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

Introduction

The goal of the original MMAP placement recommendations was to identify students who were highly likely to succeed at any given level of an English and math course. The results suggested that many students had been placed too low, with underrepresented minority and female students placed disproportionately lower than their non-minority and male peers, especially in math.

The passage of AB 705 required the field to think differently and determine how best to maximize overall completion of the transfer-level course (“throughput”) in one year rather than determining who is highly likely to succeed in a particular course, regardless of level. The throughput rate is the percentage of students who complete transfer-level English or math courses with a grade of C or better within two primary semesters or three primary quarters. For students beginning below transfer-level, the throughput rate is defined as the percentage of students who attempt and succeed in the initial basic skills course in which they are placed, then enroll and pass any subsequent basic skills courses, before finally enrolling in and successfully completing the first transfer-level course in the sequence. Unlike the original goal of MMAP to identify students who are highly likely to succeed at a particular level, AB 705 changes the task to identifying students highly unlikely to succeed if directly placed into transfer-level.

MMAP Methodology

The MMAP decision trees¹ include all students enrolled in an English or math course in the California Community College (CCC) system who also had four full years of high school data available in the California Partnership for Achieving Student Success (Cal-PASS Plus) data system, resulting in 250,000 cases. As such, MMAP research is based on retrospective data—students who had already been placed, enrolled, and completed courses in the CCC system between 2008 and 2014. The decision trees depict students’ success rates using course grades in the first English or math course they completed at a CCC and other transcript information. Example transcript information included in the models includes cumulative unweighted high school grade point average (HSGPA), highest courses completed, type of course completed (by level and subject matter), and delay between high school and college.

Decision rules were formed by setting certain criterion, so that if students met or exceeded a minimum average probability of success at a certain level, they would be grouped together. The chosen criterion (70% predicted success rate at transfer-level) represents the minimum average successful completion rate of groups of students that the model places into that level of courses.

AB 705 Adjustments to the Rule Sets

In the decision trees, a machine-learning algorithm had split the data to create groups or “nodes” of students with similar success rates based on the inputs (high school transcript information). For example, students with an HSGPA below 1.9 have a 43% predicted success rate in transfer-level

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¹ Decision trees are a form of data modeling that results in a set of “if-then” rules, where the if-then statements are referred to as “nodes” or “leaves” of the tree.
English (the lowest node), while students with an HSGPA greater than or equal to 3.1 have an 87% predicted success rate (the highest node). To meet AB 705 compliance, the MMAP research team focused on the lowest nodes with the lowest likelihood of success, as these students are expected to be least likely to succeed in the target course and presumably most likely to benefit from placement into basic skills courses. While these lowest node characteristics involve only HSGPA, higher nodes for math courses involve other characteristics, such as completion of Algebra II (intermediate algebra).

The success rates of students in the lowest node are based upon the rates of success among students with the lowest HSGPA who were also eligible to enroll into the transfer-level course. One could assume that low GPA students who were historically placed into below transfer level work are academically lower performers than those historically placed into transfer-level and that their success rates might be lower than students who historically placed into transfer-level. The concern is that direct transfer-level placement of students who both have lower high school performance and were historically placed into basic skills courses may lower their overall success rate at transfer-level.

This concern is referred to as “double placement.” To estimate the impact of double placement, the MMAP research team used the same data set used to develop the original MMAP rule sets and focused on transfer-level English, statistics, and pre-calculus, and the characteristics of the students in the lowest node of the decision tree. The MMAP research team obtained ACCUPLACER scores for a subset of English and math students and used multiple approaches to estimate direct placement success rates for the 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 as set of regression-adjusted success rates for each course.

**Conclusion**

Based on the analysis described above, for all three courses (transfer-level English, statistics, and pre-calculus), 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. Direct transfer-level completion in English among students in the lowest node (HSGPA < 1.9) was 43% (39% for the regression-adjusted model) compared to 12% among students who started at one level below transfer-level. For statistics, the completion rate for the lowest node (HSGPA < 2.3) was 40% (29% for the regression-adjusted model), compared to 10% for students who started at one level below. For pre-calculus, the completion rate in the lowest node (HS GPA < 2.6) was 38% (27% for the regression-adjusted model) compared to 13% for students who started at one level below.

This analysis did not result in evidence that students with a low HSGPA would have higher throughput rates by being placed into traditional remediation; therefore, we are unable to identify any group of students who are highly unlikely to succeed if directly placed into transfer-level English, statistics, or pre-calculus. The MMAP Research Team recommends, and has always recommended, that colleges conduct their own analyses to compare below-transfer-level basic skills throughput rates to direct transfer-level placement success rates both with and without specialized support such as co-requisites to ensure that local data support the statewide findings. Additional details on the rule sets can be accessed [here](#).

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2 English – Students in the lowest node = 7,294; students in the regression adjusted model = 1,749; students who started one level below = 13,241.
Statistics – Students in the lowest node = 1,485; regression adjusted model = 809; students who started one level below = 11,309.
Pre-Calculus – Students in the lowest node = 1,753; regression adjusted model = 661; students who started one level below = 18,917.