CONNECTING THE DOTS: USING DATA VISUALIZATION TO CONNECT HIGH SCHOOL TO COLLEGE

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I care a lot about people finding their own path, and I think the world’s a better place if we let people figure out their passions and what they’re good at and give them the knowledge and skills to do that, but our education system isn’t designed to do that — it rounds you out and makes you interchangeable with everyone else.

Todd Rose, Author of *The End of Average*
How did the work begin?

Brief History of the Santa Ana Partnership

The Santa Ana Partnership has been working together since 1983 to address and dismantle barriers to student success systemically.

- K-16 Partnership centered on educational achievement, college access and completion in one of the nation’s youngest & most Latino cities.

- Connects students, parents, and community to education locally.

- Works simultaneously at the program, school/college, and system levels to seed innovation and share data to measure progress along the way.
The Intersegmental Math Team

- Started in 2012 to address areas of shared concern between the SAUSD and SAC Math Departments
- For the past few years, efforts have focused on aligning curriculum, increasing senior year math course taking, and improving placement
- As a part of the Basic Skills- Student Outcomes Transformation (BS-SOT) grant, members of the intersegmental math team have been tasked with developing plans for articulation and improving student success in college level courses.
BS-SOT Team

- The goal of the BS-SOT team has been to increase the number of students who complete their math sequence or a college-level course within 1 year of finishing high school.

- The approach to accomplishing this task has been multi-faceted:
  1. Research placement, senior-year course-taking and first-year college course taking to better understand the path from high school to college
  2. Improve placement via multiple measures and appropriate test preparation
  3. Examine the possibility of articulation from high school directly into college-level courses
  4. Look into other paths that will improve the goals of the team
What is Pathways Thinking?

◦ “Pathways-thinking” is focused on completion of degrees, certificates, transfer, or skills. Students establish their educational goals and we design our programs and services around completion of those goals.

◦ Math is considered to be a skill necessary for students to achieve many success goals.
  ◦ Math is required for degrees, certificates, and transfer.
  ◦ Math operates for many students as a gatekeeper to their degree and certificate goals.
  ◦ However, math is more generalized than a lot of other fields of study- hence pathways are simplified, but student skills are less focused

◦ A students’ choice of math course though is going to be dependent upon their field of study and so requires guidance and planning.
The Focus on Completion

- Much research on math education has focused on completion of specific courses
  - Valid issue- SAC Math had a 51% course completion rate for individual courses
  - There are large equity differences between different races and socio-economic groups on the course completion level
- Increasing focus has been placed on completion of student success goals
  - Basic Skills Completion rates are on average less than 35%
  - The probability of a student completing first semester Calculus after beginning in any basic skills course is less than 2%
- So, while we may be needing to work on individual courses, the issue with sequences and program completion are more dire.
SAUSD Pathways Data

- The current SAUSD pathways tool examines the math course taking and course success for the class of 2014-15 at SAUSD, while they took courses at SAC in 2015-16.
- No students placed using multiple measures. All were placed using the MDTP.

The question: From a college math perspective, are students maximizing their senior year?
SAUSD Senior Year Math Course Taking

- AP Calculus: 12.20%
- AP Stats: 8.40%
- Math Analysis: 7.50%
- Probability and Statistics: 25.80%
- College Algebra: 29.50%
- Algebra II, Geometry, and Algebra I: 16.30%
Santa Ana College Pathways

- Calculus (STEM): 11%
- College Algebra and Business Calculus (Business): 17%
- Statistics (Social Sciences): 41%
- Humanities and Elementary Teaching: 17%
- Intermediate Algebra (CTE): 13%

Percentage of Students Taking Math
Examination of the Pathways Tool

- Whitney Youngren
### Freshmen Year Course-Taking by Senior Year Course

<table>
<thead>
<tr>
<th>College Courses</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLAM Algebra</td>
<td>53</td>
</tr>
<tr>
<td>STEM Algebra</td>
<td>39</td>
</tr>
<tr>
<td>Liberal Arts Math</td>
<td>19</td>
</tr>
<tr>
<td>Statistics</td>
<td>14</td>
</tr>
<tr>
<td>STEM Path</td>
<td>2</td>
</tr>
<tr>
<td>Business Path</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>55</td>
</tr>
</tbody>
</table>

**College Courses:**
- College Algebra
- Probability and Stats
- Math Analysis
Course Success by Senior-Year Math Course

Freshmen Year Math Course

SLAM Algebra

BSTEM Algebra

Statistics

Course Success

28%

38%

[VALUE]

Algebra II

College Algebra

Probability and Statistics

Math Analysis

All SAUSD Freshmen
Probability of Placing into Transfer Math by Senior-Year Course

Math Analysis (n=55) 52.7%
Probability and Statistics (n=191) 18.8%
College Algebra (n=162) 46.9%
Senior-Year Course Taking

Probability and Statistics
- Students are successful in Statistics and Liberal Arts Algebra
  - 58% success
  - Highest success rate for all senior-year courses
- Low placement into transfer courses
  - MDTP is algebra based and students don't have any recency to be successful on the test
  - Prob-Stats students are not recommended to take level 3 (which places into transfer math)

Math Analysis and College Algebra
- Students are more successful in STEM Algebra and STEM based Algebra courses
- Students are not as successful in SLAM-based courses
- Students are far more likely to place into transfer-level courses
The quandary of testing and senior-class choice

◦ Success in subsequent coursework would indicate that students should take senior-year courses that would prepare them for their particular pathway

◦ However, if a student takes Probability and Statistics, they are far less likely to place into transfer math

◦ How do you advise students?
What about the Multiple Measures?

- Students can place into Statistics or Liberal Arts Math using the Multiple Measures

- SAC’s threshold for placement into Statistics or Liberal Arts Math is a 3.0 overall unweighted 9-11th grade GPA
Changing Trends in Testing: The Multiple Measures and the CAI

- Currently, SAC uses the MDTP for assessing and placing students.
- Over the last three years, over 30% of students have failed to place. In 2017, 25.2% of students failed to place. Multiple measures will eliminate the non-placement.
- Using current testing and multiple measures, 81% of students will be at either 1-level below or at college level.
  - 45% placed into one-level below college-level
  - 36% placed into college-level
Placement-Before and After Multiple Measures

Before Multiple Measures
- Basic Math: 415
- Pre-Algebra: 81
- Algebra Redesign: 140
- College-level: 409
- No Placement: 559

After Multiple Measures
- Basic Math: 548
- Pre-Algebra: 163
- Algebra Redesign: 674
- College-level: 126
- No Placement: 674
Senior-Year Math Course by GPA

**Below 3.0**
- Algebra II and below: 98.70%
- Probability and Stats: 81.10%
- College Algebra: 74.50%
- Math Analysis: 46%

**3.0 and over**
- Algebra II and below: 1.30%
- Probability and Stats: 18.90%
- College Algebra: 25.50%
- Math Analysis: 54%
Dual Enrollment or Early College?

- Are students ready to take college classes?

- Certainly, a large number of students are eligible for college courses by the multiple measures for college-level courses.

- Which students should be taking college-level math courses after their junior year?
Senior Year Course by Grade in Math Analysis

- AP (n=463): 86.4% A, 74.0% B, 46.9% C
- College Algebra (n=129): 9.2% A, 18.9% B, 31.1% C
- Prob-Stats (n=57): 4.4% A, 6.2% B, 15.8% C
- Math Analysis (n=11): 0.0% A, 0.0% B, 5.3% C
- Stepped Down (n=4): 0.0% A, 0.9% B, 1.0% C
Facilitating Math Pathways

- Selecting students who are ready for college-level math towards AP and dual enrollment
- Finding ways to facilitate students entering into transfer-level courses via testing or multiple measures while preparing them from a skills-perspective
  - Clear statement of the required pre-requisite skills that are necessary for success in a particular pathway
  - Course requirements in high school should be set towards teaching or emphasizing those prerequisites
- Methods we could use to do this:
  - Multiple Measures placement to obviate the need for Algebra-based testing
  - Dual Enrollment for qualified students to finish their math requirements before beginning full-time college
  - Senior-year course selection that would prepare students for their college math courses