Placement in a Post-AB 705 World

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Agenda

• Requirements of AB 705
• Review of MMAP and Results to Date
• Adapting MMAP to AB 705
  – English and Math
• Placement and Support Recommendations for English
• Discussion
AB 705 (Irwin) requirements

- Use of high school performance data
- Use of “highly unlikely” standard
- Optimize student’s probability of completing transfer-level English and math in their first year
- Optimize student’s probability of completing ESL sequence in three years
Brief Overview of the Multiple Measures Assessment Project (MMAP)
Data Set for the Models

- CCC students enrolled in an English, Math, Reading or ESL class with matching high school data in Cal-PASS Plus
  - ≈1 M cases for Math & English; ≈200k for Reading & ESL

- Bulk of data from 2008 through 2014
- Rules built from students with 4 years of high school data (≈25% of sample)
  - 70% probability of success or higher required for transfer placement


Variables Explored in the Models

- High school unweighted cumulative GPA
- Grades in high school courses
- CST scores
- Advanced Placement (AP) course taking
- Taking higher level courses
- Delay between high school and community college
- HS English types (expository, remedial, ESL)
- HS math level (Elem Algebra, Integrated Algebra, Pre-Calculus)
<table>
<thead>
<tr>
<th>Transfer Level Course</th>
<th>Direct Matriculant</th>
<th>Non-Direct Matriculant</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Algebra (STEM) Passed Algebra II (or better)</td>
<td>HS 11 GPA &gt;=3.2 OR</td>
<td>HS 12 GPA &gt;=3.2 OR</td>
</tr>
<tr>
<td></td>
<td>HS 11 GPA &gt;=2.9 AND Pre-Calculus C (or better)</td>
<td>HS 12 GPA &gt;=3.0 AND Pre-Calculus or Statistics (C or better)</td>
</tr>
<tr>
<td>Statistics (General Education/Liberal Arts) Passed Algebra I (or better)</td>
<td>HS 11 GPA &gt;=3.0 OR</td>
<td>HS 12 GPA &gt;=3.0 OR</td>
</tr>
<tr>
<td></td>
<td>HS 11 GPA &gt;=2.3 AND Pre-Calculus C (or better)</td>
<td>HS 12 GPA &gt;=2.6 AND Pre-Calculus (C or better)</td>
</tr>
<tr>
<td>English</td>
<td>HS 11 GPA &gt;=2.6</td>
<td>HS 12 GPA &gt;=2.6</td>
</tr>
</tbody>
</table>

## Summary of Differences Between Students Placed Traditionally and Students Placed by MMAP

### Mathematics

<table>
<thead>
<tr>
<th>Comparison Group</th>
<th>Comparison</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students placed directly into transfer-level by existing method in same term</td>
<td>Success rates</td>
<td>MMAP success rates equal</td>
</tr>
<tr>
<td>Students placed 1 level below in previous year</td>
<td>Completion of transfer-level math in 2 years</td>
<td>MMAP throughput 41 percentage points higher</td>
</tr>
<tr>
<td>Students placed 2 levels below in previous year</td>
<td>Completion of transfer-level math in 2 years</td>
<td>MMAP throughput 53 percentage points higher</td>
</tr>
</tbody>
</table>

### English

<table>
<thead>
<tr>
<th>Comparison Group</th>
<th>Comparison</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students placed directly into transfer level by existing method in same term</td>
<td>Success rates</td>
<td>MMAP success rates 2 percentage points higher</td>
</tr>
<tr>
<td>Students placed 1 level below in previous year</td>
<td>Completion of transfer-level English in 2 years</td>
<td>MMAP throughput 26 percentage points higher</td>
</tr>
<tr>
<td>Students placed 2 levels below in previous year</td>
<td>Completion of transfer-level English in 2 years</td>
<td>MMAP throughput 40 percentage points higher</td>
</tr>
</tbody>
</table>
Overall Summary

– Success rates of students placed by MMAP are ≥ students placed directly into transfer-level using the institutions traditional placement method
  • even though MMAP placement 2-5X placement into transfer level courses
– Successful completion of transfer level course (throughput) is 20 (English) to 40 (Math) percentage points higher than for students placed even just one level below.
– Implementation of MMAP rules can be nuanced
  • For example, don’t use statistics rules to place into trigonometry or precalculus
  • Placement messaging should be done once with a single voice and specifically state the recommended course
– Collaboration between high schools and colleges has increased
Adapting MMAP to AB 705

It’s all about throughput.
Adapting MMAP to AB 705

- MMAP decision trees were based on identifying students who were highly likely to be successful
  - At least 70% probability of success in transfer-level

- Now, students can only be assigned to remediation if:
  - They are *highly unlikely* to succeed at the transfer-level class
  - AND
  - Remediation maximizes their probability of throughput
What is a “Throughput Rate”?  

• The probability of getting to and through a gateway course within a specified period of time.

• **Throughput rate (AB 705):** The proportion of a cohort of students who complete the transferable or gateway math or English course within two primary semesters or three primary quarters of entering their first course in the sequence.
## Transfer-Level English Throughput Rates

<table>
<thead>
<tr>
<th>GPA/Course Level</th>
<th>Pass Rate</th>
<th>Students %</th>
</tr>
</thead>
<tbody>
<tr>
<td>11th grade GPA &lt; 1.9 and D or worse</td>
<td>43%</td>
<td>~10%</td>
</tr>
<tr>
<td>11th grade &gt;=1.9 and D or worse in 11th</td>
<td>49%</td>
<td>~5%</td>
</tr>
<tr>
<td>11th grade &gt;=1.9 and C- or better in 11th</td>
<td>62%</td>
<td>~23%</td>
</tr>
<tr>
<td>11th grade GPA &gt;=2.6</td>
<td>80%</td>
<td>~62%</td>
</tr>
</tbody>
</table>
Maximizing Throughput: English

One-year English throughput rate by placement level for students with less than a 1.9 high school GPA

- 43% pass rate
- ~10% of students

11th grade GPA < 1.9
Identifying the Intent Cohort

Ed. Goals of Students Starting at One-level below in Math

- Terminal AA/AS, Certificate, etc. (11.6%)
- Associate & Transfer (57.2%)
- Transfer, no Associate (14.8%)
- Associate, no Transfer (3.1%)
- Vocational Deg, no Transfer (0.5%)
- Vocational Cert, no Transfer (0.5%)
- Discover Career Interests (2.7%)
- Acquire Job Skills (1.9%)
- Update Job Skills (0.3%)
- Maintain Cert/License (0.6%)
- Personal Development (2.9%)
- Basic Skills (1.8%)
- High School or GED credits (9.3%)
- Noncredit to Credit Courses (0.1%)
- Coursework for University (4.3%)
Decision Tree

**Root Node**

- **HS_11_GPA_CUM >= 3**
  - **Branch**
    - **Internal Node/split**
      - **HS_11_GPA_CUM >= 3.3**
        - **Terminal node/leaf**
          - **Node 3**
            - **PRE_CALC_UP11 >= 0.5**
              - **Node 7**
                - **Node 8**
                  - **ALG_II_UP11_C >= 0.5**
                    - **Node 9**
                      - **Node 10**
                        - **Node 12**
                          - **0.49 (10%)**
                          - **Node 11**
                            - **0.58 (19%)**
          - **Node 4**
            - **Node 5**
              - **0.81 (8%)**
          - **Node 6**
            - **Node 1**
              - **Node 2**
                - **Node 11**
                  - **0.7 (16%)**
                  - **Node 12**
                    - **0.7 (4%)**
                      - **Node 8**
                        - **Node 10**
                          - **0.4 (12%)**

**Percent of students in leaf**

**Probability of success**
# Statistics Throughput Rates

**AB 705 Analysis of Pass Rates of Groups of Students in Transfer-level Statistics**

<table>
<thead>
<tr>
<th>GPA Category</th>
<th>Pass Rate</th>
<th>Students %</th>
</tr>
</thead>
<tbody>
<tr>
<td>11th grade GPA &lt; 2.3</td>
<td>40%</td>
<td>~12%</td>
</tr>
<tr>
<td>11th grade GPA &gt;= 2.3 and C- or worse in Algebra II</td>
<td>49%</td>
<td>~10%</td>
</tr>
<tr>
<td>11th grade GPA &gt;= 2.3 and C or better in Algebra II</td>
<td>58%</td>
<td>12%</td>
</tr>
<tr>
<td>11th grade GPA &gt;= 2.3 and C or better in Pre-Calculus</td>
<td>70%</td>
<td>~4%</td>
</tr>
<tr>
<td>11th grade GPA &gt;= 3.0</td>
<td>80%</td>
<td>~62%</td>
</tr>
</tbody>
</table>
Maximizing Throughput: Statistics

One-year Math throughput rate by placement level for students with less than a 2.3 high school GPA

- **40%** pass rate
- **~12%** of students

<table>
<thead>
<tr>
<th>Placement Level</th>
<th>Throughput Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer-level</td>
<td>40%</td>
</tr>
<tr>
<td>One-level below</td>
<td>7%</td>
</tr>
<tr>
<td>Two-levels below</td>
<td>2%</td>
</tr>
<tr>
<td>Three-levels below</td>
<td>2%</td>
</tr>
<tr>
<td>Four-levels below</td>
<td>1%</td>
</tr>
</tbody>
</table>
Putting it all together:
Multiple Measures and Corequisite Support

Mathematics at Cuyamaca College

- Disjunctive placement (higher of test-based placement or multiple measures based placement – adapted from Phase 1 MMAP recommendations
  - Algebra I with C or better plus HSGPA ≥ 2.8: Statistics with corequisite support
  - Algebra II with C or better and HSGPA ≥ 2.8: College algebra or higher w/corequisite support
  - Other MMAP placement recommendations for higher placement without support

English at Skyline College

- Phased transition over three years
  - Accelerated developmental education at one level below
  - Then MMAP implementation of English placement recommendations and corequisite developmental education courses


Gateway momentum in Math at Cuyamaca

Completion of transfer-level math before and after change by assessment level

- Three+ Levels Below: 4% (Fall 2013 Cohort), 56% (Fall 2016 Cohort)
- Two Levels Below: 19% (Fall 2013 Cohort), 33% (Fall 2016 Cohort)
- One Level Below: 36% (Fall 2013 Cohort), 55% (Fall 2016 Cohort)
- All: 23% (Fall 2013 Cohort), 69% (Fall 2016 Cohort)

Completion of transfer-level math before and after change by ethnicity

- Asian: 33% (Fall 2013 Cohort), 75% (Fall 2016 Cohort)
- African American: 6% (Fall 2013 Cohort), 15% (Fall 2016 Cohort)
- Hispanic: 15% (Fall 2013 Cohort), 16% (Fall 2016 Cohort)
- White: 15% (Fall 2013 Cohort), 76% (Fall 2016 Cohort)
- All: 23% (Fall 2013 Cohort), 67% (Fall 2016 Cohort)

Fall 2013 Cohort (Transfer Math in 2 years)
Fall 2016 Cohort (Transfer math completion 1 semester w/support)
Gateway momentum in English at Skyline

**English placement by level and cohort**

- **Transfer-Level**
  - Fall 2013: 80%
  - Fall 2016: 47%

- **One Level Below**
  - Fall 2013: 40%
  - Fall 2016: 17%

- **Two Levels Below**
  - Fall 2013: 14%
  - Fall 2016: 3%

**Successful rate by cohort and course type**

- **Fall 2013**
  - Transfer Level: 67%
  - F2015-S2017 (traditional): 65%
  - F2015-2017 (w/support): 69%
Maximizing completion of transfer-level course

Mathematics

- CCC LTN 1 level below vs. direct placement (no support): 7% vs. 25%
- Cuyamaca ≥3 levels below: 4% vs. 33%
- Tennessee (≤13 ACT): 3% vs. 33%

English

- CCC LTN 1 level below vs. direct placement (no support): 12% vs. 34%
- Skyline: 69% vs. 54%
- Tennessee (≤13 ACT): 25% vs. 54%

*CCC comparison examines throughput in 1 year for students in lowest terminal node (LTN), compared to the plausible range of success rates for direct placement without additional support. Cuyamaca & Tennessee compare 2 year period for throughput to direct placement with corequisite support. Skyline corequisite completion comparison group not available.
The BSTEM ‘Intent Cohort’

• Which students intend to pursue a calculus-oriented Business-STEM math pathway from one-level below?
• Some students have a goal of a terminal associate’s degree and one-level below satisfies their requirement
• Some students intend to pursue a Statistics or Liberal Arts Math pathway
• How to distinguish intent?
The BSTEM ‘Intent Cohort’

- Remove those with a non-transfer educational goal (11.6%)
- Remove those on the SLAM path
  - Of those who progress to transfer-level math, 75% take SLAM vs. Precalculus, Calculus, Trig., or Business Calculus
  - Reduce remaining one-level below starting cohort by 75%
- Product of this process is the BSTEM intent cohort
  - This will be the denominator for BSTEM throughput rates
  - The denominator is reduced to 3,200 from 14,478
Figure 5. Pre-Calculus – L0 Y Pre-Calculus DM

- HS_11_GPA_CUM >= 3.1
  - no
  - HS_11_GPA_CUM >= 2.6
    - PRE_CALC_UP11 >= 0.5
      - 0.38 (16%)
    - CALC_UP11 >= 0.5
      - 0.49 (5%)
  - yes
    - HS_11_GPA_CUM >= 3.4
      - 0.67 (21%)
      - 0.72 (2%)
      - CALC_UP11_BMINUS >= 0.5
        - 0.76 (20%)
        - 0.94 (3%)
# Pre-Calculus Throughput Rates

**AB 705 Analysis of Groups of Students in Precalculus**

<table>
<thead>
<tr>
<th>11th grade GPA &lt; 2.6 and no Precalc. in HS</th>
<th>11th grade GPA &lt; 2.6 with Precalculus in HS</th>
<th>11th grade GPA&gt;=2.6 and &lt; 3.1</th>
<th>11th grade GPA&gt;=3.1 and &lt; 3.4</th>
<th>11th grade GPA &gt;=3.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 38% pass rate</td>
<td>• 49% pass rate</td>
<td>• 56% pass rate</td>
<td>• 67% pass rate</td>
<td>• 78% pass rate</td>
</tr>
<tr>
<td>• ~16% of students</td>
<td>• ~5% of students</td>
<td>• ~36% of students</td>
<td>• ~21% of students</td>
<td>• ~23% of students</td>
</tr>
</tbody>
</table>
Maximizing Throughput: Pre-Calculus

One-year BSTEM throughput rate by placement level for students with less than a 2.6 high school GPA and no HS precalculus

- 11th grade GPA < 2.6 and no Precalc. in HS
  - 38% pass rate
  - ~16% of students
Pre-Calculus Lowest Node

- 3,200 students with < 2.6 HSGPA and no precalculus in high school by grade 11 began at one-level below transfer math with intent to pursue a BSTEM path
  - 1,035 attempt a BSTEM class within one year (32.3%)*
  - 453 are successful in any BSTEM class, including College Algebra (14.2%)
- Throughput from one-level below into BSTEM is 14.2%
- If placed directly into Precalculus, throughput is 38%
Moderate to high performing high school students must be placed directly into transfer-level courses by law.

Further, the evidence to date, within California and nationally, suggests that even lowest performing HS students are more likely to complete transfer-level English & Math (Statistics for SLAM, PreCalculus for STEM students with HS intermediate algebra) with additional supports than if placed in a developmental education sequence.

To use another method, colleges must be able to provide clear evidence that students will be more likely to complete transfer-level courses within one year than by placing them directly into transfer-level courses with appropriate support.
# Placement/Support Recommendations for English

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

For students with high school transcripts within 10 years of enrollment at CC, excluding students who are locally advised to take the ESL test.
### Placement/Support Recommendations for Statistics

<table>
<thead>
<tr>
<th>High School Performance</th>
<th>AB 705-Compliant Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School GPA ≥ 3.0</td>
<td>Transfer-Level Statistics</td>
</tr>
<tr>
<td>Or</td>
<td>No additional academic or corequisite support required</td>
</tr>
<tr>
<td>High School GPA ≥ 2.3 &amp;</td>
<td>Transfer-Level Statistics</td>
</tr>
<tr>
<td>C or Better in Precalculus</td>
<td>Additional academic and corequisite support recommended</td>
</tr>
<tr>
<td>High School GPA 2.3–3.0</td>
<td>Transfer-Level Statistics</td>
</tr>
<tr>
<td>High School GPA &lt; 2.3</td>
<td>Transfer-Level Statistics</td>
</tr>
<tr>
<td></td>
<td>Additional academic and corequisite support strongly recommended</td>
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</tbody>
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For students with high school transcripts within 10 years of enrollment at CC.
Discussion
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