An Analysis of Placement Patterns & Sequence Completion at Cañada College

DRAFT REPORT

Office of Planning, Research and Student Success
The Cañada Math Sequence

Curriculum Sequence

- PRE-ALGEBRA
  - ELEMENTARY ALGEBRA
  - INTERMEDIATE ALGEBRA
  - TRANSFER COURSES

Course Level Sequence

- PRE-ALGEBRA
  - ELEMENTARY ALGEBRA
    - Math 110 (5.0 Units)
    - Math 111 (3.0 Units)
  - INTERMEDIATE ALGEBRA
    - Math 120 (5.0 Units)
    - Math 122 (3.0 Units)
    - Math 123 (3.0 Units)
  - TRANSFER COURSES

Note: Only a very small % of students move along the pathway indicated by the dashed line.
The gap between student placement and their actual course taking behavior is greatest in Pre-Algebra.

A placement into Pre-Algebra creates a strong disincentive to take a math course.

Data Source: San Mateo District Data Warehouse (Sept 2008). Note that findings are preliminary.
Students that place into a course tend to outperform their non-placed peers

<table>
<thead>
<tr>
<th>Curriculum</th>
<th>Course</th>
<th>Course Success Rate</th>
<th>Performance Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Placed</td>
<td>Pre-Req</td>
</tr>
<tr>
<td>Pre-Algebra</td>
<td>Math 811</td>
<td>58.6%</td>
<td>N/A</td>
</tr>
<tr>
<td>Elementary Algebra</td>
<td>Math 110</td>
<td>49.7%</td>
<td>35.8%</td>
</tr>
<tr>
<td></td>
<td>Math 111</td>
<td>50.4%</td>
<td>42.1%</td>
</tr>
<tr>
<td></td>
<td>Math 112</td>
<td>51.4%</td>
<td>37.9%</td>
</tr>
<tr>
<td>Intermediate Algebra</td>
<td>Math 120</td>
<td>56.1%</td>
<td>55.0%</td>
</tr>
<tr>
<td></td>
<td>Math 122</td>
<td>60.9%</td>
<td>49.7%</td>
</tr>
<tr>
<td></td>
<td>Math 123</td>
<td>58.9%</td>
<td>53.9%</td>
</tr>
<tr>
<td>Transfer Level</td>
<td></td>
<td>69.1%</td>
<td>58.4%</td>
</tr>
</tbody>
</table>

Note: Coverage period is Fall 2000 – Spring 2007; Pre-Req success rate does not include students retaking the course.

Students entering Elementary & Intermediate Algebra through prerequisite completion display systematically lower performance than students placed into the course.
We ask the question: based on average course success rates what is the expected outcome for a Pre-Algebra student attempting to complete the Algebra Sequence?

Message #1: Students starting in Math 811 hoping to complete the Algebra Sequence face a daunting task.

Message #2: A Truth about the nature of sequences: The longer the sequence the lower the flow-through rate.
So before we examine actual algebra sequence completion what do we know

Recall: placement rates into each of the Algebra Courses have remained relatively stable over time.

1. Placement into Pre-Algebra significantly lowers a student’s likelihood of taking a Math course.

2. The cumulative effect of low course pass rates within the Algebra sequence, by itself, leads to low sequence completion rates.

Any effective strategy to improve sequence completion must address these two areas!
## Placement Test Retake Activity

<table>
<thead>
<tr>
<th>Placement Test Discipline</th>
<th>Retake the Placement Test</th>
<th>Score Higher on the Retake</th>
<th>Place into a Higher Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Placement</td>
<td>14.1%</td>
<td>88.3%</td>
<td>69.4%</td>
</tr>
<tr>
<td>English Placement</td>
<td>8.6%</td>
<td>56.0%</td>
<td>25.2%</td>
</tr>
</tbody>
</table>

Data Source: San Mateo District Data Warehouse (Sept 2008). Note that findings are preliminary.

Most students, nearly 85%, retake the test within a week of their first test.

These findings suggest that:

1. students are probably not properly prepared for their initial placement experience & not sufficiently aware that the placement test is a **high stakes exam**
2. Better preparation may help students improve their test performance
Analysis of Course Sequence Completion

Cohort Analysis Methodology

• Select students that placed into Pre-Algebra and track them through the sequence.

• Limit cohort to First time course takers (remove from the cohort all students retaking Math 811).

• Allow students to move through Algebra Sequence at their own pace (but not to exceed five years).

• Allow them unlimited retakes

• Period of coverage = Fall 2000 – Spring 2008
## Sequence Completion Rates by Initial Course Placement

### Cañada Curriculum Sequence

<table>
<thead>
<tr>
<th>Initial Placement</th>
<th>2 years</th>
<th>3 years</th>
<th>4 years</th>
<th>5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE ALGEBRA</td>
<td>2.3%</td>
<td>3.6%</td>
<td>5.4%</td>
<td>6.1%</td>
</tr>
<tr>
<td>ELEMENTARY ALGEBRA</td>
<td>15.5%</td>
<td>19.1%</td>
<td>20.6%</td>
<td>22.4%</td>
</tr>
<tr>
<td>INTERMEDIATE ALGEBRA</td>
<td>43.4%</td>
<td>47.6%</td>
<td>49.2%</td>
<td>49.2%</td>
</tr>
<tr>
<td>TRANSFER LEVEL MATH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Students are 3 to 4 times more likely to complete the sequence when starting in Elementary Algebra.

Data Source: San Mateo District Data Warehouse (Sept 2008). Note that findings are preliminary.
First Sequence Completion Rates for Pre-Algebra Students

First Chain in Algebra Sequence

Of those Passing Pre-Algebra:

- Percent that enroll in Elementary Algebra:
  - 2 years: 28.4%
  - 3 years: 48.2%
  - 4 years: 56.1%
  - 5 years: 59.1%

- Percent that pass Elementary Algebra:
  - 2 years: 20.5%
  - 3 years: 25.3%
  - 4 years: 26.9%
  - 5 years: 30.5%

Cohort Pass Rate ~ 55% to Elementary Algebra
Cohort Pass Rate ~ 30% to Pre-Algebra

Percent of Students Successfully moving from Pre-Algebra Elementary Algebra within 5 Years

Data Source: San Mateo District Data Warehouse (Sept 2008). Note that findings are preliminary.
### Sequence Completion Rates by Initial Course Placement

**Cañada Curriculum Sequence**

![Course Flow Diagram](image)

<table>
<thead>
<tr>
<th>Initial Placement</th>
<th>2 years (%)</th>
<th>3 years (%)</th>
<th>4 years (%)</th>
<th>5 years (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received an “A” in Pre-Algebra*</td>
<td>8.8</td>
<td>13.8</td>
<td>15.3</td>
<td>17.8</td>
</tr>
<tr>
<td>Did not Receive an “A” in Pre-Algebra</td>
<td>0.8</td>
<td>1.7</td>
<td>2.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Mastery is key!** Preliminary findings suggest that students receiving an A grade in Pre-Algebra are 8 or 9 times more likely to complete the algebra sequence.

**Important Finding:** For students receiving an A in Pre-Algebra there is no disproportional impact by ethnicity in algebra sequence completion.

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*Math 811 is a self-paced course. Cohort is restricted students receiving an A grade and completing the course in one semester (3.0 units).*
Sequence Completion Rates by Initial Course Placement

<table>
<thead>
<tr>
<th>Initial Placement</th>
<th>2 years</th>
<th>3 years</th>
<th>4 years</th>
<th>5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>811</td>
<td>2.3%</td>
<td>3.6%</td>
<td>5.4%</td>
<td>6.1%</td>
</tr>
<tr>
<td>110</td>
<td>19.1%</td>
<td>21.9%</td>
<td>23.2%</td>
<td>23.7%</td>
</tr>
<tr>
<td>111</td>
<td>11.8%</td>
<td>16.2%</td>
<td>17.9%</td>
<td>19.1%</td>
</tr>
<tr>
<td>120</td>
<td>57.0%</td>
<td>58.8%</td>
<td>59.6%</td>
<td>59.6%</td>
</tr>
<tr>
<td>122</td>
<td>29.7%</td>
<td>36.4%</td>
<td>38.7%</td>
<td>38.7%</td>
</tr>
</tbody>
</table>

- 3 to 4 times more likely to complete sequence starting in Elementary Algebra
- 2 times as likely to complete sequence starting in Intermediate Algebra
Pathway analysis: successful sequence completion rates by sequence route

<table>
<thead>
<tr>
<th>Pathway</th>
<th>2 years</th>
<th>3 years</th>
<th>4 years</th>
<th>5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 811</td>
<td>2.2%</td>
<td>4.0%</td>
<td>5.2%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Math 111</td>
<td>0.4%</td>
<td>1.1%</td>
<td>1.3%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Math 112</td>
<td>0.3%</td>
<td>0.7%</td>
<td>1.1%</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

Students receiving an A in Math 811 are roughly 10 times more likely to take the orange pathway.
Profile of those completing the Algebra Sequence:

- Display mastery of course content (A Grade)
- Complete the sequence within 2 academic years
- Take the shortest sequence pathway (811, 110, 120)

Profile of the Non-completer (those that make the attempt):

- Starts at the bottom of the sequence
- Long time lapses between courses
- Does not Pass the course on their first attempt
- Engage in multiple course retakes *

* Only 13.1% of students that withdraw from Pre-Algebra ever pass the course. The chances of passing are highest when the retake is in the subsequent semester.
Take Away

As you reflect on possible methods/approaches to refine and improve the placement process keep in mind:

1. **Our findings that suggest:**
   - students are probably not properly prepared for their initial placement experience & not adequately aware that the placement test is a high stakes exam
   - Better preparation may help students improve their test performance.

2. **Even modest improvements in course success rates can have big impacts!**