Placement and Performance

Understanding and predicting preparation and success in Math and English at Long Beach City College

This presentation represents an amalgam of a number of different presentations to internal institutional audiences as well as a presentation with our former Executive Vice President of Academic Affairs, Don Berz to the CCCCIO in October 2011. Fundamental and critical aspects of this research were completed by our two research analysts, Andrew Fuenmayor and Karen Rothstein, our Associate Dean of Institutional Effectiveness, Eva Bagg, and our Director of Institutional Research, John Hetts. Questions can be directed to John Hetts at jhetts@lbcc.edu or 562-938-4052.
Overview

1) Background on the research
2) Placement in English at LBCC
3) Predicting placement in English at LBCC
4) Predicting performance in English at LBCC
5) Placement in Math at LBCC
6) Predicting placement in Math at LBCC
7) Predicting performance in Math at LBCC
8) Alignment of placement and performance
   a) Methods for improving alignment
   b) Effects of misalignment
9) Discipline pilot changes in placement at LBCC
10) Why it matters
1) Background of request

- As part of construction of new Promise Pathways learning metropolis, a local unified school district (LUSD) asked to explore possibility of:
  - better alignment of English, Reading, and Math courses at our respective institutions
  - placement based on course performance
    - E.g., to provide parallel opportunities to those provided to students matriculating to CSULB
- Before proceeding, English department requested research examining success rates of LUSD students at LBCC
1) Background: Data development

- Worked with Cal-PASS to generate 5 year cohort (05-06 to 09-10)
  - All courses taken at LUSD and LBCC, California Standards Tests, much, more…
  - Encrypted identifier that allows us to link students between institutions
- Key aspects of cohort
  - Students coming directly from LUSD
  - Examining first English and Math courses taken at LBCC
- Key variables
  - Sophomore, Junior & Senior year English and Math courses taken at LUSD and spring semester grades in those courses
  - 11th grade CST scores (or most recent) at LUSD
  - English courses taken in first term at LBCC and grades in those courses
2) Current placement: English

- What does LUSD’s pattern of English placement look like?
  - Fall, 2010 LUSD cohort (most recent available)

<table>
<thead>
<tr>
<th></th>
<th>English 1</th>
<th>English 105 (1 level below)</th>
<th>English 801B</th>
<th>English 801A (3 levels below)</th>
<th>No Assessment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>171</td>
<td>581</td>
<td>0</td>
<td>480</td>
<td>442</td>
<td>1674</td>
</tr>
<tr>
<td>Percent</td>
<td>10.2%</td>
<td>34.7%</td>
<td>N/A</td>
<td>28.7%</td>
<td>26.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Percent of Assessed</td>
<td>13.9%</td>
<td>47.2%</td>
<td>N/A</td>
<td>39.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3) Predicting Assessed Level of Preparation/Placement in English

- Primary method of assessing level of preparation has been:
  - student’s performance on standardized assessment instrument (DTLS and, more recently, Accuplacer)
  - combination of assessment & response to writing prompt
    - (Added EAP and other CCC’s assessments in Fall 2010)

- What predicts assessed preparation?
  - Predicting how students will score on the assessment
  - I.e., where they will be placed in our English course sequence.
Predicting Placement via DTLS/Accuplacer

- Logistic regression
- Outcome:
  - Course students are placed in at LBCC
    - Uses 801A as basis for comparison
      - 1) What predicts placement into 105 (vs. 801A)
      - 2) What predicts placement into English 1 (vs. 801A)

- Key predictors:
  - CST - 11th Grade California Standards Test score in English (CST-ELA)
  - Grade in 11th grade English
  - Grade in 12th grade English
  - 11th and 12th Grade GPA (sans English)
  - A-G courses taken in 11th and 12th grade
  - Course in 12th grade
  - Using Rhetoric & Comp* (now EWRC) as baseline for comparison
    - vs. AP English, Multicultural Lit, Film Analysis, Remedial (English 7-8), Other Electives (e.g., British Literature, Bible as Literature, etc.)
    - Note reason for placement in remedial English.
  - Figures provide the unstandardized regression coefficients
Cohort Demographics

Total Cohort: N = 7398, English Cohort: N = 2747
Predicting Placement in English 105 (1 level below) vs. 801A (3 levels below)

LUSD Course (compared to Rhetoric and Comp)

- Remedial
- AP
- GPA (11)
- GPA (12)
- A-G (11)
- A-G (12)
- EngGrade (11)
- EngGrade (12)
- CST-ELA (z)

Other
Multicultural Lit
Film Analysis

† = p < .10, * = p < .05, ** = p < .01, x = p < 1 x 10^-30
Predicting Placement in English 1 vs. 801A (3 levels below)

LUSD Course (compared to Rhetoric and Comp)

- Other
- Multicultural Lit
- Film Analysis
- Remedial
- AP
- GPA (11)
- GPA (12)
- A-G (11)
- A-G (12)
- EngGrade (11)
- EngGrade (12)
- CST-ELA (z)

† = p < .10, * = p < .05, ** = p < .01, x = p < 1 x 10^-50
What matters most for predicting placement in English at LBCC is: 11th grade CST scores

I.e., performance on and placement (DTLS/Accuplacer) is strongly predicted by CST score in 11th grade
- Overall GPA matters some
- AP increase placement in English 1
- Remedial English increases placement in 801A.

Students 11th grade CST score could be used instead of Accuplacer to place students
- effectively disregarding last 3 semesters of high school
4) Predicting Performance in English

- Which factors are best predictors of **performance** in English at LBCC?
  - Use same data to look at **successful completion** of our English courses
  - Predicting likelihood of getting C or better.

- Rhetoric & Comp course again used as comparison
- English course taken at LBCC added
  - The difficulty/level of the course should be a substantial predictor of likelihood of success for any given student
  - English 1 as comparison
Predicting Success in English

- LUSD (vs. Rhetoric and Comp)
- LBCC (vs. English 1)

1 level below
3 levels below
Other
Multicultural Lit
Film Analysis
Remedial
AP
GPA (11)
GPA (12)
A-G (11)
A-G (12)
EngGrade (11)
EngGrade (12)
CST-ELA (z)

-3.6
.37*
.40*
.52**
.63****
.74****
.77***
.32**
.10**
.13**
.34***
.11†

† = p < .10, * = p < .05, ** = p < .01, x = p < 1 x 10^-50
Summary: Performance

- What most strongly predicts performance in our English courses is:
  - Level of course taken at LBCC
  - But after that
    - Overall grades (sans English) in 12th grade
      - Grades in 11th grade also matters
    - AP English
    - Grades in English
  - CST matters hardly at all.
5) Current method of math placement

- Standard method of assessing level of preparation:
  - performance on standardized assessment instrument

- Previously Mathematics Diagnostic Testing Project (MTRP) exams:

- Currently Accuplacer math
  - Arithmetic, Elementary Algebra and College Math
  - since July 2008, for placements starting SP09

- To provide multi-method approach, self-reported highest math class successfully completed also used
5) Current math placement pattern

- What does LUSD’s current pattern of placement in Math look like?
  - Fall, 2010 LUSD cohort (most recent available)

<table>
<thead>
<tr>
<th>Transfer</th>
<th>120/130 (Intermediate Algebra)</th>
<th>110 Algebra</th>
<th>815 Preparation for Algebra</th>
<th>805 Arithmetic</th>
<th>No assessment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>153</td>
<td>321</td>
<td>528</td>
<td>227</td>
<td>28</td>
<td>417</td>
</tr>
<tr>
<td>% of Total</td>
<td>9.1%</td>
<td>19.2%</td>
<td>31.5%</td>
<td>13.6%</td>
<td>1.7%</td>
<td>24.9%</td>
</tr>
<tr>
<td>% of Assessed</td>
<td>12.2%</td>
<td>25.5%</td>
<td>42.0%</td>
<td>18.1%</td>
<td>2.2%</td>
<td></td>
</tr>
</tbody>
</table>

- 28.3% of all first-time LUSD students assess at 130 or above. Alternatively: 37.7% of those that complete assessment do

- Cf: 18.2% of our first time students assess at 130 or above, 30.5% of those that complete assessment.
6) Predicting Placement in Math

- What predicts course placement (i.e., our assessment of students level of preparation)?
  - Again, essentially predicting how students will score on the assessment

- Same 5 year cohort (begin at LBCC from F05 to F09)
  - All courses at LUSD and LBCC (through SP10), CSTs, more…
  - Encrypted identifier links students between institutions

- Key aspects of research
  - Students coming directly (Spring to Fall) from LUSD
  - Math course (if any) taken at LBCC in first semester
  - In order to get full high school math sequencing, limiting to final 3 years of the cohort

- Substantially simplified sampling of overall research
6) Predicting Placement via MDTP/Accuplacer

- Ordinal regression - outcome is math course students take first at LBCC*
  - Uses basic skills placement (805/815) as comparison condition
    - What predicts placement into:
      - Algebra (110)
      - Intermediate Algebra (120/130)
      - Transfer level or higher (Math 27-84)

- Key predictors:
  - Last math course taken at LUSD
    - Algebra 2 is comparison course
  - Math GPA
  - 12th grade GPA (sans Math)
  - 11th grade GPA (sans Math)
  - Last California Standards Test taken (usually 11th grade)
    - Algebra 1, Geometry*, Algebra 2, Trigonometry
      - Multiplied by score on the test that they took
  - Number of A-G courses taken in 11th and 12th grade

- Key complications:
  - 1) Massive variation in patterns of course-taking, start, and end point
  - 2) Massive floor effect on performance at both institutions (very few A’s and B’s in Math)
  - 3) Higher degree of codetermination of variables:
    - CST results more strongly determines sequences of courses taken in Math
    - Harder to separate CST from courses taken
Cohort Demographics

Overall Math taken in first term

Total Cohort: N = 7398, Math Cohort: N = 1951
Threshold needed for placement into each category compared to baseline of 805/815 (3 and 4 levels below)

- Math 110 - Algebra: -.79
- Math 130 – Intermediate Algebra: 2.02
- Transfer level – College Algebra/Trigonometry: 3.57

Slide 1

- Coefficients for CST (standardized)
- Which CST you took (Geometry CST set as comparison)
- Interaction between them:
  - (to check for difference in meaning of CST increment for different Math tests)
Coefficients predicting threshold needed for placement into each category

- Trig*CSTscore: -0.39*
- Alg2*CSTscore: 0.09
- Alg*CSTscore: 0.13
- CST (z): 0.75***
- TrigCST: 0.92***
- Alg2CST: 0.74***
- AlgCST: -0.82***

* p<.05, ** p< .01, *** p<.001
Coefficients predicting placement by coursework related variables*

+ p<.10, * p<.05, ** p< .01, *** p< .001
What matters most for predicting placement/Accuplacer is: **CST scores and final course completed/CST test taken**

I.e., performance on and placement using standardized assessments is strongly predicted by:
- CST score in 11\textsuperscript{th} grade
- Which CST you took
  - Higher your score, which one you took matters less
- Course-taking pattern in 12\textsuperscript{th} grade

Students 11\textsuperscript{th} grade CST score and test taken could be used as alternative to place students
- Should we?
7) Predicting Performance

- Which factors are best predictors of performance in Math at LBCC?
  - Use same data to look at successful completion
  - Predicting likelihood of getting C or better.

- Math course taken at LBCC added
  - Everything else is the same
  - Math 130 set as comparison
Coefficients predicting performance for CSTs (CST comparison is the Geometry CST)

+ p<.10, * p<.05, ** p< .01, *** p< .001
Coefficients predicting performance by coursework related variables

LUSD (vs. Algebra 2)

A-G Classes: .06
11th grade GPA: .21*
12th grade GPA: .25**
Math GPA: .73 ***
AP Calculus: 1.26 **
Trigonometry: .20
AP Stats: .30
Finite Math: .18
Geometry: -.56***
Algebra 1: -.59 ***

+ p<.10, * p<.05, ** p<.01, *** p<.001
Coefficients predicting performance based on course taken at LBCC (difficulty/level: 130/intermediate algebra is comparison

![Bar graph showing coefficients for Transfer, 110, and 805/815.]

- Transfer: -.38*
- 110: .30*
- 805/815: .97***

* p<.05, ** p< .01, *** p< .001
Summary: Performance

- What most strongly predicts performance in our Math courses is:
  - how good a student you are.
    - 12th grade matters most, 11th grade some additional
  - how far you make it in the math sequence.
  - Standardized assessment matters far less in performance than in placement.
  - Obvious effect of course difficulty at LBCC.
8) Alignment

- Goal of assessment and placement is to get students into courses where likely to succeed.
- Placement should be well-aligned with predicted performance.
  - Want to place students in courses where reasonably confident they will perform well.
  - I.e., optimally, major predictors of performance should be the primary bases for placement.
  - Great deal of research on both learning and well-being that argues that you get the most learning, best performance, and most identification with/enjoyment of the task when the difficulty of the task is well-calibrated to students skills to provide challenge at or slightly beyond their currently level of ability.
Alignment

- 11th grade CST strongly predicts Accuplacer-based placement
  - weakly predicts performance in courses (though more strongly for Math).

- Grades and courses in 12th grade strongly predicts performance
  - More weakly related to placement in those courses

- Implication: current method of placement is not well aligned with what leads to success in our classrooms

- Placing students based on high school performance, particularly 12th grade course performance holds potential to more strongly align placement with likelihood of success
  - Place students currently likely to fail in more appropriate courses
  - Place students likely to succeed in courses more suitable to preparedness
8b) Consequences of mismatches in alignment using English as an example

- 1/3 of students currently placed in English 1 are not likely to succeed
  - (D, & F, and to a lesser extent C students with high CST/Accuplacer scores)
- 1/8 of students currently placed in 105 are not likely to succeed
  - (D and F students with moderate CST/Accuplacer scores)
- 3/5 of students placed in Basic Skills appear to be highly likely to succeed at levels higher than where currently placed by Accuplacer if allowed the opportunity
  - (A & B students with moderate to low CST scores)

What happens to those students?
- Let’s take just what happens to A students placed in 105 and 801.
100 A students who place into 105 or 801A using Accuplacer

- 100 in English 1
  - 77.9% pass
  - ~78 complete English 1

- 100 in English 105
  - 82.1% pass
  - 60% retention
  - 49 in English 1
  - 85% pass
  - ~42 complete English 1

- 100 in English 801A
  - 88% pass
  - 60% retention
  - 52 in 801B
  - 90% pass
  - 60% retention

- 28 in English 105
  - 90% pass
  - 60% retention
  - 15 in English 1
  - 90% pass
  - ~13 complete English 1
100 B students who place into 105 or 801A using Accuplacer

100 in English 1
65.6% pass
~66 complete English 1

100 in English 105
72.9% pass
60% retention
43 in English 1
85% pass
~37 complete English 1

100 in English 801A
82.2% pass
60% retention
49 in 801B
90% pass
60% retention

26 in English 105
90% pass
60% retention
14 in English 1
90% pass
~12 complete English 1
Additional CCC evidence

- Working, small scale model at Grossmont-Cuyamaca
  - *(single large high school initially, bringing to scale)*
  - **95%** of their A & B students were placed into Basic Skills in English
    - Our rate for LUSD seniors is ~81%
- A & B students now placed into English 1
  - **86%** of A & B students successfully complete English 1 on their first try
    - Only 5% would have been allowed to even try.
9) Developing pilot for LBCC English placement for LUSD students

- English Department is developing a plan to place students on a pilot basis in the following way for students from LUSD
  - A’s and B’s in senior year English* placed in English 1
    - * with the exception of students in remedial English courses in their senior year
      - (though there is some evidence that the best students even there may also be likely to succeed)
  - Evidence that these students should successfully complete English 1 at or above current success rates for the course
  - All other students will be placed using standard assessment process
9) Developing pilot for LBCC Math placements for LUSD students in development

- Collaborative effort to develop full, evidence-based, multivariate approach to assessment
  - Math was already part of the way there
    - Recognition of value of grades in particular high school courses as alternative method of placement
    - Use of self-reported highest course taken in assessment
    - Recommended preps of literacy
- Intent to employ full breadth of evidence available for students from LUSD to assess their level of preparation/place them in our courses
  - Any student who is likely to successfully complete a course at or above the average rate will be placed no lower than that course.
- Comprehensive multi-measure model of assessment currently being finalized
10: Why this will matter: Building better pathways

- Based on internal research, research done cooperatively as part of California Leadership Alliance for Student Success (CLASS) initiative and other research emerging from CCRC LBCC is building:
  - Prescriptive, full-time course load
    - Emphasis on early completion of courses in English, Math, and Reading
  - At the core, direct placement in coursework based on true, multi-method, evidence-based, holistic assessment of capabilities of students
- Taken together, what types of changes will this mean for our students?
Example of what this will mean using English pilot as an example

Percentage of LUSD first-term student cohort taking English courses in their first semester

<table>
<thead>
<tr>
<th>Course Level</th>
<th>Promise Pathways model</th>
<th>Current 1st semester enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 1</td>
<td>52%</td>
<td>11%</td>
</tr>
<tr>
<td>One level below</td>
<td>29%</td>
<td>21%</td>
</tr>
<tr>
<td>Three levels below</td>
<td>17% 19%</td>
<td></td>
</tr>
<tr>
<td>Did not take English</td>
<td>52% 0%</td>
<td></td>
</tr>
</tbody>
</table>
More broadly, what this will mean

Percentage of first-term students taking transfer-level English, disaggregated by ethnicity

| Current Placement | | Full Placement Model | |
|-------------------|------------------|----------------------|
|                    | Asian | Black | Hispanic | White | Asian | Black | Hispanic | White |
| English 1          | 8%    | 9%    | 13%      | 14%    | 53%   | 45%   | 59%      | 58%   |
| One level below    | 20%   | 21%   | 19%      | 20%    | 59%   | 40%   | 49%      | 47%   |
| Three levels below | 26%   | 19%   | 20%      | 8%     | 59%   | 34%   | 32%      | 27%   |
| Did not take English | 19% | 14% | 19% | 20% | 59% | 40% | 49% | 47% |
| P2: English 1      | 8%    | 9%    | 13%      | 14%    | 53%   | 45%   | 59%      | 58%   |
| P2: One level below| 20%   | 21%   | 19%      | 20%    | 59%   | 40%   | 49%      | 47%   |
| P2: Three levels below | 26% | 19% | 20% | 8% | 59% | 40% | 49% | 47% |

Legend:
- Asian
- Black
- Hispanic
- White
How this changes things

Projected completions of transfer-level English in first year (with LUSD cohort of ~1000)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Asian</th>
<th>Black</th>
<th>Hispanic</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current (F2010)</td>
<td>101</td>
<td>16</td>
<td>9</td>
<td>45</td>
<td>22</td>
</tr>
<tr>
<td>Promise Pathways</td>
<td>571</td>
<td>105</td>
<td>59</td>
<td>240</td>
<td>109</td>
</tr>
</tbody>
</table>
Why this should work

- More comprehensive data not previously available for students now is available for statistical modeling thanks to Cal-PASS
- Fits principles that most educators know well based on decades of experience
  - Performance in the class room predicts performance in the classroom
  - Standardized tests predicts performance on standardized tests
- Solves two ongoing problems:
  - Students placed in courses where they are unlikely to succeed (red in table)
  - Students placed in courses below the level of performance that they are capable of (green in table)
  - More likely to place students in their zone of proximal development
    - Maximizes performance, learning, enjoyment of education, and well-being.

<table>
<thead>
<tr>
<th>LUSD Grade</th>
<th>LBCC course placement using current method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LUSD Grade</td>
</tr>
<tr>
<td>A</td>
<td>36%</td>
</tr>
<tr>
<td>B</td>
<td>30%</td>
</tr>
<tr>
<td>C</td>
<td>27%</td>
</tr>
<tr>
<td>D</td>
<td>6%</td>
</tr>
<tr>
<td>F</td>
<td>1%</td>
</tr>
</tbody>
</table>
Additional implications

- Helps contextualize at least one reason why acceleration and alignment work reasonably well
  - Many high school students are reasonably prepared, and in fact, far more prepared than most people would be prepared to admit but are being **misclassified** by assessment.
  - These innovative approaches to curriculum may work at least in part because they are placing students closer to where they are already **fully prepared** to succeed.

- Helps provides some glimpses into possible explanations for faculty experiences in the classroom with students that appear unprepared to succeed in upper-level courses despite being placed there and students in lower-level courses producing work beyond what many of their classmates are able to achieve
  - Students are being placed in those levels based on a mechanism that is not strongly related to actual performance
10) Recommendations:

- This set of research, which is continuing to develop, provides a promising way forward to increase all of our student progress and achievement rates by:
  - 1) Determining the actual predictors of performance in coursework at our colleges, particularly amongst key preparatory disciplines.
  - 2) Aligning placement methods with those predictors

- Broadly speaking, it suggests the importance and potential of:
  - Developing and implementing broad-based, multi-method evidence-based assessment and placement locally and systemically
  - Supporting the efforts of the CCCCCO, Cal-PASS, the Institute for Evidence-Based Change, and the Data Quality Campaign to make K-16 data available to all community colleges in California and nationally and, to end on a slightly more irreverent note…
    - Considering John Lennon’s advice (slightly reframed) from one of his later songs….
      - All we are saying… is give B’s a chance (or at the very least, B students).