Co-requisite Math: Strategies to address the math completion equity gap

Joan Zoellner, Course Program Specialist

August 7th, 2019
Session outcome and objectives

By the end of this session, participants will be able to use data to identify current equity gaps in their mathematics pathways and understand the role of co-requisite structures in helping to close those gaps.

- Discuss and explore strategies for identifying current equity gaps in current math pathways.
- Discuss the role of co-requisite structures in closing equity gaps in mathematics achievement.
- Develop strategies to monitor co-requisite implementation for persistence of unequal outcomes.
Group Norms

- Make equity central.
- Focus on fulfilling our charge.
- Understand that those who work, learn.
- Seek clarification in language and ideas to increase understanding.
- Look for solutions, not blame.
- Focus on systems, not people.
- Recognize that everyone has expertise.
- Be honest.
- Share talk time.
What do we mean by “equity”? 

Our mathematical education reforms will be equitable when it is not possible “to predict mathematics achievement and participation based solely on student characteristics such as race, class, ethnicity, sex, beliefs, and proficiency in the dominant language.”

- Rochelle Gutierrez
We believe this work must be...

- Student-centered
- Faculty-driven
- Administrator-supported
- Policy-enabled
- Culturally-reinforced
Who is in Attendance?

Please stand up if you are ...

• An Administrator
• A Math Faculty
• A Director of Advising
• A K-12 Partner
• A Student Services Leader
• An Institutional Researcher
SBCTC Recommendations

**Clear pathways:** With guidance from advisors and career counselors, students choose pathways that lead quickly toward certificates or degrees.

**Program and degree maps:** Faculty map out curriculum and learning outcomes for entire programs. The programs connect to careers. They launch students directly into a career with a certificate or two-year degree, or into a university where the students learn more about their chosen fields.
SBCTC Recommendations

Eliminate or accelerate remediation: Colleges implement strategies that dramatically increase the rate at which students complete college-level English and math in their first year of enrollment.

Enhanced intake and advising practices: Colleges redesign intake, orientation, placement and advising to help entering students choose a path and enroll in a program of study as quickly as possible. This includes required advising on a regular basis, the tracking of student progress, and early alert systems that notify faculty and staff when students falter.
Understanding the ways we interpret data

- We each have paradigms that guide our thought patterns and actions
- Not necessarily limited or fixed
  - Can use multiple paradigms at the same time
  - Your own worldview can evolve
Attrition from long (remedial) course sequences

Assume we had 75% pass rates in all developmental and gateway mathematics courses.

What percentage of students would pass their gateway mathematics course?

Two levels below gateway: \((100\%)(75\%)(75\%)(75\%) = 42.2\%\)

What if 90% persisted at each transition point?

\((100\%)(90\%)(75\%)(90\%)(75\%)(90\%)(75\%) = 30.8\%\)
Attrition - Example

Number of students referred one level below college-level:
100
Attrition - Example

Number of students never enrolled in the pre-college course: 37

Number of students referred one level below college-level: 100

Number of students who enrolled in pre-college course: 63
Attrition - Example

Number of students never enrolled in the pre-college course: 37

Number of students referred one level below college-level: 100

Number of students who enrolled in pre-college course: 63

Number of students who passed pre-college course but did not enroll in college-level course: 26

Number of students who enrolled in college-level course: 26

Number of students who did not pass pre-college course within a year: 11
Attrition - Example

Number of students referred one level below college-level: 100

Number of students who enrolled in pre-college course: 63

Number of students who passed pre-college course but did not enroll in college-level course: 26

Number of students who passed college-level course within 2 years: 17

Number of students who did not pass pre-college course within a year: 11

Number of students who did not pass college-level course within two years: 9

17%
What do we mean by “equity”? 

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How will we know if we have equitable outcomes if we don’t look at our data using this lens?
Equity Gaps in Attrition

If we disaggregate the data and repeat this calculation for the population of White students, Black students, Asian students, American Indian Alaska Native students, Native Hawaiian or Other Pacific Islander students, will we get the same final percentage?

If not, where do students in these populations see a different outcome? Can we determine why?

How can we close any equity gaps that we identify?
Equity Gaps in Attrition

According to Complete College America, “Corequisite Support benefits all students but benefits students of color more because more than half of African American students and a third of Hispanic students drop out when they are in the remedial pipeline compared to a quarter of white students.”

Are these numbers the same at your institution? Dig into your data and find out!
Equity Gaps in Attrition

Use data from your institution to fill out the Attrition Equity Gap Analysis worksheet.

What did you notice?

What questions does this data surface for you?
The Case for Co-requisite Supports

A selection of studies looking at the impacts of co-requisite models on student success, retention, and closing the equity gaps:

- Tennessee Board of Regents
- CUNY
- Cuyamaca College
Tennessee Community Colleges
Gateway Math Success in One Year

![Graph showing success rates in one year for different ACT Math levels and implementation models.](image)

Tennessee Board of Regents Brief #3: Co-Requisite Remediation Full Implementation 2015-16
Results of TBR Co-requisite Mathematics
Full Implementation – Minority* Students

* As labeled by the TBR study
Enrollment Status After 3 Years

<table>
<thead>
<tr>
<th>Enrollment Status</th>
<th>Elem Alg N=297</th>
<th>Elem Alg w/WS N=313</th>
<th>Stat w/ WS N=297</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Enrolled</td>
<td>17.1%</td>
<td>19.4%</td>
<td>25.2%</td>
</tr>
<tr>
<td>Enrolled</td>
<td>52.9%</td>
<td>55.6%</td>
<td>48.1%</td>
</tr>
<tr>
<td>Graduated</td>
<td>30.0%</td>
<td>25.0%</td>
<td>26.7%</td>
</tr>
</tbody>
</table>

Logue, Watanabe-Rose, & Douglas, randomized control trial conducted Fall 2013
Success Rates Disaggregated by Ethnicity (First-Time Students)

<table>
<thead>
<tr>
<th>Incoming Students</th>
<th>Fall 2013 Cohort Transfer Math in Two Years</th>
<th>Fall 2016 Cohort Transfer Math with support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>??</td>
<td>8</td>
</tr>
<tr>
<td>Black/African American</td>
<td>16</td>
<td>29</td>
</tr>
<tr>
<td>Latinx</td>
<td>173</td>
<td>144</td>
</tr>
<tr>
<td>White</td>
<td>141</td>
<td>142</td>
</tr>
<tr>
<td>All</td>
<td>576</td>
<td>356</td>
</tr>
</tbody>
</table>

Cuyamaca College, CA
Closing Equity Gaps

- Studies examining co-requisites have shown that their implementation decreases existing equity gaps. How can institutions work to continuously improve co-requisite supports, once implemented, to completely close those gaps?

- First, institutions need to identify which groups remain underserved by the new models.

- Percentage Point Gap Analysis
## Percentage Point Gap Analysis

<table>
<thead>
<tr>
<th>Population Category</th>
<th>Number of students in cohort</th>
<th>Number of students successful</th>
<th>Success Rate</th>
<th>Percentage Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Percentage Point Gap Analysis - Example

<table>
<thead>
<tr>
<th>Population Category</th>
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<th>Number of students successful</th>
<th>Success Rate</th>
<th>Percentage Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>90</td>
<td>60</td>
<td>66.7%</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>100</td>
<td>80</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Decline to State</td>
<td>10</td>
<td>7</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>147</td>
<td>73.5%</td>
<td></td>
</tr>
</tbody>
</table>
## Percentage Point Gap Analysis – Example Option 1

<table>
<thead>
<tr>
<th>Population Category</th>
<th>Number of students in cohort</th>
<th>Number of students successful</th>
<th>Success Rate</th>
<th>Percentage Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>90</td>
<td>60</td>
<td>66.7%</td>
<td>-6.8%</td>
</tr>
<tr>
<td>Female</td>
<td>100</td>
<td>80</td>
<td>80%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Decline to State</td>
<td>10</td>
<td>7</td>
<td>70%</td>
<td>-3.5%</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>147</td>
<td>73.5%</td>
<td>-</td>
</tr>
</tbody>
</table>

To meet the average success rate, another 6 male students would need to pass the course.
<table>
<thead>
<tr>
<th>Population Category</th>
<th>Number of students in cohort</th>
<th>Number of students successful</th>
<th>Success Rate</th>
<th>Percentage Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>90</td>
<td>60</td>
<td>66.7%</td>
<td>-13.3%</td>
</tr>
<tr>
<td>Female</td>
<td>100</td>
<td>80</td>
<td>80%</td>
<td>-</td>
</tr>
<tr>
<td>Decline to State</td>
<td>10</td>
<td>7</td>
<td>70%</td>
<td>-10%</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>147</td>
<td>73.5%</td>
<td>-</td>
</tr>
</tbody>
</table>

To meet the highest success rate, another 12 male students would need to pass the course.
Percentage Point Gap Analysis

- Highlights persisting inequities
- Provides a target group to work with to determine alternate strategies
  - What barriers might be contributing to the gaps?
  - Investigate strategies that other institutions have implemented to serve these populations.
- Try new things and see if they close the gap.
- Ongoing process of improvement.
What do we mean by “equity”?

Our mathematical education reforms will be equitable when it is not possible “to predict mathematics achievement and participation based solely on student characteristics such as race, class, ethnicity, sex, beliefs, and proficiency in the dominant language.”

- Rochelle Gutierrez
Links and Citations


• Tennessee Board of Regents Brief #3: Co-Requisite Remediation Full Implementation 2015-16


• Center for Urban Education, University of Southern California, Closing Racial Equity Gaps, https://cue.usc.edu/tools/closing-racial-equity-gaps/

Contact Information

- Joan Zoellner, Course Program Specialist
  joan.zoellner@austin.utexas.edu

- General information about the Dana Center
  www.utdanacenter.org

- DCMP Resource Site
  www.dcmathpathways.org

- To receive monthly updates about the DCMP, contact us at
dcmathpathways@austin.utexas.edu
The Charles A. Dana Center at The University of Texas at Austin works with our nation’s education systems to ensure that every student leaves school prepared for success in postsecondary education and the contemporary workplace.

Our work, based on research and two decades of experience, focuses on K–16 mathematics and science education with an emphasis on strategies for improving student engagement, motivation, persistence, and achievement.

We develop innovative curricula, tools, protocols, and instructional supports and deliver powerful instructional and leadership development.