Multiple Measures Assessment Project: The opportunity and adversity of increasing placement accuracy

The RP Conference
April 21, 2017

http://rpgroup.org/All-Projects/ctl/ArticleView/mid/1686/articleId/118/Multiple-Measures-Assessment-Project-MMAP
Pilot College Implementation Overview

- 64 pilot colleges have signed a data sharing agreement
  - we have assisted or been in contact with 13 additional colleges, but they have not signed the agreement
- Approximately 20 colleges implemented a pilot in fall 2015 or spring 2016 (or prior)
  - most were small pilots to serve as a trial run
- Approximately 25 colleges reported they piloted in fall 2016 or plan to in spring 2017
- Approximately 17 are still in the planning phase
The Models
Data Set for the Models

• CCC students enrolled in an English, Math, Reading or ESL class with matching high school data in CalPASS
  • ~1 M cases for Math & English; ~200k for Reading & ESL
• Bulk of first CCC enrollments from 2008 through 2014
• Rules were developed with the subset of students who had four years of high school data (about 25% of total sample)
• Used rpart to create the trees
  • uses a machine learning algorithm where the order of entry of the variables does not matter. All predictors are considered in the algorithm, the predictor with the greatest gain to the model is selected for the first branch of the tree, continues to split until the splits no longer improve the model.
Variables Explored in the Models

- High School Unweighted Cumulative GPA
- Grades in high school courses
- CST scores
- Advanced Placement course taking
- Taking higher level courses (math)
- Delay between HS and CCC (math)
- HS English types (expository, remedial, ESL)
- HS Math level (Elem Algebra, Integrated Algebra, Pre-Calculus)
## Transfer-Level Placement Recommendations

<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)</td>
<td>HS 11 GPA &gt;=3.2 OR</td>
<td>HS 12 GPA &gt;=3.2 OR</td>
</tr>
<tr>
<td>Passed Algebra II (or better)</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)</td>
<td>HS 11 GPA &gt;=3.0 OR</td>
<td>HS 12 GPA &gt;=3.0 OR</td>
</tr>
<tr>
<td>Passed Algebra I (or better)</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>

# One-Level Below Rule Sets

<table>
<thead>
<tr>
<th>One Level Below Course</th>
<th>Direct Matriculant</th>
<th>Non-Direct Matriculant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>HS 11 GPA &gt;=2.2</td>
<td>HS 12 GPA &gt;= 2.4 AND 12\textsuperscript{th} Grade English C (or better)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HS 12 Grade GPA &gt;=1.7 AND 12th Grade English C+ (or better)</td>
</tr>
<tr>
<td>ESL</td>
<td>HS 11 GPA &gt;=2.7</td>
<td>HS 12 GPA &gt;=2.6</td>
</tr>
</tbody>
</table>

- The vast majority of ELL/ELD HS students (~85%) who enter CC begin directly in mainstream English coursework.
- Other major populations of ESL students (e.g., international students, migrants, older immigrants) will not have US high school transcripts and so other multiple measures, such as essays, must be used with those groups.
Results from the Field
Multiple Measures at Mira Costa

*3.0 or above OR 2.5 GPA plus a B in English course, self-reported transcripts. N=1,329 for MMAP
Success by Placement Type at Mira Costa for Transfer-Level English

<table>
<thead>
<tr>
<th>Semester</th>
<th>Pre-Reform</th>
<th>Post_Reform</th>
<th>Compass</th>
<th>MMAP</th>
<th>EAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2016</td>
<td>65%</td>
<td>69%</td>
<td>64%</td>
<td>67%</td>
<td>71%</td>
</tr>
<tr>
<td>F2016</td>
<td>68%</td>
<td>75%</td>
<td>70%</td>
<td>80%</td>
<td>72%</td>
</tr>
</tbody>
</table>

n=1,094 n=179 n=498 n=1,150
Las Positas Preliminary English Results

Transfer-Level Placement

- F2015: 35%
- F2016: 78%

Success Rate

- F2013: 75%
- F2014: 70%
- F2015: 75%
- F2016 (all): 76%
- F2016 (MM only): 77%

Rule set: self-reported transcripts; >= 2.5 GPA; N = 348
Rule set: English = 2.3 AND B- or better; Math = 3.2 AND C or better

bit.ly/MMAPPilotLessons
Fall 2016 Pilot Norco College

Success rates in transfer-level coursework by placement method

Statewide rule set: English = 196; Math = 205
Spring 2015: Shasta College

Rule set: GPA 2.7 AND B or better in last English course; N = 471
No significant difference in success rates among the three student groups

- Multiple Measures Cohort (93.01%) significantly more likely to be retained in English courses (overall) than Traditionally Assessed (84.49%) group
- Neither group differed from All Others group (89.54%)

### Success Rate

<table>
<thead>
<tr>
<th></th>
<th>Multiple Measures Cohort</th>
<th>Traditionally Assessed</th>
<th>All Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average (all courses)</strong></td>
<td>67%</td>
<td>64%</td>
<td>65%</td>
<td>65%</td>
</tr>
<tr>
<td><strong>Transfer level</strong></td>
<td>67%</td>
<td>68%</td>
<td>71%</td>
<td>69%</td>
</tr>
<tr>
<td><strong>Below transfer</strong></td>
<td>65%</td>
<td>60%</td>
<td>55%</td>
<td>58%</td>
</tr>
</tbody>
</table>

### Retention Rate

<table>
<thead>
<tr>
<th></th>
<th>Multiple Measures Cohort</th>
<th>Traditionally Assessed</th>
<th>All Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average (all courses)</strong></td>
<td>93%</td>
<td>84%</td>
<td>90%</td>
<td>88%</td>
</tr>
<tr>
<td><strong>Transfer level</strong></td>
<td>93%</td>
<td>84%</td>
<td>92%</td>
<td>89%</td>
</tr>
<tr>
<td><strong>Below transfer</strong></td>
<td>94%</td>
<td>85%</td>
<td>87%</td>
<td>86%</td>
</tr>
</tbody>
</table>
Fall 2015: SDCCD Pilot

Transfer-level Success Rates by Method of Entry

Math
- Accuplacer: 60%
- MMAP: 58%
- Other: 61%
- Sequence: 59%

English
- Accuplacer: 68%
- MMAP: 79%
- Other: 69%
- Sequence: 70%

Statewide rule set
## Irvine Valley College F2016 MMAP Pilot: Transfer-level English

<table>
<thead>
<tr>
<th></th>
<th>Success Rate</th>
<th>Drop Rate</th>
<th>Withdraw Rate</th>
<th>Failure Rate</th>
<th>S:Correct placement</th>
<th>F:Correct Placement</th>
<th>F:Little effort</th>
<th>F:Considerable positive effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placed via MM into Course</td>
<td>85%</td>
<td>30%</td>
<td>3%</td>
<td>6%</td>
<td>95%</td>
<td>88%</td>
<td>8%</td>
<td>27%</td>
</tr>
<tr>
<td>All other students in Course</td>
<td>77%</td>
<td>27%</td>
<td>7%</td>
<td>11%</td>
<td>93%</td>
<td>88%</td>
<td>14%</td>
<td>26%</td>
</tr>
</tbody>
</table>

**S:** Student Survey End of Term  
**F:** Faculty Survey End of Term  

### Graph Notes:
- **X-axis:** Percentage rates (0% to 100%)
- **Y-axis:** Percentage rates (0% to 100%)
- **Bars:** Blue indicates students placed via MM into Course; Red indicates all other students in Course.

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**Educational Results Partnership**

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**Research Planning Professional Development for California Community Colleges**

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**theRPgroup**
Considerations

• MMAP decision rules are designed to align with specific transfer-level math courses, i.e. don’t use statistics rules to place into College Algebra

• Implementation of MMAP locally has been nuanced, and in some cases challenging. Once integrated into the CAI platform, it will help streamline the process for colleges
Pilot Summary

– MMAP rules performing as expected
– Messaging around the use of multiple measures should be done in a single voice and specifically state which course they should enroll in
  - Placing via a test and then trying to overwrite that placement with later messages leads to a reduction in use of the enhanced placement
– Implementation of MM rules is nuanced, requiring careful compliance with details
– MMAP started conversations within departments that did not exist prior
– Collaboration between high schools and colleges has increased and is an important element of success
Self-Reported Transcript Data and Non Cognitive Variables
Self-reported high school transcript data

- 69 community colleges are now collecting self-reported data through the Open CCCApply application
  - this includes a mix of pilot and non-pilot colleges

- The team is currently trying to get access to these data to analyze the validity of self-reported data.
  - however preliminary data from the pilot colleges shows reliability between self-reported transcript data and actual transcripts
Preliminary Self-Report Data

• Overall strong correlation between self-reported high school GPA and actual GPA observed: $r(12,048) = .707$

• Students with lower overall GPA somewhat less likely to report accurately

• Correspondence could be be improved by
  – encouraging students to bring/consult transcripts at beginning of application and/or
  – making clear that inaccurate information could invalidate application
    • (though it would rarely be in college’s or student’s best interest for college to follow through on that threat).
## Self-reported high school transcript data

<table>
<thead>
<tr>
<th>HSGPA Range</th>
<th>N</th>
<th>HSGPA</th>
<th>srHSGPA</th>
<th>Difference</th>
<th>± .25</th>
<th>± .50</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00-1.49</td>
<td>514</td>
<td>1.1</td>
<td>2.5</td>
<td>1.4</td>
<td>5.1%</td>
<td>7.4%</td>
</tr>
<tr>
<td>1.50-1.99</td>
<td>961</td>
<td>1.8</td>
<td>2.6</td>
<td>0.8</td>
<td>17.5%</td>
<td>33.3%</td>
</tr>
<tr>
<td>2.00-2.49</td>
<td>1889</td>
<td>2.3</td>
<td>2.7</td>
<td>0.4</td>
<td>27.8%</td>
<td>55.5%</td>
</tr>
<tr>
<td>2.50-2.99</td>
<td>2842</td>
<td>2.8</td>
<td>3.0</td>
<td>0.2</td>
<td>46.6%</td>
<td>78.0%</td>
</tr>
<tr>
<td>3.00-3.49</td>
<td>3385</td>
<td>3.2</td>
<td>3.4</td>
<td>0.1</td>
<td>60.4%</td>
<td>90.2%</td>
</tr>
<tr>
<td>3.50-4.00</td>
<td>2356</td>
<td>3.7</td>
<td>3.7</td>
<td>0.0</td>
<td>80.4%</td>
<td>96.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11947</td>
<td>2.9</td>
<td>3.1</td>
<td>0.3</td>
<td>50.1%</td>
<td>74.9%</td>
</tr>
</tbody>
</table>
14 pilot colleges have reported they are in the process of collecting Social-psychological (noncognitive variables) data. The team is currently following up to try to get access to these data. These include: Grit, Hope, Mindset, Conscientiousness, Teamwork Scale, Academic Self-Efficacy Scale, College Identity Scale.

Preliminary results from a few colleges have not shown consistent relationships between the measured variables and course outcomes, but this could be due to many factors:

- timing of survey (during testing, application, etc.)
- length of survey
- frame of reference
Social-psychological (non cognitive variables) data

- Some positive relationships with outcomes for some student groups:
  - Students with who are undecided
  - Undocumented students
  - DSPS students
  - Veterans
  - Athletes
  - Age 50+
Multiple Measures and ESL
ESL Findings

- Most HS ESL go into CC
- Most Credit ESL students do not come from NC
- High School origin does not generally relate to college outcomes
- Multiple measures for ESL will benefit from extra questions on application
What is an ESL Student?

- High school ELL designation or ELD course history AND taking community college ESL (included in MMAP ESL analysis)
- High school ELL designation or ELD course history but NOT taking community college ESL (included in MMAP English analysis)
- Non-native speakers with no high school information available AND taking community college ESL (not included in MMAP)
- Non-native speakers with no high school information available but NOT taking community college ESL (not included in MMAP)
High School to Community College
ESL Transition in MMAP Data

- 50,851 ESL students with complete high school transcripts:
  - 5,026 (10%) took an ESL class as their last high school language arts course.
  - 3,682 (13%) took an ESL class as their first college language arts course.
  - 465 (1%) had a record of taking any non-credit ESL course at a community college.
Intra-Class Correlations (ICC) Between Grade Points in First Community College ESL Course and High School Origin and College Destination by Highest Level of ESL Offered

<table>
<thead>
<tr>
<th>Highest Level of ESL at Community College</th>
<th>Level of First ESL Course</th>
<th>High School Origin</th>
<th>College Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer-Level</td>
<td>Transfer-level</td>
<td>0.03</td>
<td>0.05**</td>
</tr>
<tr>
<td>485 high schools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 colleges</td>
<td>1 level below transfer</td>
<td>0.03**</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>2 levels below transfer</td>
<td>0.05*</td>
<td>0.03**</td>
</tr>
<tr>
<td>One Level Below Transfer-Level</td>
<td>1 level below transfer</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>289 high schools</td>
<td>2 levels below transfer</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>30 colleges</td>
<td>3 levels below transfer</td>
<td>0.04</td>
<td>0.05**</td>
</tr>
<tr>
<td>Two Levels Below Transfer-Level</td>
<td>2 levels below transfer</td>
<td>0.05</td>
<td>0.07**</td>
</tr>
<tr>
<td>253 high schools</td>
<td>3 levels below transfer</td>
<td>0.07</td>
<td>0.02</td>
</tr>
<tr>
<td>27 colleges</td>
<td>4 levels below transfer</td>
<td>0.27**</td>
<td>0.09</td>
</tr>
</tbody>
</table>

* significant at 0.05 level; ** significant at 0.01 level
Other ESL Measures

- Questions on intake forms such as:
  – Years speaking English
  – Years of formal education
  – Self rating of writing, reading, speaking, listening
- TOEFL Scores
- Other tests or credentials
Assessing the Impact of MMAP
Baseline reporting & key categories

• Develop a baseline report prior to implementation
  – proportion of students who place into each level
  – proportion of students who enroll into each level
  – success rates, by level
  – sequence completion, by cohort and by initial placement

• Develop method/plan for identifying students placed via:
  – Overlap group \((MM \text{ and } Test)\)
  – Multiple measures \((MM \text{ only or } MM \text{ only with overlap group})\)
  – Test placement \((Test \text{ only or } Test \text{ only with overlap group})\)
  – Entire Group
  – Total of 6 possible combinations
The six groups

- Test placement
- MMAP placement
- Both test & MMAP
- Test only
- MMAP only
- All students

All Test

All MMAP
Planning Comparisons

- Students from prior terms
  - Identify students who would have been eligible for MMAP using local criteria (e.g., first-time students, high school, etc.)
  - Make sure to use comparable terms (e.g., fall vs. fall)
  - Retrospective datafile available:
    - useful to help identify students who would have been eligible
    - good for propensity score matching, logistic regression, etc.

- Ineligible or students w/o available data in same term

- Additional comparisons for specific outcomes:
  - Placements: what placements MMAP-eligible students would have received
  - Throughput rates: students who have progressed through sequence (no. of gateway completers / no. of those initially enrolled)
Early Outcome Metrics

• Proportion of incoming students placed at transfer-level compared to:
  – how they would have been placed otherwise (if available)
  – comparable students in previous terms

• Course enrollment rate and success rates
  – Part 1 - MMAP-placed student performance
    • Students placed by MMAP (do not separate until Part 2) vs. typical success rates in course
  – Part 2 - By method of placement into transfer level
    • Overlap group (MM and Test)
    • Multiple measures (MM only or MM only with overlap group)
    • Test placement (Test only or Test only with overlap group)
    • Entire Group

• Successful completion of transfer-level course in first year
Long-term Outcome Metrics

- Enrollment & success rates in next course in sequence
- Transferable units attempted/completed in first semester/year
- Persistence to second semester/year
- Behavioral intent to transfer
- Completion of unit milestones (30, 60)
- Degree, certificate, transfer
Placement Error

- **Overplacement**: Student is placed above their ability to succeed. Highly visible.
- **Underplacement**: Student could have been successful at a higher level than where placed. Tends to be invisible.

- Current placement systems tend to result in much greater underplacement error.
- Total placement error is minimized when over- and underplacement are balanced.
Additional resources on DI

• Using DI Methods to Identify Equity Gaps
  – https://prolearningnetwork.cccco.edu/ask-resource/disproportionate-impact/

• Assessing and Mitigating Disproportionate Impact in Matriculation Services

• Assessment Validation Project
  – http://rpgroup.org/content/assessment-validation-project

• Matriculation Evaluation: Student Resources
  – http://rpgroup.org/content/matriculation-evaluation-student-resources
Integration with CAI
Integration of MMAP with CAI

- Common Assessment platform will house a transcript data repository
  - repository will be source-agnostic & store transcript data from variety of sources, including CalPASS & self-report via CCC Apply
  - statewide decision trees programmed into platform, for internally generated Multiple Measures placement recommendation
  - Will allow for deviations in the statewide models

- Students will receive single placement recommendation created from disjunctive placement model

- Platform users with the “Counselor” role will have access to all placement recommendations for a student as will college SIS
Subsequent integration with CAI

- Initial integration may allow some minimal local customization.
  - Future phases will support Conjunctive and Compensatory methods
  - Guidance, limits, and thresholds for local customization will be provided as phased releases progress
- Functionality for additional local multiple measures not yet determined.
  - Will rely on feedback and direction from field (e.g., the MMAP project and all of you)
- Timeline for subsequent phases to be determined in forthcoming road mapping exercise.
AB 705

• AB 705 (Irwin) would amend the Seymour-Campbell Student Success Act of 2012 to require:
  – colleges to use high school transcript data, and it sets a standard for how community colleges use high school transcript data, in the placement of students into math and English courses
• The bill also puts requirements on corequisites:
  – concurrent support during the same semester that a student takes the college-level English or mathematics course, but only if it is determined that the support will be essential to the student's success in the college-level English or mathematics course and that the support constitutes no more than half of the units required for the college-level course
Ongoing Discussion for AB 705

ASCCC and the CO are hoping to require the Department of Education to share high school transcript data for all students. Currently, a memorandum of understanding is needed between a CC and a HS district through Cal-Pass.

• While the bill requires the use of HS transcript data, it is not requiring the use of any specific data or the use of MMAP.
• Stay tuned to Legislative Updates for further developments on this bill as the language may change before signed into law.
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