, the default placement rules stated that students in every high school performance band should have direct access to college Composition, Statistics, and Precalculus. Colleges were advised to provide corequisite or other concurrent support for students in the lowest placement band who enroll in the transfer-level course.

Appendix B Tables

Table B1. Data for Figures 2 and 3. Number of Students with Precalculus as First CCC Math Enrollment in Any Term in the Academic Year, Disaggregated by Placement Bands

Precalculus Placement Bands	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
High or Mid	2,813	2,838	2,891	3,856	4,750	5,523	6,017	8,241	9,925	11,857	11,313	11,158
Low	286	300	251	427	403	392	459	525	770	1,844	1,715	1,482

Table B2. Data for Figures 6 and 7. Number of Students with Statistics as First CCC Math Enrollment in Any Term in the Academic Year, Disaggregated by Placement Bands

Statistics Placement Bands	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
High or Mid	7,402	7,019	7,564	9,937	12,209	14,740	18,509	27,654	42,013	72,933	73,768	66,772
Low	701	583	565	843	918	1,037	1,227	1,914	3,682	13,758	11,951	9,936

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