Method Detail for Let Icarus Fly Slides

Slide 3 & 4: Required repetition of previously successful courses.
The data used come from the data set constructed for the Multiple Measures Assessment Project covering students with available high school data from a public California high school in CalPASS Plus, the voluntary intersegmental education longitudinal data system in California funded by the California Community Colleges and managed by Educational Results Partnership. Students in the sample enrolled in their first math course in a California Community College between 1997 and 2015 (but with more limited data for initial enrollments prior to 2003) covering 1,253,605 students. More detail about this sample can be found in Bahr et al., forthcoming – unpublished version available here: https://umich.app.box.com/v/Bahr-2017-PlacementAccuracy. Using the CalPADS codesets for Course Group State (https://www.cde.ca.gov/ds/sp/cl/systemdocs.asp) to determine final level of mathematics successfully completed in high school with a C- or better and the CCCCO Management and Information System (MIS) code CB21 (http://extranet.cccco.edu/Portals/1/TRIS/MIS/Left_Nav/DED/Data_Elements/CB/cb21.pdf) to determine the level of first mathematics enrollment at a California Community College, mathematics courses were ranked starting from courses prior to pre-algebra and including algebra, geometry, intermediate algebra (or algebra 2), and college level courses or higher (i.e., courses post-intermediate algebra for both community colleges and high school, including statistics, college algebra, trigonometry, precalculus, and calculus) for the comparison. (As a result, for the purposes of this simplified comparison, a student who finished in precalculus but started in the community college at college algebra would not be counted as starting two levels below where she finished in high school.) For slide 4, the average number of courses students were required to complete was disaggregated by demographic characteristics as determined by student self-report at application to their community college.

Slide 5: MMAP Placement Recommendations.
Because student placements are not stored in the CCCCO's MIS system and thus are not available in CalPASS Plus (thus, precluding one from knowing the assessments of students who never enrolled in a course in mathematics), Slide 5 uses as a baseline estimate of the percentage of students statewide placed into developmental mathematics in the California Community Colleges the historic rates of student placement below transfer as reported in the last Basic Skills Accountability: Supplement to the ARCC (Accountability for the Community Colleges) Report published by the California Community Colleges Chancellor's Office in 2012, available here (see Table C1): http://californiacommunitycolleges.cccco.edu/Portals/0/reportsTB/REPORT_BASICSKILLS_FINAL_110112.pdf. Estimates of students who could have been placed into transfer-level is based on students identified as part of the MMAP research as students likely to have a success rate of 70% or higher in at least one-transfer level course (statistics, general education and liberal arts mathematics, college algebra, or higher). This rate was selected as a conservative threshold to be met by the statewide Multiple Measures Workgroup that was a subgroup working for the Statewide Common Initiative Steering Committee, a collaborative statewide effort to design an assessment that could be used by colleges systemwide. This percentage was selected because it was effectively the statewide average success rate in transfer-level English for the previous year, which was just below 70%. Even though the statewide success rate for entry-level transfer-level mathematics was somewhat lower (just below 67%), the same target rate of 70% was used for mathematics out of an abundance of fairness. Again, Bahr et al (forthcoming) provides details about the overall sample as well as the method for developing the placement recommendation thresholds. In addition, the results of the decision-tree analyses for courses in mathematics are available here: http://rpgroup.org/Portals/0/Documents/Projects/MultipleMeasures/DecisionRulesandAnalysisCode/Math-Decision-Trees-4_3_16.pdf and a summary of the high school performance required for recommendation for placement into courses throughout the mathematics sequence are available here: through outcomes of the decision tree analyses are available at: https://rpgroup.org/Portals/0/Documents/Projects/MultipleMeasures/DecisionRulesandAnalysisCode/Statewide-Decision-Rules-5_18_16_1.pdf

Slide 6: College-level course completion by pilot colleges.
Early pilot colleges provided the success completion rates (completion of the course with a C or better) of students placed into transfer-level courses using the MMAP placement recommendations described above compared to students enrolled in the same courses at the institution in the same terms as the initial pilot who either were placed there directly by the test or who had initially been placed below transfer-level into developmental mathematics courses but had successfully completed the required prerequisite courses they had been assigned to complete before advancing to the transfer-level course. The early pilot college results are available by college here: https://www.dropbox.com/s/z479z2ii8rb7jdv/PilotCollegeResults2017Final.pdf?dl=0. The California Community College Chancellor's Offices Basic Skills Cohort Progress Tracker (available here: https://datamart.cccco.edu/Outcomes/BasicSkills_Cohort_Tracker.aspx) was used to determine the percentage of students who began either one or two levels below who successfully completed any transfer-level math course within two years of their first mathematics enrollment.

S**lide 7: What about everybody else?**
This slide again uses the decision tree analyses in mathematics referenced earlier. However, instead of being used to identify students who were the most likely to successfully complete the course as before, the decision trees were instead used to identify students from the analysis who were the *least* likely to successfully completed a course based on their high school performance. In referring to the decision-trees, one can usually find this subset of students to the bottom left of the decision-trees for the course.

Slide 8: Lowest performing high school students.
Using the high school performance thresholds of the students least likely to succeed in the mathematics course in question, the success rate of students who started in that course was compared to the cohort completion rate, or throughput, of students in the same, lowest range of high school performance within a year, a guideline used because it was required by statute, California Assembly Bill 705 (AB705) for students in the MMAP analytical data set described above and detailed in Bahr et al, 2017. Additionally, students' performance on Accuplacer was available for a subset of students. In order to control for possible selection effects associated with placement into the courses, the success rates of the lowest performing band of students who had placed into transfer courses was adjusted downward to account for differences in their standardized test performance as was differences in the overall distribution of high school performance of students who placed into transfer-level vs. one level below. Multivariate regression was used to predict success rate in target transfer-level using GPA and test scores. The average HSGPA and test scores for students in the lowest range of high school performance were calculated for each level of first course attempted which were then used in the regression model to predict success in the target course. Success rates were estimated by weighting estimates from each level by the number of students beginning at each level, with a standard error of prediction from the regression used to create a confidence interval for the estimated success rate. More details and the analytical code for this adjustment are available here:
https://rpgroup.org/Portals/0/Documents/Projects/MultipleMeasures/Publications/MMAP_AB705_TechnicalPaper_FINAL_091518.pdf. In sum, the success rates for students placed directly into transfer-level courses were adjusted downwards in order to control for potential selection effects that might be correlated with success rates, as evident from the downward adjustment of the success rates by the estimation process.

Additionally, the throughput rates for mathematics were adjusted upwards in three ways. First, the denominator was adjusted downward, increasing the throughput rate, to remove the proportion of students with educational goals that did not require the completion of a transfer-level math course (e.g., completion of a certificate, completion of a local associate degree without intent to transfer, etc.) and so would have been far less likely to attempt one in the past. However, any completion of transfer-level math was still included in the denominator, even if completed by a student with a goal that did not require a transfer-level course. Second, the denominator was adjusted further downward to reflect the proportion of students in non-STEM pathways (removing the proportion of STEM pathway students from the denominator) and in STEM pathways (removing the proportion of non-STEM pathways students from the denominator). However, again, any transfer-level math course was counted for as a successful completion for statistics (thus making sure to count other routes to completion of the transfer-math requirement for non-STEM students) and, even in the STEM pathway, counting any STEM courses below precalculus such as college algebra or trigonometry as a completion to be as fair as possible to colleges that might have additional courses between intermediate algebra and precalculus so as not to penalize the completion rate for different choices in curricular structure of the mathematics sequence.

Slide 9: Disaggregation by subgroups.
Two separate reports covering the disaggregation of the comparison between completion of the transfer-level course when placed there and when starting one-level below are available here:
http://rpgroup.org/Portals/0/Documents/Projects/MultipleMeasures/Publications/AB705_DSPS_EOPS.pdf and here:
http://rpgroup.org/Portals/0/Documents/Projects/MultipleMeasures/Publications/AB705_Gender_Ethnicity.pdf. There was no subgroup that was more likely to complete the transfer-level course if they started one level below than if they started directly in the transfer-level course.

Slide 11: Preliminary findings. A custom dataset was generated using CalPASS Plus data to match students with available high school data to college data for two colleges that were early adopters of corequisite supports for Statistics. The total sample of students with both available high school data and who enrolled in a Statistics course with corequisite support at one of the two institutions from F2016-Spring 2018 was 498, 202 students with a HSGPA <2.3, 214 with a HSGPA between 2.3 and 3.0, and 82 with a HSGPA ≥ 3.0.