Math Matters: Transition from High School to Postsecondary Education

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National/State Data

• **Placement** in developmental math courses
  • 28% - 42% (National Data, 2010)
  • **Enrolling** in developmental math (KBOR – 2013/14)
    • 30.9% at community colleges
    • 12.6% at state universities

• **Completion rate** (Grade C or better)
  • 21% - 30% (National Data, 2010)
  • **Completing** developmental math in 2 years (KBOR – 2013/14)
    • 66.8% at community colleges
    • 76.2% at state universities
  • **Also completing College Algebra** in 2 years (KBOR – 2013/14)
    • 19.0% at community colleges
    • 40.7% at state universities
Concerns

- Impact on student self-esteem
- Barrier to postsecondary access
- Increasing costs – for students and institutions
- Workforce: Increased need for K-16 coherence
KSA-M: 2008-2010

- Coverage: algebra, geometry, and data analysis
- 84 multiple-choice items/scores ranging from 0-100/reliability=95%
- Taken at end of 9th, 10th, or 11th grade – Opportunity to Learn
- Can be retaken by those not reaching proficiency
- Used for building accountability, not student graduation
  - Academic warning
  - Approaches standards
  - Proficient
  - Exceeds standards
  - Exemplary
KIDS & KSPSD Datasets

• How well does KSA-M predict developmental math placement in postsecondary education?

• How well does KSA-M predict developmental math performance in postsecondary education?

• How well does KSA-M predict non-developmental math performance in postsecondary education? Is that different from developmental math performance in postsecondary education?
Hierarchical Generalized Linear Models

• Used when outcome variables are influenced by nested variables – students/K-12 schools/postsecondary institution

• Levels of Performance on KSA-M
  • Below proficiency – academic warning & approaches standards
  • Proficient
  • Above proficiency – exceeds standards & exemplary

• The analysis generates a statistical model that we used to estimate expected probabilities for the outcome variables
Predicting Developmental Math Placement
Student Variables Examined

- Graduation Year
- Gender
- Race/Ethnicity
- Gifted
- Mild/Moderate Disability
- Gap Between High School Graduation & First Math Course in Postsecondary Education
## Student Demographics

<table>
<thead>
<tr>
<th></th>
<th>Community Colleges</th>
<th>State Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>%Female</td>
<td>50.45%</td>
<td>48.70%</td>
</tr>
<tr>
<td>%White-Non-Hispanic/Asian</td>
<td>72.18%</td>
<td>82.76%</td>
</tr>
<tr>
<td>%Mild/Moderate Disability</td>
<td>5.94%</td>
<td>1.44%</td>
</tr>
<tr>
<td>Average FRL%</td>
<td>38.79%</td>
<td>32.31%</td>
</tr>
</tbody>
</table>
DMATH Placement by Gender and Race/Ethnicity – Community Colleges

- White/Asian Male
- White/Asian Female
- Underrepresented Male
- Underrepresented Female
DMATH Placement by Gender and Race/Ethnicity – State Universities

- White/Asian Male
- White/Asian Female
- Underrepresented Male
- Underrepresented Female
DMATH Placement by **Mild/Moderate Disability** – Community Colleges

![Bar chart showing DMATH placement by disability level and proficiency level.](chart.png)

- Below:
  - No Disability: 0.9
  - Disability: 0.9
- Proficient:
  - No Disability: 0.7
  - Disability: 0.8
- Advanced:
  - No Disability: 0.2
  - Disability: 0.2
DMATH Placement by **Mild/Moderate Disability** – State Universities

Below: Proficient

No Disability | Disability
---|---
0.6 | 0.7

Proficient

No Disability | Disability
---|---
0.2 | 0.5

Above

No Disability | Disability
---|---
0.01 | 0.01
School Variables Examined

- K-12 Location
- School size
- School structure/grade span
- Percent highly qualified math teachers
- Percent of math courses above Algebra II
- Percent of students eligible for Free & Reduced Lunch (FRL)
- School Average Performance on KSA-M
- Sector: Public vs. Private
DMATH Placement by **Percentile FRL** in K-12 - Community Colleges

Below

Proficient

Above

- 25 %ile FRL
- 50 %ile FRL
- 75 %ile FRL
DMATH Placement by **Percentile FRL** in K-12 – State Universities

- **Below**
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL

- **Proficient**
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL

- **Above**
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL
More Likely to be Placed?

**Gender:**
- 2-Yr – no difference
- 4-Yr – females

**Race/Ethnicity:**
- 2-Yr – minorities at all levels
- 4-Yr – minorities at proficiency and above

**Disability:**
- 2-Yr – with disability at below and proficient (largest difference at proficient level)
- 4-Yr – same as 2-Yr

**Percentile FRL:**
- 2-Yr – as percentile of FRL eligibility increases; smallest increase at below proficiency
- 4-Yr – no difference at proficient and above; at below proficiency, students from schools with lower FPL more likely to be placed
Pass DMATH
Pass DMATH by **KSA-M Performance**

<table>
<thead>
<tr>
<th>Below</th>
<th>Proficient</th>
<th>Above</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
</tr>
</tbody>
</table>

- 2-year
- 4-year
Pass DMATH by **Gender and Race/Ethnicity** – Community Colleges

Below

Proficient

Above

- White/Asian Male
- White/Asian Female
- Underrepresented Male
- Underrepresented Female
Pass DMATH by **Gender and Race/Ethnicity** - State Universities

- White/Asian Male
- White/Asian Female
- Underrepresented Male
- Underrepresented Female
Pass DMATH by **Mild/Moderate Disability** – State Universities

- **Below**: Proficient (Mild/Moderate Disability)
- **Proficient**: No Disability
- **Above**: Disability
Pass DMATH by **Percentile FRL Status** in K-12 – Community Colleges

- **Below**
- **Proficient**
- **Above**

25 %ile FRL  | 50 %ile FRL  | 75 %ile FRL
Pass DMATH by **Percentile FRL Status** in K-12 – State Universities

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**Below**
- 25%ile FRL: 0.60
- 50%ile FRL: 0.70
- 75%ile FRL: 0.80

**Proficient**
- 25%ile FRL: 0.70
- 50%ile FRL: 0.80
- 75%ile FRL: 0.90

**Above**
- 25%ile FRL: 0.80
- 50%ile FRL: 0.90
- 75%ile FRL: 1.00

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*Note: Percentile FRL Status represents the financial need of students based on their academic performance.*
More Likely to Pass DMATH?

**Gender:**  
2-Yr – females at all levels  
4-Yr – females at all levels; difference greatest at proficient

**Race/Ethnicity:**  
2-Yr – no difference at below and proficient; majority at above  
4-Yr - minorities at proficiency and above; majority at below

**Disability:**  
2-Yr – no disability at all levels (largest difference at above)  
4-Yr – no disability at below and above; no difference at proficient  

difference is more than 40 percentage points at above

**Percentile FRL:**  
2-Yr – as percentile of FRL eligibility increases, likelihood of passing DMATH increases with least difference at above  
4-Yr – same as 2-Yr. but a larger effect
Pass Non-DMATH
Pass Non-DMATH by **Gender and Race/Ethnicity** - Community Colleges

- White/Asian Male
- White/Asian Female
- Underrepresented Male
- Underrepresented Female
Pass Non-DMATH by **Gender and Race/Ethnicity** - State Universities

- White/Asian Male
- White/Asian Female
- Underrepresented Male
- Underrepresented Female
Pass Non-DMATH by **Mild/Moderate Disability** - Community Colleges

![Bar graph showing the percentage of students passing Non-DMATH by disability status and proficiency level.](chart.png)

- Below: No Disability (0.6) vs. Disability (0.6)
- Proficient: No Disability (0.7) vs. Disability (0.8)
- Above: No Disability (0.8) vs. Disability (0.7)
Pass Non-DMATH by **Mild/Moderate Disability** – State Universities

![Bar Chart](chart.png)

- Below
- Proficient
- Above

- No Disability
- Disability
Pass Non-DMATH by **Percentile FRL Status** in K-12 – Community Colleges

![Bar Chart]

- Below
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL

- Proficient
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL

- Above
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL
Pass Non-DMATH by **Percentile FRL Status** in K-12 – State Universities

![Bar chart showing pass rates for Non-DMATH by FRL status and percentile in K-12 schools.](chart.png)

- **Below**
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL

- **Proficient**
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL

- **Above**
  - 25%ile FRL
  - 50%ile FRL
  - 75%ile FRL
More Likely to Pass Non-DMATH?

**Gender:**
- 2-Yr – females
- 4-Yr – females with differences in likelihood decreasing with increased performance on KSA-M

**Race/Ethnicity:**
- 2-Yr – no differences at all levels
- 4-Yr – majority at all levels of performance on KSA-M; largest difference for students who scored below proficiency

**Disability:**
- 2-Yr – no difference at below and proficient; at above those with no mild/moderate disability are more likely to pass
- 4-Yr – with disability at below proficient; no disability at proficient and above

**Percentile FRL:**
- 2-Yr – as percentile of FRL eligibility decreases at below and proficient; no difference at above proficiency
- 4-Yr – no difference at proficient and above; at below proficiency, students from schools with lower FPR more likely to pass
## Summary

<table>
<thead>
<tr>
<th>Placement</th>
<th>Pass DMATH</th>
<th>Pass Non-DMATH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below</td>
<td>88.7%  61.3%</td>
<td>56.2%  63.8%</td>
</tr>
<tr>
<td>Proficient</td>
<td>65.4%  24.4%</td>
<td>70.7%  70.0%</td>
</tr>
<tr>
<td>Above</td>
<td>25.1%  4.0%</td>
<td>74.2%  82.5%</td>
</tr>
</tbody>
</table>
Other Thoughts?