Three-Year Effects of Corequisite Remediation With College-Level Statistics

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This Presentation

• Randomized controlled trial investigating the effects of corequisite math remediation on student success

• Initial research was published in 2016 in *Educational Evaluation and Policy Analysis*

• That paper looked at effects on performance of CUNY students in associate-degree programs through one year after the intervention

• Now we have three-year follow-up data including graduation rates
First some information and context

Theory:
Remedial courses prepare unprepared students for college-level work.
Actual results of traditional remedial courses

- Course pass rates are low
- Persistence and graduation rates are low
- Financial aid can be depleted
- Student loan default is high
- Civil rights are violated
Completion of mathematics remediation is the single largest academic barrier to college completion

Community College Research Center (2014)
Alternative:

Corequisite Remediation
Some of the data supporting corequisite remediation

Corequisite remediation has been shown successful with college-level courses in:

chemistry, mathematics, reading,
sociology, and writing

(Belfield, Jenkins, & Lahr, 2016; Burdman, 2013; Cho, Kopko, Jenkins, & Jaggars, 2012; Denley, 2016; Edgecombe, Jaggars, Xu, & Baragan, 2014; Hern & Snell, 2014; Hesser & Gregory, 2016; Jaggars, Hodara, Cho, & Xu, 2015; Kashyap & Mathew, 2017; Parker, Traver, & Cornick, 2018; Royer & Baker, 2018; “Scaling Co-Requisite Supports at the Tulsa Community College”; “Scaling Co-Requisite Supports at the University of Central Arkansas, 2018”; Vandal, 2014)
But people said...

- Those data don’t prove corequisite remediation is better.
- Those data are primarily descriptive.
- They don’t involve controlled studies.
- The students in the corequisite courses and/or the faculty teaching them may not be the same as in traditional remedial courses.
- Even with extra help, these students can’t pass college-level courses.
Randomized controlled trial conducted in fall 2013

907 students at 3 CUNY community colleges, all assessed as needing remedial elementary algebra, and who did not need college algebra for their majors, were randomly assigned to:

- **Group EA**: Traditional remedial elementary algebra (control)
- **Group EA-WS**: Traditional remedial elementary algebra with a weekly workshop
- **Group Stat-WS**: Introductory, college-level, statistics with a weekly workshop (corequisite remediation)
Some methodological details

- Students were randomly assigned in summer 2013 to courses in fall 2013
- Workshops were 2 hours per week, led by advanced undergraduates
- Each instructor taught one section of each course type (EA, EA-WS, and Stat-WS)
Evidence of Stat-WS Students
Being the Most Motivated of the Three Groups

• Group EA-WS had the highest rate of summer melt

• Stat-WS Students were more likely than those in EA-WS to attend their workshops

• Stat-WS students were more likely to report forming their own study groups than the other two groups
Course Pass Rates in Fall 2013

- EA (Traditional Remediation): 39.3% (n=244)
- Stat-WS (College-Level Course + Workshop): 55.7% (n=246)

(N=717)
Marginal Effect of Math Placement Score on Probability of Passing by Group Assignment

Mean (SD) Compass test score = 25.0 (6.5)
But people said...

- The statistics students only did better than the elementary algebra students because the faculty were easier on the statistics students.

- For this reason, and because they never had the elementary algebra they were supposed to have, the statistics students won’t be able to pass other courses.
So, not including statistics courses, how many credits did EA and Stat-WS students accumulate by 1 year after the experiment?

EA students: **16**

Stat-WS students: **19**
Quantitative-course status of participants one year after experiment’s end

- **EA (n=244)**
  - 50% basic quantitative skills not proficient
  - 34% basic quantitative skills proficient but have not passed a college-level quantitative course
  - 16% passed college-level quantitative course

- **Stat-WS (n=246)**
  - 38% basic quantitative skills not proficient
  - 5% basic quantitative skills proficient but have not passed a college-level quantitative course
  - 57% passed college-level quantitative course
• Results first publicly presented at CADE in 2014, with additional data presented at CADE in 2016

• Article published online in EEPA in July 2016

• Published in print in EEPA in September 2016

• Received What Works Clearinghouse “without reservations” rating in March 2018
But despite our randomized controlled trial, people said...

- Stat-WS students will not continue to do well

- They don’t have the elementary algebra they need for their natural and social science general education courses
Percentage of Students Completing Each of CUNY’s General Education Categories Within Three Years

*Difference between groups is statistically significant at p<.01
But people said...

- The Stat-WS students will not take and pass the math courses that need elementary algebra and college algebra as a prerequisite.
- Some EA students will take elementary and college algebra and get excited by math so that they take advanced math courses, but Stat-WS students will not have that opportunity.
All math courses taken and passed by EA and Stat-WS students in the three years since the experiment

<table>
<thead>
<tr>
<th>Course</th>
<th>EA</th>
<th>Stat-WS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistics (Intro and Advanced)</td>
<td>80</td>
<td>174</td>
</tr>
<tr>
<td>College Algebra</td>
<td>42</td>
<td>32</td>
</tr>
<tr>
<td>Liberal Arts Mathematics</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>Health-Related Mathematics</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Precalculus</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Calculus I</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Calculus II</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Calculus III</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Differential Equations</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Linear Algebra</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>204</td>
<td>272</td>
</tr>
</tbody>
</table>
But people said...

- Students assessed as needing elementary algebra can’t take and pass college algebra without passing elementary algebra first
who passed their assigned statistics course during the experiment (fall 2013) and later passed college algebra without ever having taken elementary algebra and with no additional assistance:

14
But people said...

- If you don’t make these students take elementary algebra, they will not be able to later change their mind and complete math-intensive majors
All students who graduated within three years with a major requiring college algebra or above

EA
Associate in Engineering
A.S. in Science

Stat-WS
Associate in Computer Science
Assoc. in Business Admin.
A.S. in Liberal Arts
A. S. in Liberal Arts
A. Bus.
But people said...

- Changing one course requirement won’t affect graduation rates, and it certainly won’t increase graduation rates.
EA and Stat-WS graduation rates three years after the experiment was conducted:

<table>
<thead>
<tr>
<th></th>
<th>EA N=297</th>
<th>Stat-WS N=297</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate's</td>
<td>9.8%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Degree, Enrolled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor's</td>
<td>7.4%</td>
<td>10.8%</td>
</tr>
<tr>
<td>Associate's</td>
<td>9.4%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Degree, not</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrolled</td>
<td>20.5%</td>
<td>19.9%</td>
</tr>
<tr>
<td>Bachelor's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrolled in</td>
<td>52.9%</td>
<td>48.1%</td>
</tr>
<tr>
<td>Associate's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrolled in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Enrolled</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Associate's Degree, Enrolled Bachelor's
- Associate's Degree, not Enrolled Bachelor's
- Enrolled in Bachelor's
- Enrolled in Associate's
- Not Enrolled
Summary of 3-Year Results

<table>
<thead>
<tr>
<th>Group</th>
<th>Not Enrolled</th>
<th>Enrolled</th>
<th>Graduated</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA</td>
<td>52.9%</td>
<td>30.0%</td>
<td>17.2%</td>
</tr>
<tr>
<td>Stat-WS</td>
<td>48.1%</td>
<td>26.7%</td>
<td>25.3%</td>
</tr>
</tbody>
</table>

- Graduation rate of Stat-WS students is 8.1 percentage points higher than that of EA students
- 47% more Stat-WS students graduated than EA students
Because it took only a D to pass Stat-WS, but a C to pass Elementary Algebra, Stat-WS was easier to pass, and the students who passed it with a D must not have done well afterwards.
Graduation rate

Of all EA students who passed EA during the experiment: **28%**

Of Stat-WS students who passed Statistics during the experiment but only with a D: **41%**
But some people said...

- Maybe the Stat-WS students graduated at a higher rate, but they won’t do as well as the EA students after graduation because they won’t have had the elementary algebra that people need for their jobs.
Postgraduation Performance

• We don’t have employment data for the students in our experiment (yet)

• But two recent studies have shown that, for the great majority of jobs, algebra is not needed. In contrast, having taken statistics may help increase women’s postgraduation salary (Belfield & Liu, 2015; Douglas & Attewell, 2017)
Effects on Performance Gaps

• None of our results differ by students’ race/ethnicity

• Given that students from underrepresented groups are more likely to be assigned to math remediation, and given that corequisite remediation helps all students assigned to math remediation similarly, corequisite remediation can help decrease graduation rate gaps between underrepresented and other students.
And if you are interested in the cost of education:

Of all EA and Stat-WS students randomly assigned:

Mean number of math courses an EA student had to take to pass his/her general education quantitative requirement: 5.2

Mean number of math courses a Stat-WS student had to take to pass his/her general education quantitative requirement: 2.6
Conclusions

• Students assessed as needing elementary (remedial) algebra & not majoring in a math-intensive major:
  – are more likely to pass assigned course if instead take college-level statistics with extra support
  – are more likely to graduate, including passing college-level general education social & natural science courses and all types of math courses

• This approach can help close performance gaps
Conclusions cont’d:

• Corequisite math remediation works!
• Is everyone now using it?
How about CUNY?

• What percentage of new associate-degree students should be in college-level math or corequisite math remediation each fall?
Thank you!

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