Multiple Measures Assessment Project: English as a Second Language

CATESOL
Santa Clara, October 20, 2017

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

**Collaboration**
- CAI
- CCCCCO
- Cal-PASS+
- RP Group
- 64+ CCCs

**Model Development**
- English
- Math
- ESL
- Reading
- Non-cognitive Variables
- Self-reported transcript data

**Engagement**
- Local replication
- Webinars
- Professional development
- Support
- Pilot results inform statewide implementation
Pilot College Implementation Overview

- 65 pilot colleges have signed a data sharing agreement
- 13+ additional colleges have received informal assistance
- ≈20 colleges implemented a pilot in fall 2015 or spring 2016 (or prior) mostly as small pilots to serve as a trial run
- Approximately 25 colleges reported they piloted in fall 2016 or planned to in spring 2017
- Approximately 17 are still in the planning phase
- Results from more than 12 colleges for English and 7 in math with more results being analyzed currently
The Models
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 first CCC enrollments from 2008 through 2014
- Rules used students with 4 years of high school data (≈25% of sample)
- Used rpart, a machine learning algorithm, to create decision trees
- Local researchers trained to replicate models locally
- MMAP code
- R4IR Tutorial https://drive.google.com/drive/folders/0Bz-jqwGzLQjJajA5YUIxUjdETzA?usp=sharing
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)
<table>
<thead>
<tr>
<th>Description</th>
<th>High Schools</th>
<th>Colleges</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ESL file</td>
<td>1,492</td>
<td>107</td>
<td>185,033</td>
</tr>
<tr>
<td>Top level transfer complete high school transcripts</td>
<td>485</td>
<td>41</td>
<td>4,901</td>
</tr>
<tr>
<td>Top level 1 level below transfer complete high school transcripts</td>
<td>289</td>
<td>30</td>
<td>2,768</td>
</tr>
<tr>
<td>Top level 2+ levels below transfer complete high school transcripts</td>
<td>253</td>
<td>27</td>
<td>1,026</td>
</tr>
</tbody>
</table>

- About 25% of students had 4 years of high school transcripts and were used for building the decision rules
ESL Findings

- Most HS ESL go into CC English (87%)
- Most Credit ESL students do not come from Non-Credit (99%)
- High School origin does not generally relate to college outcomes
- Multiple measures for ESL will benefit from extra questions on application
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.
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)
How to Read an ESL Decision Tree

Figure 1. Interpreting One-Level Below Transfer Level ESL - L1 DM Decision Tree

Root Node

hs_11_gpa >= 2.7

No

0.54
61%

Yes

0.74
39%

Node 1

Terminal node/leaf

Probability of success

Percent of students in leaf
## Criteria for Decision Trees

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer-Level (L0) criterion</td>
<td>0.70</td>
</tr>
<tr>
<td>One-Level Below Transfer (L1) criterion</td>
<td>0.65</td>
</tr>
<tr>
<td>Two-Levels Below Transfer Level (L2) criterion</td>
<td>0.60</td>
</tr>
<tr>
<td>Three-Levels Below Transfer Level (L3) criterion</td>
<td>0.55</td>
</tr>
</tbody>
</table>
# ESL Rule Set Examples

<table>
<thead>
<tr>
<th>Top Level Course</th>
<th>Direct Matriculant</th>
<th>Non-Direct Matriculant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Level</td>
<td>HS 11 GPA ≥ 2.5</td>
<td>HS 12 GPA ≥ 2.4</td>
</tr>
<tr>
<td>One Level Below Transfer</td>
<td>HS 11 GPA ≥ 2.7</td>
<td>HS 12 GPA ≥ 2.6</td>
</tr>
<tr>
<td>Two Levels + Below Transfer</td>
<td>HS 11 GPA ≥ 2.8</td>
<td>HS 12 GPA ≥ 2.9 OR English CST ≥ 292</td>
</tr>
<tr>
<td>Transfer Level English</td>
<td>HS 11 GPA ≥ 2.6</td>
<td>HS 12 GPA ≥ 2.6</td>
</tr>
<tr>
<td>Level</td>
<td>Direct Matriculants (Through 11th grade)</td>
<td>Non-Direct Matriculants</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Transfer level</td>
<td>High school 11th grade cumulative GPA of 2.5 or better</td>
<td>High school 12th grade cumulative GPA of 2.4 or better</td>
</tr>
<tr>
<td>One-level below</td>
<td>High school 11th grade cumulative GPA of 1.5 or better</td>
<td>High school 12th grade cumulative GPA of 2.0 or better</td>
</tr>
<tr>
<td>Two-levels below</td>
<td>High school 11th grade cumulative GPA of 1.3 or better</td>
<td>High school 12th grade cumulative GPA of 1.8 or better</td>
</tr>
<tr>
<td>Three-levels below</td>
<td>Placement via test or other locally determined measure</td>
<td>Placement via test or other locally determined measure</td>
</tr>
<tr>
<td>Four-levels below</td>
<td>Placement via test or other locally determined measure</td>
<td>Placement via test or other locally determined measure</td>
</tr>
<tr>
<td>Five-levels below</td>
<td>Everyone else</td>
<td>Everyone else</td>
</tr>
<tr>
<td>Colleges</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>Students</td>
<td>4,914</td>
<td>4,914</td>
</tr>
<tr>
<td>Level</td>
<td>Direct Matriculants (Through 11th grade)</td>
<td>Non-Direct Matriculants</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>One-level below</td>
<td>High school 11th grade cumulative GPA of 2.7 or better</td>
<td>High school 12th grade cumulative GPA of 2.6 or better</td>
</tr>
<tr>
<td>Two-levels below</td>
<td>High school 11th grade cumulative GPA of 2.2 or better</td>
<td>High school 12th grade cumulative GPA of 2.4 or better</td>
</tr>
<tr>
<td>Three-levels below</td>
<td>Remedial or Non-remedial English course in 9th, 10th, or 11th grade with a C+ or better</td>
<td>High school 12th grade cumulative GPA of 1.5 or better</td>
</tr>
<tr>
<td>Four-levels below</td>
<td>Placement via test or other locally determined measure</td>
<td>Placement via test or other locally determined measure</td>
</tr>
<tr>
<td>Five-levels below</td>
<td>Everyone else</td>
<td>Everyone else</td>
</tr>
<tr>
<td>Colleges</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Students</td>
<td>2,752</td>
<td>2,752</td>
</tr>
</tbody>
</table>

Note: placement via test or other locally determined measure = too few cases available to grow decision trees or rules.

¹ Criterion = 0.59
<table>
<thead>
<tr>
<th>Level</th>
<th>Direct Matriculants (Through 11th grade)</th>
<th>Non-Direct Matriculants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-levels below</td>
<td>High school 11th grade cumulative GPA of 2.8 or better</td>
<td>High school 12th grade cumulative GPA of 2.9 or better OR English CST score of 292 or higher</td>
</tr>
<tr>
<td>Three-levels below</td>
<td>High school 11th grade cumulative GPA of 2.3 or better</td>
<td>Placement via test or other locally determined measure*</td>
</tr>
<tr>
<td>Four-levels below</td>
<td>High school 11th grade cumulative GPA of 1.8 or better</td>
<td>Placement via test or other locally determined measure**</td>
</tr>
<tr>
<td>Five-levels below</td>
<td>Everyone else</td>
<td>Everyone else</td>
</tr>
<tr>
<td>Colleges</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Students</td>
<td>1,014</td>
<td>1,014</td>
</tr>
</tbody>
</table>

* L2 C ESL NDM rule that was previously listed was removed due to inability to replicate in later iteration.
** L2 D ESL NDM rule that was previously listed was removed due to inability to replicate in later iteration.
## Transfer-Level Math Placement Examples

<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 $\geq$3.2 OR</td>
<td>HS 12 GPA $\geq$3.2 OR</td>
</tr>
<tr>
<td>Passed Algebra II (or better)</td>
<td>HS 11 GPA $\geq$2.9 AND Pre-Calculus C (or better)</td>
<td>HS 12 GPA $\geq$3.0 AND Pre-Calculus or Statistics (C or better)</td>
</tr>
<tr>
<td>Statistics (General Education/Liberal Arts)</td>
<td>HS 11 GPA $\geq$3.0 OR</td>
<td>HS 12 GPA $\geq$3.0 OR</td>
</tr>
<tr>
<td>Passed Algebra I (or better)</td>
<td>HS 11 GPA $\geq$2.3 AND Pre-Calculus C (or better)</td>
<td>HS 12 GPA $\geq$2.6 AND Pre-Calculus (C or better)</td>
</tr>
</tbody>
</table>

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 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 30 colleges</td>
<td>2 levels below transfer</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td></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 27 colleges</td>
<td>3 levels below transfer</td>
<td>0.07</td>
<td>0.02</td>
</tr>
<tr>
<td></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
  • Do you dream in English?
• TOEFL Scores
• Other tests or credentials
• What measures do you use?
ESL Survey

4. At what age did you start learning English?
   - 0-5 Preschool
   - 6-11 Primary school
   - 12-15 Lower secondary
   - 16-18 Upper secondary
   - 19-22 College/University
   - 23-29
   - 30-39
   - 40-49
   - 50+

5. How often do you speak in English?
   - With Friends
     - Never 0%
     - Not very often 25%
     - Sometimes 50%
     - Often 75%
     - All the time 100%
   - With Family
     - Never 0%
     - Not very often 25%
     - Sometimes 50%
     - Often 75%
     - All the time 100%
   - At School
     - Never 0%
     - Not very often 25%
     - Sometimes 50%
     - Often 75%
     - All the time 100%

6. Did you receive a college or university degree from outside the United States?
   - Yes
   - No
   - Don’t know

- Years of ESL instruction
- Dreaming in English
- Language of mobile phone
- Watching, Reading, Internet use in English
- Work in English environment
- Self-rated proficiency
- Number of languages
- Use of translation sheet

For a copy of this survey in English and Spanish, email: Loris Fagioli, Director of Research, lfagioli@ivc.edu
### Predicting Success

<table>
<thead>
<tr>
<th></th>
<th>Level -1</th>
<th>Level -2</th>
<th>Level -3</th>
<th>Level -4</th>
<th>Level -5</th>
<th>Level -6</th>
<th>Level -7</th>
</tr>
</thead>
<tbody>
<tr>
<td>i4 Age</td>
<td>-0.046</td>
<td>0.163</td>
<td>0.032</td>
<td>-0.071</td>
<td>-0.041</td>
<td>-0.293</td>
<td>-0.175</td>
</tr>
<tr>
<td>i5 with Friends</td>
<td>-0.142</td>
<td>-0.200</td>
<td>-0.036</td>
<td>0.093</td>
<td>0.040</td>
<td>0.248</td>
<td>0.146</td>
</tr>
<tr>
<td>i5 with Family</td>
<td>-0.162</td>
<td>-0.206</td>
<td>0.081</td>
<td>-0.056</td>
<td>0.277</td>
<td>0.070</td>
<td>-0.064</td>
</tr>
<tr>
<td>i5 at School</td>
<td>-0.198</td>
<td>-0.071</td>
<td>0.103</td>
<td>-0.107</td>
<td>0.156</td>
<td>0.148</td>
<td>0.057</td>
</tr>
<tr>
<td>i6 Foreign college degree</td>
<td>-0.093</td>
<td>0.130</td>
<td>-0.020</td>
<td>-0.077</td>
<td>-0.123</td>
<td>0.106</td>
<td>0.051</td>
</tr>
<tr>
<td>i7 ESL instruction US</td>
<td>-0.144</td>
<td>-0.015</td>
<td>-0.032</td>
<td>-0.003</td>
<td>0.133</td>
<td>0.270</td>
<td>0.169</td>
</tr>
<tr>
<td>i8 Work</td>
<td>-0.110</td>
<td>-0.211</td>
<td>-0.232</td>
<td>0.106</td>
<td>-0.148</td>
<td>0.076</td>
<td>-0.015</td>
</tr>
<tr>
<td>i10 Dreams</td>
<td>-0.138</td>
<td>-0.184</td>
<td>-0.366</td>
<td>-0.004</td>
<td>0.080</td>
<td>-0.096</td>
<td>-0.052</td>
</tr>
<tr>
<td>i11 Phone English</td>
<td>-0.185</td>
<td>-0.021</td>
<td>-0.229</td>
<td>-0.022</td>
<td>0.265</td>
<td>0.192</td>
<td>-0.191</td>
</tr>
<tr>
<td>i11 Phone other</td>
<td>0.185</td>
<td>0.004</td>
<td>0.229</td>
<td>0.022</td>
<td>-0.265</td>
<td>-0.192</td>
<td>0.167</td>
</tr>
<tr>
<td>i11 Phone none</td>
<td>0.000</td>
<td>0.051</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.071</td>
</tr>
<tr>
<td>i12 TV (hr)</td>
<td>-0.055</td>
<td>-0.013</td>
<td>-0.303</td>
<td>0.026</td>
<td>0.201</td>
<td>0.199</td>
<td>0.270</td>
</tr>
<tr>
<td>i12 Reading (hr)</td>
<td>0.401</td>
<td>-0.018</td>
<td>-0.176</td>
<td>0.003</td>
<td>0.018</td>
<td>-0.067</td>
<td>-0.136</td>
</tr>
<tr>
<td>i12 Internet (hr)</td>
<td>-0.171</td>
<td>-0.013</td>
<td>-0.124</td>
<td>0.030</td>
<td>0.025</td>
<td>-0.007</td>
<td>0.147</td>
</tr>
<tr>
<td>i13 Proficiency</td>
<td>-0.142</td>
<td>-0.044</td>
<td>-0.218</td>
<td>-0.005</td>
<td>0.360</td>
<td>0.139</td>
<td>-0.025</td>
</tr>
<tr>
<td>i14 Languages Nr</td>
<td>0.073</td>
<td>0.194</td>
<td>-0.198</td>
<td>0.031</td>
<td>0.136</td>
<td>0.033</td>
<td>0.205</td>
</tr>
<tr>
<td>i15 Translation Sheet None</td>
<td>-0.053</td>
<td>0.028</td>
<td>0.152</td>
<td>0.006</td>
<td>0.223</td>
<td>-0.083</td>
<td>-0.158</td>
</tr>
<tr>
<td>i15 Translation Sheet Some</td>
<td>0.000</td>
<td>-0.069</td>
<td>-0.062</td>
<td>-0.057</td>
<td>-0.283</td>
<td>0.116</td>
<td>0.212</td>
</tr>
<tr>
<td>i15 Translation Sheet Yes</td>
<td>0.053</td>
<td>0.049</td>
<td>-0.140</td>
<td>0.074</td>
<td>0.088</td>
<td>-0.045</td>
<td>-0.020</td>
</tr>
<tr>
<td>Scaled Score</td>
<td>-0.201</td>
<td>-0.084</td>
<td>-0.144</td>
<td>-0.008</td>
<td>0.373</td>
<td>0.169</td>
<td>0.000</td>
</tr>
<tr>
<td>N</td>
<td>62</td>
<td>207</td>
<td>76</td>
<td>56</td>
<td>57</td>
<td>58</td>
<td>40</td>
</tr>
</tbody>
</table>
Results from the Field
Pilot Summary

- MMAP rules performing as expected
- Messaging should be done once with a single voice and specifically state the recommended course
- Implementation of MMAP rules is nuanced
  - For example, don’t use statistics rules to place into calculus
- MMAP started new conversations within and across departments and services that did not occur prior
- Collaboration between high schools and colleges has increased and is an important element of success
Success Rates in Transfer-level English

Success Rates in Transfer-level Math

“Under our previous policies, African American and Latino students were far less likely to place into transfer-level math. Under the new policies, African American students’ access to transfer-level math increased eight-fold, Latino students’ access increased four-fold, and the disproportionate impact in placement was eliminated for all racial groups.”
– Cuyamaca College

“There are thousands of reasons to do this; each one has a name.”
– Bakersfield College

“MMAP is a COMPLETION initiative, not a SUCCESS initiative.”
– Santa Monica College
Imperial Valley College Challenges in Implementation

- Low participation in CalPassPlus
- No electronic transcript system in place
- Little awareness of MMAP campus-wide
- Limited IR Staff
- “Our students are different” and dealing with skepticism
Fall 2016 MMAP Implementation - English

Transfer English - Success Rates

- Non-MMAP: N=704, 58.80%
- MMAP: N=109, 71.60%
Fall 2016 MMAP Implementation - Math

Transfer Success Rates

<table>
<thead>
<tr>
<th></th>
<th>Non-MMAP</th>
<th>MMAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>673</td>
<td>44</td>
</tr>
<tr>
<td>Success Rate</td>
<td>62.70%</td>
<td>70.50%</td>
</tr>
</tbody>
</table>
Recommendations

• Promote MMAP awareness campus-wide
  – Involve IT, IR, SSSP, Faculty, Enrollment Management and Counseling
  – Share Data!
• Work with local high schools
  – Form articulation agreements, dual-enrollment, etc.
  – Report back to your feeder schools
• Training with IT and SSSP/Assessment on record keeping
• Training with Counselors on interpreting recommendations
Multiple Measures at Mira Costa

Spring/Fall 2016 Placement into Transfer English

*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

- Pre-Reform: S2016 - n=1,094, 65%; F2016 - n=498, 68%
- Post_Reform: S2016 - n=179, 69%; F2016 - n=1,150, 75%
- Compass: S2016 - n=1,094, 64%; F2016 - n=498, 70%
- MMAP: S2016 - n=1,094, 67%; F2016 - n=498, 80%
- EAP: S2016 - n=1,094, 71%; F2016 - n=1,150, 72%
Las Positas Preliminary English Results

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
Irvine Valley College F2016 MMAP Pilot: Transfer-level English

Success Rate: 85% (S: Correct placement)
Drop Rate: 30% (F: Correct Placement)
Withdraw Rate: 3% (S: Little effort)
Failure Rate: 6% (F: Considerable positive effort)

95% (S: Correct placement) vs. 88% (F: Correct Placement)
88% (S: Student Survey End of Term) vs. 88% (F: Faculty Survey End of Term)
27% (S: Correct placement) vs. 26% (F: Correct Placement)

All other students in Course compared to students placed via MM into Course.

Placed via MM into Course vs. All other students in Course.
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: $r(12,048) = 0.707$

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

• Correspondence could 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).
Social-psychological (non cognitive variables) data

• 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+
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