Replicating AB 705 Adjustments Locally

Craig Hayward, Bakersfield College + The RP Group
John Hetts, Educational Results Partnership + CalPASS Plus
Dan Lamoree, Educational Results Partnership + CalPASS Plus
Mallory Newell, De Anza College + The RP Group
Craig Rutan, Academic Senate for California Community Colleges
Terrence Willett, Cabrillo College + The RP Group

MMAP Webinar
September 19, 2018
Agenda

1. How to acquire your CalPASS data
2. How to merge your CalPASS data and your local assessment data
3. Running the adjustment regression (in R and in SPSS) with demo
4. Interpreting the results
5. Research prioritization
6. Q & A
Multiple Measures Assessment Project

- Ongoing, multiple year collaborative effort of CCCC0, Common Assessment Initiative (CAI), RP Group, Cal-PASS Plus (Educational Results Partnership & San Joaquin Delta College), and now >90 CCC pilot colleges
- Identify, analyze, & validate multiple measures data (including HS transcript data, non-cognitive variable data, & self-report HS transcript data)
- Focus on predictive validity (success in course) using classification and regression tree models (robust to missing data, non-linear effects, and interactions)
  - Very conservative approach: target ≥70% success rate in college level course
- Engage pilot colleges to conduct local replications, test models and pilot use in placement, and provide feedback
## English & Math Transfer-Level Placement Recommendations

<table>
<thead>
<tr>
<th>Transfer Level Course</th>
<th>Recommended for Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>HS GPA ≥ 2.6</td>
</tr>
</tbody>
</table>
| Statistics Passed Algebra I (or better)| HS GPA ≥ 3.0  
\textit{or}  
HS GPA ≥ 2.3 & Pre-Calculus C (or better) |
| Precalculus Passed Algebra II (or better) | HS GPA ≥ 3.4  
\textit{or}  
HS GPA ≥ 2.6 & enrolled in Calculus |

# Placement/Support Recommendations: English

<table>
<thead>
<tr>
<th>High School Performance</th>
<th>AB 705-Compliant Placement</th>
</tr>
</thead>
</table>
| **HSGPA ≥ 2.6**         | Transfer-Level English Composition  
No additional academic or concurrent support required |
| **HSGPA 1.9 - 2.6**     | Transfer-Level English Composition  
Additional academic and concurrent support recommended |
| **HSGPA < 1.9**         | Transfer-Level English Composition  
Additional academic and concurrent support strongly recommended |

For students with high school transcripts within 10 years of enrollment at CC, excluding students locally determined to be ESL.
## Placement/Support Recommendations: Statistics

<table>
<thead>
<tr>
<th>High School Performance</th>
<th>AB 705-Compliant Placement</th>
</tr>
</thead>
</table>
| HSGPA ≥ 3.0 OR HSGPA ≥ 2.3 & ≥C in Precalculus | Transfer-Level Statistics  
No additional academic or concurrent support required |
| HSGPA 2.3–3.0 | Transfer-Level Statistics  
Additional academic and concurrent support recommended |
| HSGPA < 2.3 | Transfer-Level Statistics  
Additional academic and concurrent support strongly recommended |

For students with high school transcripts within 10 years of enrollment at CC, completion of HS Algebra*
**Placement/Support Recommendations: BSTEM Math**

<table>
<thead>
<tr>
<th>High School Performance</th>
<th>AB 705-Compliant Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSGPA ≥ 3.4 OR HSGPA ≥ 2.6 &amp; enrolled in HS Calculus</td>
<td>Transfer-Level Gateway STEM Math</td>
</tr>
<tr>
<td></td>
<td>No additional academic or concurrent support required</td>
</tr>
<tr>
<td>HSGPA ≥2.6 or Enrolled in HS Precalculus</td>
<td>Transfer-Level Gateway STEM Math</td>
</tr>
<tr>
<td></td>
<td>Additional academic and concurrent support recommended</td>
</tr>
<tr>
<td>HSGPA ≤ 2.6 and no Precalculus</td>
<td>Transfer-Level Gateway STEM Math</td>
</tr>
<tr>
<td></td>
<td>Additional academic and concurrent support strongly recommended</td>
</tr>
</tbody>
</table>

For students with high school transcripts within 10 years of enrollment at CC and who completed Algebra 2/Intermediate Algebra/Integrative Math 3 or higher in high school*
Possible Questions for Local Researchers

• Do the state level rules apply well to our college?
• Does our remedial sequence outperform direct transfer level placement?
• Do we have one or more subgroups who require extra and/or specialized supports?
• What support strategies optimize student achievement?
Beware Implicit Bias

- Different demographic groups may not be homogenously distributed geographically so creating rules that vary by high school can then result in different rules for different ethnic groups or different socioeconomic status.
  - Consider communicative/relational consequences vs. relative utility
- We are required to give students with disabilities equal opportunity through accommodations, not by differential exclusion with placement rules.
Obtaining Your Data for Research Purposes

• Researchers can upload a student cohort file containing all past students to CalPASS Plus (http://calpassplus.org) to generate a research file that will mirror the data file received for placement.
  – Data matches will be rarer for students who attended high school prior to 2011 and largely unavailable for students who attended high school prior to 2006.

• Alternatively, researchers can request the local slice of the retrospective data file (http://bit.ly/MMAPRetrospective) used in the original MMAP research from ERP (dlamoree@edresults.org).
Welcome to Cal-PASS Plus, California’s actionable system of data linking student performance from pre-K through 12, to college and the workplace.

Explore Data and Collaborate

Pre K-12 Schools
Community Colleges
Universities
Regional Learning Councils

Education-to-Work Pipeline

Select Your Region OR Select Your County

Early Childhood Education
Elementary Education
High School Readiness
College Readiness and Access
Certificates and Completion
Higher Education

School Readiness
Elementary School
High School
College Readiness
Certificate and Degree Transfers
Baccalaureate Completion
Employment and Living Wage Jobs

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File Submission

This page is for submitting your data files. We have created a new, simple process so you can upload your files without using the old "validator" system.

This file submission takes place over SSL-encrypted protocol and files are never stored on our web servers (not even temporarily). They are immediately deposited into the secure storage, not accessible via Internet. It is more secure than FTP (SFTP, or FTPS).

**File Purpose**

Select purpose:

- Help Desk
- CALPADS
- CAHSEE
- STAR
- Legacy Cal-PASS K-12 Submission
- University Level Data Submission
- MMAP Student Cohort File

Choose files

Links to the data descriptions and definitions found under File Purpose:

- **CALPADS**: Submit all end of year files. Click link for more details. **Note:** For ODS Extracts made after July 2014, be sure to include the SELA file in your submission.

- **Legacy K-12**: (Pre-CALPADS) Submit Cal-PASS student, course and award extract files

- **STAR**: Submit all

- **CAHSEE**: Submit all

- **University Level Data**: All requested,
### Student Cohort

*** File Type: Tab Delimited Text File ***

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>college_id</td>
<td>X(03)</td>
<td>GI01</td>
<td>COMIS DED</td>
</tr>
<tr>
<td>student_id</td>
<td>X(09)</td>
<td>SB00</td>
<td>COMIS DED</td>
</tr>
<tr>
<td>id_status</td>
<td>X(01)</td>
<td>SB01</td>
<td>COMIS DED</td>
</tr>
<tr>
<td>birthdate</td>
<td>9(08)</td>
<td>SB03</td>
<td>COMIS DED</td>
</tr>
<tr>
<td>gender</td>
<td>X(01)</td>
<td>SB04</td>
<td>COMIS DED</td>
</tr>
<tr>
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<td>COMIS DED</td>
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<td>SB31</td>
<td>COMIS DED</td>
</tr>
<tr>
<td>name_last</td>
<td>X(40)</td>
<td>SB32</td>
<td>COMIS DED</td>
</tr>
</tbody>
</table>

Typical Prospective File Use: Placement Recommendations

• **Prospective File DED**

• The prospective file provides the original MMAP statewide placement recommendations based on the statewide research as well as additional data for colleges that have developed a local evidence-based model.

• In this use case, you’ll be uploading previous applicants (current and former students) to facilitate a match to local assessment and other data.

Retrieval

• Download SFTP Software (e.g., WinSCP).
• Get Credentials
• Login to SFTP site:
  • host: ftp.calpassplus.org
  • username: <username>
  • password: <password>
  • port: 22
• Download File: uniqueidentifier.prospective.txt
Merge CalPASS and Local Placement Data

- In CalPASS, the K-12 to CC link uses a power match based on student characteristics.
- Use SB00 to localID crosswalk to link with local placement data including test scores, multiple measures questions, placement level, enrollment and progression through sequence.
- Can be manual or work with IT to set up more automated process as resources and priorities allow.
- For example, Cabrillo merges CalPASS data with self-reported high school data from CCCApply and a local form - the system is currently being revised for AB 705.
Other Data Source Options

- Establish local data exchange with feeder K-12s
- A state level “data lake” is under development that will provide a centralized repository of K-12 and CC data
- Use self-reported data
Analytical File Considerations

- Original MMAP research did not include course repeats or non-math statistics classes (e.g. psych stats)
- State level research includes swirl (enrolled in > 1 CC) but transferred credits may be available locally
- Smaller colleges may face issue of insufficient cases
  - Should students with incomplete transcripts be included?
- Qualitative factors can also be important
- Creating this file will take 90%+ of the time for the analysis
Checking for what would maximize likelihood of successful completion of transfer-level course

Compare:

A. The success rate of similar students, in this case the lowest performing HS students, if placed directly into transfer—level course

Vs.

B. Rate of successful completion of transfer-level course within one year (AB705) for students who start one level below

Note: not success rate in transfer-level only if transfer-level is taken
Addressing selection bias

- Differences in test scores, high school grades, and other factors that led to different placement may also be related to course performance
  - REMINDER, however – tests are more weakly related to course performance

- Still, the transfer-level course performance of students with low HSGPA who test into transfer-level courses may not fully generalize to those same students who didn’t place into transfer-level.
  - Have to adjust for differences in test scores and overall GPA
Adjusting Projected Success Rates

• Difference in GPA and placement test score can be accounted for statistically and the projected success rates of similar students but from lower placement levels can be adjusted (lowered)
• Magnitude of the adjustment depends on:
  – extent of differences in test scores and GPA between those in the MMAP models and those who would potentially be entering, and;
  – strength of the association between the test scores/GPA and success in the target class
Technical Details of Adjustment Process

- Use multivariate regression to predict success rate in target transfer-level course using GPA and test scores
- Calculate mean high school GPA and test scores for lowest node students in each level/type of first attempted course
- Use regression model to predict success in the target course using means in step 2.
- Rescale regression predicted success rates against the lowest node predicted success rates to create comparability between decision-tree and regression-based predictions
- Calculate overall success rate estimate by weighting estimates from each level/type weighted by number of students beginning at each level
- Use standard error of prediction from the regression model at each level to create lower and upper error bounds for estimates also weighted as in step 5.
Additional considerations for completion of transfer-level math starting from one-level below

- Not all student goals require transfer-level math
- Need to take into account that different majors/pathways lead to different possible math
- Need to account for different curricular entry points after intermediate algebra into transfer-level math curriculum
  - College algebra, trigonometry, pre-calculus
Statistics

• For students starting one-level below
  – count any transfer-level math completions in the numerator (not just statistics)
  – adjust denominator downward (improving throughput) twice:
• Removing percentage of students with ed goals not requiring a transfer-level math course (11.6%)
• Removing percentage of students who are pursuing a B-STEM pathway (25%)
• Method provides an optimistic estimate of throughput from 1 level below:
  1. it counts transfer-level completions of students without transfer-level ed goals
  2. most students have transfer goals
  3. doesn’t account for terminal degrees that may still have transfer-math requirement
• Takes into account that different majors/pathways lead to different possible math courses
• Need to account for different curricular entry points after intermediate algebra into transfer-level math curriculum
  – College algebra, trigonometry, precalculus
Precalculus (Entry-level BSTEM)

• Chosen because it’s most advanced post-intermediate algebra entry-level STEM course across the colleges
  – Rules developed for direct placement into pre-calculus should work for colleges with earlier math courses (e.g., College Algebra or Trigonometry)
• For students starting one-level below
  – count any/all BSTEM transfer-level math completions in the numerator from College Algebra and up, not just pre-calculus (to be as fair as possible given colleges with courses between intermediate algebra and pre-calculus)
  – adjust denominator downward, removing percentage of students with ed goals not requiring transfer-level math course (as with Stats, 11.6%)
  – adjust denominator further downward to reflect percentage of students with STEM major (reduce denominator by additional 75%)
• Conservative method, avoids underestimating throughput from 1 level below
  – Counts any transfer-level math completion regardless of ed goal/major (no changes to numerator) while adjusting denominator downward to account for ed goal/major
Running Regression Adjustments

- Detailed technical paper with R code can be found here: http://rpgroup.org/Portals/0/Documents/Projects/MultipleMeasures/Publications/MMAP_AB705_TechnicalPaper_FINAL_091518.pdf
- The logic shown in R can be translated to SPSS, STATA, SAS, etc.
Regression Models

- English
  - HS GPA + ACCUPLACER sentence skills score + ACCUPLACER reading comprehension score

- Statistics and Pre-calculus
  - HS GPA + ACCUPLACER college algebra score
  - Other test scores (arithmetic and elementary algebra) for statistics did not yield useful results so only college algebra was used
Example and Demonstration
Translation from R to SPSS to STATA

### R

```r
# define regression equation
f5 <- CC_FIRST COURSE SUCCESS IND ~ HS_11_GPA_CUM + ACCUPLACER_MATH_COLLEGE_SCORE
# apply regression function to equation on dataset limited to transfer level statistics
lrlin5.2 <- lm(f5, data=math1111[math1111$CC_FIRST COURSE LEVEL ID=="Y" & math1111$CC_STATISTICS==1,])
# output
summary(lrlin5.2)
```

### SPSS

```
regression/dependent CC_FIRST COURSE SUCCESS IND /enter HS_11_GPA_CUM ACCUPLACER_MATH_COLLEGE_SCORE.
```

### STATA

```
regress CC_FIRST COURSE SUCCESS IND HS_11_GPA_CUM ACCUPLACER_MATH_COLLEGE_SCORE if CC_FIRST COURSE LEVEL ID=="Y" & CC_STATISTICS==1
```
Interpretation

Call: lm(formula = f5, data = math1111[, cc_first_course_level_id == "Y" & cc_statistics == 1, ])

Residuals:
  Min     1Q Median     3Q    Max
-0.9208 -0.5010  0.2008  0.3414  0.6831

Coefficients:     Estimate Std. Error t value Pr(>|t|)
(Intercept)   -0.2408621  0.0977605 -2.464  0.01395 *
HS_11_GPA_CUM  0.2511751  0.0309520  8.115 1.8e-15 ***
ACCUPLACER_MATH_COLLEGE_SCORE  0.0028206  0.0009045  3.118  0.00188 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.4467 on 808 degrees of freedom
(13523 observations deleted due to missingness)
Multiple R-squared:  0.09959,  Adjusted R-squared:  0.09737
F-statistic: 44.69 on 2 and 808 DF,  p-value: < 2.2e-16
Transfer-Level Course Completion in One Year from First Class in Discipline (error bars represent ±1 se)

- **Transfer-Level English (HS GPA < 1.9)**
  - Lowest Node N=7,248
  - Regression N=1,749
  - 1 level below N=13,241
  - Success: 43%
  - Regression Adjusted: 42.6%
  - Throughput: 12%

- **Statistics (HS GPA < 2.3)**
  - Lowest Node N=1,485
  - Regression N=809
  - 1 level below N=11,309
  - Success: 40%
  - Regression Adjusted: 29%
  - Throughput: 8%

- **Pre-Calculus (HS GPA < 2.6)**
  - Lowest Node N=1,753
  - Regression N=661
  - 1 level below N=18,917
  - Success: 38%
  - Regression Adjusted: 28%
  - Throughput: 13%
No one is saying that these success rates are acceptable

• However, AB705 requires that we only place students into developmental education iff:
  – students are highly unlikely to succeed at transfer-level
  – it maximizes their likelihood of completion of the transfer-level course
• Neither of these conditions appear to be met even for the lowest performing high school students
• That limits us to providing concurrent or corequisite support
Research Priorities

- With limited time and personnel colleges must determine which questions are most important
  - Creating local rules
  - Automating data flows
  - Evaluation of new curricula and supports
  - Identifying disproportionate impacts
  - Qualitative research into the student and teacher experience
Increased access to transfer-level math is strongly linked to increases in throughput

Questions?

All webinars are archived here:
http://rpgroup.org/Our-Projects/All-Projects/Multiple-Measures/Presentations-and-Webinars

Upcoming webinars:

Validating Innovative Curriculum Under AB 705
Tuesday, October 9 | 12 - 1 pm
https://cccconfer.zoom.us/j/937608807
1 646 876 9923 (US Toll)
Meeting ID: 937 608 807

AB 705 Adjustments, Ethnicity, Gender and Special Populations
Thursday, October 25 | 10 - 11 am
https://cccconfer.zoom.us/j/553127255
1 646 876 9923 (US Toll)
Meeting ID: 553 127 255

Developing an AB 705 Evaluation/Research Plan
Wednesday, November 7 | 10:30 – 11:30 am
https://cccconfer.zoom.us/j/440539610
+1 646 876 9923 (US Toll)
Meeting ID: 440 539 610