Center for the Analysis of Postsecondary Readiness: Remediation Background
Organization of the Center

MDRC

Descriptive Study of Developmental Education

Evaluation of The New Mathways Project (RCT in TX)

CCRC

Evaluation of New Assessment Practices (RCT in NY)

Supplemental Studies
Students Needing 1+ Developmental Education Course (NCES, 2013)

- Community Colleges: 68%
- Open Access 4-Year Colleges: 40%
Student Progression Through the Developmental Math Sequence

- 11% Passed Introductory College-Level Math (7,001 Students)
- 13% Continued to Intro College-Level Math
- 21% Continued to High-Level Developmental Math
- 37% Continued to Mid-Level Developmental Math
- 74% Began Taking Developmental Math

- 89% Were Lost during the Sequence (56,649 Students)
- 26% Did Not Enroll after Referral (16,549 Students)

63,650 Students Referred to 3+ Levels of Developmental Math

*Bailey, Jeong & Cho, 2010*
Educational Outcome by Math CPT Score and Estimated Discontinuity

- **Passing First College-Level Course**
  - Estimated Discontinuity = -0.014 (0.012)

- **2 yr Degree Completion**
  - Estimated Discontinuity = -0.006 (0.006)

- **Total Credits Earned**
  - Estimated Discontinuity = 3.590 (0.657)

- **Fall-to-Fall Retention**
  - Estimated Discontinuity = 0.020 (0.012)

- **Transfer to 4 yr**
  - Estimated Discontinuity = -0.001 (0.006)

- **Total College-Level Credits Earned**
  - Estimated Discontinuity = 0.233 (0.649)
Contact us

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Visit us online:

Center for the Analysis of Postsecondary Readiness
postsecondaryreadiness.org

To download presentations, reports, and briefs, and sign-up for news announcements. We’re also on Facebook and Twitter.
National Study of Developmental Education Policies and Practices

Preliminary Results from the Institutional Survey

Alexander Mayer, Deputy Director of Postsecondary Education, MDRC
Overview of the Descriptive Study

• **Nationally representative survey**
  – Approximately 1,100 open-access and non-selective institutions
  – Key challenge: identifying respondents
  – Survey was split into 2 sections: math; and reading and writing
  – Fielded in two waves: Spring 2016 and Fall 2016

• **Qualitative study**
  – 40 interviews with institutional leadership
  – 40 interviews with system-level leadership
<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Sample Size</th>
<th>Math</th>
<th>Reading and Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public 2-year</td>
<td>506</td>
<td>91%</td>
<td>90%</td>
</tr>
<tr>
<td>Public 4-year</td>
<td>303</td>
<td>94%</td>
<td>95%</td>
</tr>
<tr>
<td>Private non-profit 4-year</td>
<td>279</td>
<td>57%</td>
<td>58%</td>
</tr>
<tr>
<td>Total</td>
<td>1,088</td>
<td>83%</td>
<td>83%</td>
</tr>
</tbody>
</table>
Use of Multiple Measures for Assessment Among Public 2-Year Colleges in Math

SOURCES: 2011 data from Fields and Parsad (2012); 2016 data from the Center for the Analysis of Postsecondary Readiness' institutional survey.
Use of Multiple Measures for Assessment Among Public 2-Year Colleges in Reading

SOURCES: 2011 data from Fields and Parsad (2012); 2016 data from the Center for the Analysis of Postsecondary Readiness' institutional survey.

NOTE: The Fields and Parsad (2012) reading statistics are for reading placement only, whereas the CAPR survey data are for both reading and writing.
Prevalence of Developmental Math Instructional Methods Among Public 2-Year Colleges

SOURCE: Data from the Center for the Analysis of Postsecondary Readiness' institutional survey.

NOTES: Percentages among 2-year public colleges that reported offering developmental courses. Colleges were counted as using an instructional method if they used it in at least two course sections. Distributions may not sum to 100 percent because categories are not mutually exclusive.
Prevalence of Developmental Reading Instructional Methods Among Public 2-Year Colleges

SOURCE: Data from the Center for the Analysis of Postsecondary Readiness' institutional survey.

NOTES: Percentages among 2-year public colleges that reported offering developmental courses. Colleges were counted as using an instructional method if they used it in at least two course sections. Distributions may not sum to 100 percent because categories are not mutually exclusive.
Making Math Count

Building Accelerated Math Pathways and Early Findings on their Impact on Students' Success

Elena Serna-Wallender, Research Associate, MDRC
The Dana Center Mathematics Pathways

Key Principles and Model
Drivers that Create Barriers for Students

Postsecondary mathematics is a BARRIER to degree completion for millions of students

Mismatch of content

Long course sequences

*The Case for Mathematics Pathways* (Dana Center, 2016)
What are the Dana Center Mathematics Pathways (DCMP)?

- **Mathematics pathways are structured so that:**
  - All students, regardless of college readiness, enter directly into mathematics pathways aligned to their programs of study.
  - Students complete their first college-level math requirement in their first year of college.

- **Students engage in a high-quality learning experience so that:**
  - Strategies to support students as learners are integrated into courses and are aligned across the institution.
  - Instruction incorporates evidence-based curriculum and pedagogy.
Emerging National Math Pathways

- Liberal Arts, Fine Arts, and Humanities → Quantitative Reasoning Pathway
- Social Sciences and Social Services
- Nursing and Health Professions → Statistics Pathway
- Business and Accounting → Business Math Pathway
- Teacher Preparation → Elementary/Middle School Teacher Math Pathway
- Science, Technology, Engineering, and Math → STEM Pathway-Calculus
The DCMP Model

**Figure 1. A Comparison of Mathematics Offerings for Students with Two Levels of Developmental Need**

- **Traditional Developmental Math**
  - Semester 1: Beginning Algebra
  - Semester 2: Intermediate Algebra
  - Semester 3: College Algebra

- **Dana Center Mathematics Pathways**
  - Semester 1: Foundations of Mathematical Reasoning
  - Semester 2: Quantitative Reasoning, Path to Calculus*
  - Semester 3: Statistics, Path to Calculus*

*Students are advised to follow the mathematics pathway that best supports their college and career plans.

*Evaluation of these courses is outside the scope of this study.
The DCMP’s Key Pedagogical Changes

- **Active learning**
  - Small group work; student interaction; presenting solution methods

- **Contextualization**
  - Problems contextualized in real-life situations

- **Problem solving**
  - Multi-step problems building on previously learned content or answers
  - Multiple solution methods

- **Constructive perseverance**
  - Understanding the role struggle plays in learning

- **Reading and writing**
Sample DCMP Problem

• A research report estimates that individuals who smoke are 15 to 30 times more likely to develop lung cancer than individuals who never smoke. If the lifetime risk of developing lung cancer for non-smokers is about 1.9%, what is the lower limit of the estimated risk for smokers according to the report?

• The lower limit of the estimated risk for smokers according to this report is ________ %.
The DCMP Evaluation

Overview and Early Findings
A Mixed Methods Study of the DCMP

**Research questions:**

- Do DCMP students have better academic outcomes than students in traditional developmental math programs?
- To what degree is there fidelity to the DCMP model across colleges? What aspects of the DCMP are consistent across sites? What adaptations were made and why?
- How do the curriculum and pedagogy in the DCMP courses differ from the colleges’ traditional developmental math courses?
- Is the DCMP cost-effective relative to business as usual?
A Mixed Methods Study of the DCMP

• **Four study components:**
  – Random Control Trial (RCT)
  – Implementation study
  – Student survey
  – Cost study

• **Colleges involved, and timing:**
  – El Paso Community College, Trinity Valley Community College, Eastfield College, and Brookhaven College
  – 4 cohorts of students: Fall 2015, Spring 2016, Fall 2016, Spring 2017
  – Tracking outcomes for at least 2 semesters
The Interim Report: The Sample

- 563 students
- 1 semester of data
- Most students were in the developmental math class
- Most students were in majors aligned with pathways
- 80% = 2 developmental course needs
Key Challenges to Implementing and Evaluating the DCMP

- **Cross-systems change**
  - Will four-year transfer colleges accept non-algebra math courses?

- **Institutional change**
  - Which majors should have revised math requirements?
  - Will faculty approve these changes?
  - Will advisors place students into courses?

- **Content change**
  - Are math faculty comfortable with a move away from algebra?

- **Pedagogical change**
  - Can faculty implement more student-centered, active learning instructional methods?
The Interim Report: Key Implementation Findings

Success with four big changes:

1. **Alignment with four-year colleges**
   - Progress was made with some continuing challenges

2. **Advising revisions: More time was spent with students to identify correct major**
   - Some students were targeted, but not all eligible students
The Interim Report: Key Implementation Findings

3. Changes to course content: Integration of statistics and quantitative reasoning
   - Strong implementation → The course content was very different

4. Pedagogy change: Contextualization of content and use of more student-centered approaches
   - Relatively strong implementation → Students had a qualitatively different classroom experience
## The Interim Report: Impact Findings

<table>
<thead>
<tr>
<th></th>
<th>Program group</th>
<th>Standard group</th>
<th>Difference</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered (%)</td>
<td>87.8</td>
<td>85.9</td>
<td>1.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Registered for development</td>
<td>77.9</td>
<td>67.8</td>
<td>10.1***</td>
<td>3.7</td>
</tr>
<tr>
<td>course (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passed developmental</td>
<td>47.1</td>
<td>36.6</td>
<td>10.5**</td>
<td>4.1</td>
</tr>
<tr>
<td>math course (%)</td>
<td></td>
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</table>
The Interim Report: Findings in Context

- **Findings are promising, but it’s still early**
  - DCMP students are well positioned to take college-level math classes... but how will they perform?

- **The DCMP study is unique in...**
  - The level of rigor
  - The analysis of implementation
  - A deeper look inside the classroom
• Publicly available reports:
  – Interim brief (Summer 2017)
  – Interim update on student outcomes (Summer 2018)
  – Final report (Summer 2019)

• Available at www.mdrc.org.
Research on an Alternative Student Assessment and Placement System

Community College Research Center
MDRC
SUNY

April 2018
Today’s Presentation

• Why we need to change assessment and placement
• The CAPR research design
• Early findings
# Under-placement and Over-placement (Severe)

<table>
<thead>
<tr>
<th>Student Ability</th>
<th>Placement According to Exam</th>
<th>Developmental</th>
<th>College Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental</td>
<td></td>
<td>✔️</td>
<td><em>Over-placed</em> (English – 5%) (Math – 6%)</td>
</tr>
<tr>
<td>College Level</td>
<td><em>Under-placed</em> (English – 29%) (Math – 18%)</td>
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An Alternative – Use of Multiple Measures

• Use of more measures produces more accurate results.

• The high school GPA is an especially good predictor of success in college level courses (Scott-Clayton, 2012; Belfield and Crosta, 2014).

• Initial studies suggest that student outcomes improve when placement is more accurate.
## Multiple Measures Options

<table>
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<tr>
<th>MEASURES</th>
<th>SYSTEMS OR APPROACHES</th>
<th>PLACEMENTS</th>
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<tr>
<td>Administered by college:</td>
<td>• Waiver system</td>
<td>• Placement into traditional courses</td>
</tr>
<tr>
<td>1. Traditional or alternative placement tests</td>
<td>• Decision bands</td>
<td>• Placement into alternative coursework</td>
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<tr>
<td>2. Non-cognitive assessments</td>
<td>• Placement formula (algorithm)</td>
<td>• Placement into support services</td>
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<td>3. Computer skills or career inventory</td>
<td>• Decision rules</td>
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<td>4. Writing assessments</td>
<td>• Directed self-placement</td>
<td></td>
</tr>
<tr>
<td>5. Questionnaire items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtained from elsewhere:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. High school GPA</td>
<td></td>
<td></td>
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<tr>
<td>2. Other HS transcript information</td>
<td></td>
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<tr>
<td>(courses taken, course grades)</td>
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<td></td>
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<td>3. Standardized test results (e.g., ACT, SAT, Smarter Balanced)</td>
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## Multiple Measures Options (CAPR study)

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| Obtained from elsewhere: | | |
| 1. High school GPA | | |
| 2. Other HS transcript information (courses taken, course grades) | | |
| 3. Standardized test results (e.g., ACT, SAT, Smarter Balanced) | | |
Research on Alternative Placement Systems (RAPS)

2014 - 2019
Research Questions (Summary)

1. Do student outcomes improve when they are placed using predictive analytics?

2. How does each college adopt/adapt and implement such a system?
RAPS – Partner Sites

A – CAPR/CCRC/MDRC
B – Cayuga CC
C – Jefferson CC
D – Niagara County CC
E – Onondaga CC
F – Rockland CC
G – Schenectady County CC
H – Westchester CC

Slides available at: bit.ly/capr_ashe16
How Does the Algorithm Work?

1. Use data from previous cohorts
2. Develop formula to predict student performance
3. Use formula to place entering cohort of students
COLLEGE 2: ENGLISH

COLLEGE 2: MATH

GPA only | Test only | GPA and test | Full model
---|---|---|---
4% | 1% | 5% | 7%

GPA only | Test only | GPA and test | Full model
---|---|---|---
10% | 3% | 12% | 14%
Components of the RA Process

1. Consent
2. Test
3. Data Transfer
4. Algorithm
5. Status Quo
6. RA
7. Placement
Outcomes of Interest

PRIMARIlY

• Subject areas sequence completed (through first college level)

• Accumulation of college credits.

EXPLORATORY

• Initial placement

• Completion of first college level courses

• Persistence

• Completion
Early Findings – Full Sample

Fall 2017
Final Analysis Sample

Following students were excluded:

- Placed into ESL course
- Date of first placement exam outside intake period for fall 2016
- Still in high school at the time of enrollment
- Took placement tests across multiple days at 2 colleges (n=45)

Final Sample 4,729 first year students across 5 colleges

- 48% of students assigned to control group (n=2,274)
- 52% of students assigned to treatment group (n=2,455)
- 82% of students enroll into at least one course in 2016 (n=3,865)
Treatment Effects: Math

- College Level Course Placement: Control Group 43.7%, Program Group 48.7%
- College Level Course Enrollment: Control Group 25.3%, Program Group 30.0%
- College Level Course Enrollment and Completion: Control Group 14.1%, Program Group 17.2%
Treatment Effects: English

- College Level Course Placement: 52.4% (Control Group), 82.8% (Program Group)
- College Level Course Enrollment: 40.8% (Control Group), 60.1% (Program Group)
- College Level Course Enrollment and Completion: 27.2% (Control Group), 39.7% (Program Group)
Treatment Effects: Any College Level Course

Any College Level Course Enrollment
- Control Group: 80.7%
- Program Group: 81.6%

Any College Level Course Enrollment and Completion
- Control Group: 61.6%
- Program Group: 65.8%
Treatment Effects: Total College Level Credits Earned

College Level Credits Earned

- **Control Group**: 5.17
- **Program Group**: 5.77
Early Findings – Subgroup Analysis

Fall 2016
Treatment Effects: College Level Math Placement

- Black: Control Group 36%, Program Group 43%
- Hispanic: Control Group 48%, Program Group 58%
- White: Control Group 49%, Program Group 59%
- Pell: Control Group 39%, Program Group 46%
- Non-Pell: Control Group 54%, Program Group 58%
- Female: Control Group 41%, Program Group 51%
- Male: Control Group 50%, Program Group 52%
Treatment Effects: College Level Math Completion

- Black:
  - Control Group: 15%
  - Program Group: 18%
- Hispanic:
  - Control Group: 18%
  - Program Group: 24%
- White:
  - Control Group: 21%
  - Program Group: 25%
- Pell:
  - Control Group: 13%
  - Program Group: 22%
- Non-Pell:
  - Control Group: 25%
  - Program Group: 25%
- Female:
  - Control Group: 15%
  - Program Group: 21%
- Male:
  - Control Group: 20%
  - Program Group: 21%
Treatment Effects: College Level English Placement

<table>
<thead>
<tr>
<th></th>
<th>Control Group</th>
<th>Program Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>41%</td>
<td>80%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>54%</td>
<td>87%</td>
</tr>
<tr>
<td>White</td>
<td>49%</td>
<td>81%</td>
</tr>
<tr>
<td>Pell</td>
<td>61%</td>
<td>78%</td>
</tr>
<tr>
<td>Non-Pell</td>
<td>61%</td>
<td>88%</td>
</tr>
<tr>
<td>Female</td>
<td>54%</td>
<td>84%</td>
</tr>
<tr>
<td>Male</td>
<td>55%</td>
<td>83%</td>
</tr>
</tbody>
</table>
Treatment Effects: College Level English Completion
Some Issues

1. Assessment, placement and developmental education practices are changing rapidly.

2. Data are seldom available for key variables that may predict success in college (e.g., “non-cognitive” measures).

3. High school data are seldom in college data systems.

4. Many people in the college community are affected when placement systems are changed.
Questions?
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