High school achievement in multiple measures: Performance and recommendations

Craig Hayward, PhD
John Hetts, PhD

Common Assessment Initiative Steering Committee
Sacramento, California
1/26/15
Overview

• Which high school achievement variables best predict performance in community college English and math?
• How strong are those models? How do they compare to Accuplacer?
• How should HS variables be applied to assessment?
• What is the impact of applying HS variables as multiple measures?
  • On placement level sorts?
  • On pass rates?
  • On throughput?
  • Semesters saved?
• Next steps
High school variables that predict CC success

• English
  • Cumulative HS GPA
  • C+ or better in AP English class
  • Score on English CST

• Math
  • Cumulative HS GPA
  • Grades in Algebra II, Statistics, Trigonometry
  • Enrollment in Calculus, Algebra I
  • Taking a more challenging CST
  • Score on math CST
Correlations with Community College Grade:
11th grade Cumulative GPA vs. Accuplacer

<table>
<thead>
<tr>
<th>English</th>
<th>11th Grade GPA</th>
<th>Accuplacer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer</td>
<td>.27</td>
<td>.10</td>
</tr>
<tr>
<td>1 level below</td>
<td>.24</td>
<td>.12</td>
</tr>
<tr>
<td>2 levels below</td>
<td>.25</td>
<td>.12</td>
</tr>
<tr>
<td>3 levels below</td>
<td>.18</td>
<td>.12</td>
</tr>
<tr>
<td>4 levels below</td>
<td>.21</td>
<td>.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Math</th>
<th>11th Grade GPA</th>
<th>Accuplacer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer - STEM</td>
<td>.24</td>
<td>.19</td>
</tr>
<tr>
<td>Transfer – Stats</td>
<td>.31</td>
<td>.16</td>
</tr>
<tr>
<td>Transfer – LAM</td>
<td>.26</td>
<td>.09</td>
</tr>
<tr>
<td>1 level below</td>
<td>.28</td>
<td>.21</td>
</tr>
<tr>
<td>2 levels below</td>
<td>.26</td>
<td>.11</td>
</tr>
<tr>
<td>3 levels below</td>
<td>.23</td>
<td>.11</td>
</tr>
<tr>
<td>4 levels below</td>
<td>.19</td>
<td>.05</td>
</tr>
</tbody>
</table>
Summary

• GPA is a potent predictor
• More predictive than standardized assessments.
• Standardized assessment is overshadowed even more in a multivariate context.
• On use of cumulative 11\textsuperscript{th} grade GPA
  • Correlation between 11\textsuperscript{th} grade and 12\textsuperscript{th} grade cumulative GPA is .95
Multiple measure models

Based on High School Transcript Data
Math models: Statistics & STEM math

Transfer – Statistics (Adj. R²=.16)
• HS GPA >= 3.2
  • OR
• HS GPA >=2.7 AND CST >= 310
  • OR
• Enrolled in HS Calculus
  • OR
• C+ or better in Statistics in HS AND CST >= 242
  • OR
• B- or better in HS Trig AND CST >= 369
  • OR
• B- or better in HS Trig AND CST >= 271
  AND C or better in HS Algebra 1

Transfer – STEM (Adj. R²=.09)
• HS GPA >= 3.5
  • OR
• HS GPA >= 2.8 AND CST >= 336
  • OR
• HS GPA >= 3.1 AND Enrolled in HS Alg. I
Math models: GE Math & One level below

Transfer level GE Math (Adj. R²=.11)
- HS GPA >= 3.2
  - OR
- HS GPA > 2.4 AND CST >= 302
  - OR
- C+ or better in HS Pre-Calculus CST >= 302 AND Enrolled in Algebra I in HS

One level below – Algebra II (Adj. R²=.13)
- HS GPA >= 3.1
  - OR
- HS GPA >= 2.4 AND C+ or better in HS Algebra II AND CST >= 308
  - OR
- HS GPA >= 2.1 AND CST >= 292 AND C or better in HS Trig
  - OR
- HS GPA >= 2.8 AND C or better in HS Pre-Calculus
  - OR
- HS GPA >= 2.8 AND CST >= 310 AND B- or better in HS Algebra II
Math models: Two & Three levels below

**Two levels below – Algebra I (Adj. R²=.09)**
- HS GPA >= 3.0
  - OR
- HS GPA >= 2.3 AND CST >= 284 AND Higher CST Subject
  - OR
- HS GPA >=2.6 AND CST >= 284 AND Lower CST Subject

**Three levels below – Pre-Alg. I (Adj. R²=.07)**
- HS GPA >= 2.3 AND CST >= 278
  - OR
- HS GPA >= 1.6 AND CST >= 282 AND Higher CST Subject
  - OR
- HS GPA >= 2.3 AND Lower CST Subject Areas
  - OR
- HS GPA >= 1.9 AND >= 10 terms since HS exit
  - OR
- CST Subject Areas in (0,2,7 or 8) AND CST >=253
Impact of applying math models

Result of applying High School transcript multiple measures disjunctively with test

- Four levels below: 5.9% (Historical), 5.1% (Proposed)
- Three levels below: 14.1% (Historical), 13.1% (Proposed)
- Two levels below: 24.0% (Historical), 20.8% (Proposed)
- One level below: 26.6% (Historical), 20.2% (Proposed)
- Transfer-level: 40.8% (Proposed)
English models – Transfer & one level below

Transfer level (Adj. R²=.11)
- HS GPA >= 2.1
  - OR
- C+ or better in AP English course

One level below (Adj. R²=.08)
- HS GPA >= 2.4
  - Rule set overridden
English models – Two and three levels below

Two levels below (Adj. R^2=.09)
- HS GPA >=2.2 and CST >= 308
  - Rule set overridden

Three levels below (Adj. R^2=.03)
- HS GPA >=2.8
  - OR
- HS GPA >=2.1 and CST >= 290
  - Rule set overridden
Impact of applying English models

Result of applying High School transcript multiple measures disjunctively with test

<table>
<thead>
<tr>
<th>Levels Below</th>
<th>Historical</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four levels below</td>
<td>2.0%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Three levels below</td>
<td>4.9%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Two levels below</td>
<td>16.0%</td>
<td>4.4%</td>
</tr>
<tr>
<td>One level below</td>
<td>29.0%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Transfer-level</td>
<td>48.1%</td>
<td>86.6%</td>
</tr>
</tbody>
</table>
Impact on success rates

Transfer-level success

English

- Historical: 72%
- Proposed: 75%

Math

- Historical: 62%
- Proposed: 64%
Impact on throughput rates

Throughput rate

<table>
<thead>
<tr>
<th></th>
<th>Historical</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>55%</td>
<td>71%</td>
</tr>
<tr>
<td>Math</td>
<td>35%</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Legend:**
- Blue: Historical
- Orange: Proposed
Feedback from MMAP pilot colleges

• Placement systems are high stakes and have real consequences for our students’ lives
• All placement systems have error.
  • False negative -> predicts failure when student actually could succeed
  • False positive -> predicts success when student actually fails
• If a placement system had 25% error, how would you allocate that error between false negatives and false positives?
  • Strong consensus at pilot college convenings was that area of greatest concern was reducing the number of false negatives.
  • “All error should be allocated to the false positive side.”
    • Math faculty member from pilot college convening
Next steps

Pilot Colleges
• Refresher & ramp-up for interested common assessment pilot colleges
• Share final model with multiple measures workgroup and pilot colleges
• Implementation webinars/technical support and mentoring
• Coordinate piloting of multiple measures and collection & analysis of new validity data

MMAP Research & Implementation
• Completion of final models
• Development of model delivery system
• Outreach to partner K-12 districts
• Collection of existing available data on NCVs
• Explore incremental utility of NCVs, if any
• Develop recommendations for multiple measures model to include in CAI
• Develop recommendations for pilot NCVs to include in CAI for potential testing
Q & A

Thank you.