Registry of Efficacy and Effectiveness Studies

Study Title:
Using Computer-Assisted Instruction to Accelerate Students through Developmental Math: An Impact Study of Modularization and Compression

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Section I: General Study Information

PI name: Michael Weiss
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Study Start Date:
2013-07-01

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2019-06-30

Intervention Start Date:

-

Timing of entry:

Retrospective registration

Brief Abstract:

Community colleges are a large sector of postsecondary education. In 2016-2017, the United States had nearly 1,000 public 2-year postsecondary institutions (community colleges), serving almost nine million students, representing 39% of all undergraduates. The majority of entering community college students require developmental (or remedial) math. Success rates in the developmental math course sequence and college more broadly are discouragingly low. Policymakers, practitioners, and researchers alike are eagerly searching for reforms to improve success rates, but there is a dearth of causal evidence on the effectiveness of most proposed reforms. We sought to answer the following question: What effect does a modularized, computer-assisted, self-paced approach to developmental math (compared with a more "traditional" direct-instruction course alternative) have on students' likelihood of

completing the developmental math course sequence? Findings from a randomized controlled trial (n =1,403) are presented. The program was well implemented; however, we did not find evidence that this approach was superior to the "traditional" math class. Although these results are disappointing, they are important because modularization and self-paced computer-assisted instruction are popular reforms.

Keywords:

community college
developmental math
modularization
computer-assisted

Comments:

This analysis plan is being published retrospectively. However, it was created prior to collection of outcome data and it was not modified afterward.

Section II starts on the next page.

Section II: Description of Study

Type of Intervention:
Curriculum/Product, Practice

Topic Area of Intervention:
Postsecondary and Adult Education

Number of intervention arms:
1

Target school level:
13-16

Target school type:
Urban

Location of Implementation:
United States: United States : South

Further description of location:
Texas

Brief Description of Intervention Condition:
ModMath is a developmental math reform that changes the structure of the developmental math sequence and the instructional delivery of the curriculum, but not the course content itself. ModMath's course structure and instruction encompass four key components:
(1) modularized courses, (2) computer-assisted instruction, (3) a diagnostic assessment, and (4) on-demand, personalized assistance.

Brief Description of Comparison Condition:
Primarily "direct instruction" of math.

Comparison condition:
Business-as-usual

Comments:
-

Section III: Research Questions

Confirmatory research questions:

Question 1:
What effect does the opportunity to enroll in the ModMath program have on students' likelihood of completing the developmental math course sequence?

Exploratory research questions:

Question 1:
What effect does the opportunity to enroll in the Modmath program have on students' initial mathematics placement level?

Question 2:
What effect does the opportunity to enroll in the ModMath program have on students' progress through developmental and college-level math? (this question is similar to confirmatory question 1, except it focuses on progress rather than completion)

Question 3:
What effect does the opportunity to enroll in Tarrant's ModMath program have on students' progress through non-math courses (i.e., are there any positive spillover effects or unintended side-effects)?

Question 4:
What effect does the opportunity to enroll in the ModMath program have on students' mathematics learning? (UNANSWERED)

Question 5:
Does the effect of the opportunity to enroll in ModMath vary by students' pre-random assignment comfort with technology?

Question 6:
Does the effect of the opportunity to enroll in ModMath vary by students' pre-random assignment level of developmental need

Question 7:
Does the effect of the opportunity to enroll in ModMath vary by any of these additional pre-random assignment student characteristics? o Intent to enroll part-time o Intent to work full time

Question 8:
Is there a correlation across random assignment blocks between ModMath's estimated effects and features of the treatment contrast? (UNANSWERED)

Comments:
-

Section IV-A: Study Design (Selection)

Study Design:
Randomized Trial (RT)

Comments:
-

Section IV-B: Study Design (Input)

Study Design: Input

Unit of random assignment of intervention:
Student

Assignment within sites or blocks:
Yes

Define the sites or blocks:
Time period

Probability of assignment to treatment the same across sites or blocks:
No

Probability of assignment to treatment:
Weights were slightly different across blocks, with some having a 50:50 ratio and others a 60:40 ratio.

Unit outcome data measured:
Student

Intermediate clusters between unit of random assignment and unit of measurement:
No

Comments:
Students were randomly assigned in four unique cohorts, each at the start of a new semester.

Design Classification

Based on the responses above, this study has been classified as:
RT: Multisite (Blocked)

Section V: Sample Characteristics

Approximate number of students in the comparision condition within each time period: 580

Approximate number of students in the intervention condition within each time period: 828

Number of time periods: 1

Yes - Students whose placement test scores indicated they were referred to developmental (remedial) education in math. Yes - Five students who were randomly assigned are not included in the analyses (2 program, 3 control) because they withdrew from the study or their consent form was not recovered. Yes - Prior to the start of four semesters: Spring 2014, Fall 2014, Spring 2015, Fall 2015 No

Comments:
-

Section VI: Outcomes (Input)

Confirmatory question 1: Outcome Measure 1

Outcome domain: Student Progress/Completion - Completion of developmental math course sequence
Minimum detectable effect size: Approximately 0.148
Outcome measure: Completion of the developmental math course sequence
Scale of outcome measure: Binary
Normed or state test: No
Test-retest reliability: N/A
Internal consistency: N/A
Inter-rater reliability: N/A
Same outcome measure in treatment and comparison groups: Yes

Comments:
We explored questions regarding progress through developmental math, but the only confirmatory outcome to answer our confirmatory question was completion of the developmental math course sequence.

Section VII: Analysis Plan

Baseline data collected prior to start of intervention:
Yes

Description of baseline data:
Demographic and other background information was collected at the time of random assignment through a Baseline Information Form.

Covariates you plan to include in the model:
Two pretests and two missing indicators for students scores on the pretests., Student Pretest

Analytic model:

Where:
 the outcome for individual i.
 = a series of K "block" indicators.
 a treatment indicator
 covariates.
 an error term. Huber-White heteroskedastic robust standard errors.

Plan to handle cases with missing outcome data:
Students without evidence of having become college ready based on transcript data are assumed not to be college-ready.

Comments:
-

Section VIII: Additional Information

Links:
No links have been added yet.

Files:
File Name: Acceleration Impact Analysis Plan.docx
Description:

Comments:
Original MDRC analysis plan is attached.
