Registry of Efficacy and Effectiveness Studies

Study Title:
Replicating the CGI Experiment in Diverse Environments

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Version History

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Section I: General Study Information

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Primary Grades Math Study

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-

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-

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-

Study Start Date:
2012-09-01

Study End Date:
2016-08-31

Intervention Start Date:
2013-06-09

Timing of entry:
Retrospective registration

Brief Abstract:
Researchers will test the efficacy of CGI using a cluster-randomized controlled trial research design. Twenty-two elementary schools will be randomized to the treatment or control condition. The impact of the intervention will be tested each year using teacher knowledge measures and a teacher collaboration survey before the summer institutes, researcher observation of teacher instruction throughout the year, and student end-of-year standardized achievement tests. Three cohorts of students will be followed through third-grade. Researchers will examine the impact of the intervention on teacher and student outcomes, as well as the moderating effects of teacher and student characteristics and the mediating role of teacher knowledge and instructional practice on the intervention's impact on student outcomes.

Keywords:
mathematics; mathematics education; teacher education; professional development; cognitively guided instruction; algebraic thinking; mathematical knowledge for teaching

Comments:
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Section II starts on the next page.

Section II: Description of Study

Type of Intervention:
Professional Development

Topic Area of Intervention:
Mathematics and Science Education

Number of intervention arms:
1

Target school level:
1, 2

Target school type:
Rural, Suburban, Urban

Location of Implementation:
United States : South

Further description of location:
Florida

Brief Description of Intervention Condition:
Cognitively Guided Instruction (CGI) is a widely used professional development program for mathematics instruction in elementary school. Teachers are taught to use a categorization scheme for types of math problems and for intuitive student thinking about math problems. This two-year program consists of two summer institutes and two sets of follow-up days throughout the school year. In the summer institutes, videos illustrating student thinking and the CGI book (Children's Mathematics: Cognitively Guided Instruction) are used to introduce teachers to CGI. Then, teachers practice writing problems for particular populations. During the school year, teachers interview students, discuss student work and thinking, and apply knowledge from summer institutes.

Brief Description of Comparison Condition:
In the control condition, teachers received practice-as-usual professional development and were offered the opportunity to participate in a 2-day, district-selected STEM professional-development program.

Comparison condition:
Other

Comments:
-

Section III: Research Questions

Confirmatory research questions:
Question 1:
On average, what is the effect of the CGI program on teachers' mathematical knowledge for teaching?

Question 2:

On average, what is the effect of the CGI program on teachers' beliefs about mathematics teaching and learning?

Question 3:
On average, what is the effect of the CGI program on classroom instruction in mathematics?

Question 4:
On average, what is the effect of the CGI program on student achievement in mathematics?

Question 5:
On average, what is the effect of the CGI program on teachers' knowledge of their own students' abilities?

Exploratory research questions:
Question 1:
For whom (teachers and students) and under what conditions does the CGI program work?

Question 2:
How does the size of the effect of the CGI program on teacher outcomes vary over time?

Question 3:
What are the causal mechanisms relating treatment and student outcomes? In other words, do the teacher and student factors interrelate according to the theory of change?

Comments:
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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:
School

Assignment within sites or blocks:
Yes

Define the sites or blocks:
District

Probability of assignment to treatment the same across sites or blocks:
Yes

Probability of assignment to treatment:
.50

Unit outcome data measured:
Student

Intermediate clusters between unit of random assignment and unit of measurement:
Yes

Description of intermediate clusters:
teacher

Comments:
-

Design Classification

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

Section V: Sample Characteristics

Approximate number of students per intermediate cluster (teacher): 17

Approximate number of intermediate clusters (teacher) per school: 12

Approximate number of schools in the comparision condition within each district: 6

Approximate number of schools in the intervention condition within each district: 6

Number of districts: 2

Were there certain students that were targeted for the study?
Yes - Students had to be identified as grade 1 or 2 (i.e., first grade, second grade).

Were there certain students that were excluded from the study?
Yes - Students in the 22 sample schools that were not in grades 1 or 2 were excluded from the study.

Were there certain intermediate clusters (teacher) that were targeted for the study?
Yes - Teachers had to be responsible for teaching mathematics to students in grades 1 or 2.

Were there certain intermediate clusters (teacher) that were excluded from the study?
Yes - Teachers who were not responsible for teaching mathematics at grades 1 or 2.

Were there certain schools that were targeted for the study?
No

Were there certain schools that were excluded from the study?
Yes - At the request of one of the regional superintendents in one of the school districts, several elementary schools were removed from the list of eligible schools due to other obligations with the district. Some of these schools were identified as persistently low performing, and the state department of education had assumed some control over the schools, which resulted in removing their option to participate in projects such as this one. The resulting list of eligible schools comprised 90% of the total elementary schools in District A.

Were there certain districts that were targeted for the study?
No

Were there certain districts that were excluded from the study?
No

Comments:
-

Section VI: Outcomes (Input)

Confirmatory question 1: Outcome Measure 1

Outcome domain: Teacher Outcome Domain - Mathematical knowledge for teaching, as measured by the Knowledge for Teaching Early Elementary Mathematics (K-TEEM; Schoen, Bray, Wolfe, Tazaz, & Nielsen, 2017) test.
Minimum detectable effect size:
Outcome measure: Knowledge for Teaching Early Elementary Mathematics
Scale of outcome measure: Continuous
Normed or state test: No
Test-retest reliability: N/A
Internal consistency: .79
Inter-rater reliability: N/A
Same outcome measure in treatment and comparison groups: Yes

Confirmatory question 2: Outcome Measure 1

Outcome domain: Teacher Outcome Domain - Teacher beliefs about mathematics teaching and learning processes
Minimum detectable effect size:
Outcome measure: Beliefs about Mathematics Teaching and Learning (B-MTL)
Scale of outcome measure: Continuous
Normed or state test: No
Test-retest reliability: N/A
Internal consistency: .88
Inter-rater reliability: N/A
Same outcome measure in treatment and comparison groups:

Confirmatory question 3: Outcome Measure 1

Outcome domain: Teacher Outcome Domain - Classroom instruction
Minimum detectable effect size:
Outcome measure: Instructional Quality Assessment
Scale of outcome measure: Continuous
Normed or state test: No
Test-retest reliability: N/A
Internal consistency:
Inter-rater reliability:
Same outcome measure in treatment and comparison groups: Yes

Confirmatory question 4: Outcome Measure 1

Outcome domain: Student Achievement - Mathematics

Minimum detectable effect size:

Outcome measure: Mathematics Performance and Cognition

Scale of outcome measure: Continuous

Normed or state test: No

Test-retest reliability: N/A

Internal consistency: .90

Inter-rater reliability: .99

Same outcome measure in treatment and comparison groups: Yes

Confirmatory question 4: Outcome Measure 2

Outcome domain: Student Achievement - Mathematics

Minimum detectable effect size:

Outcome measure: Iowa Test, Math Problems, Level 7 and 8, Form C

Scale of outcome measure: Continuous

Normed or state test: Yes

Same outcome measure in treatment and comparison groups: Yes

Confirmatory question 4: Outcome Measure 3

Outcome domain: Student Achievement - Mathematics

Minimum detectable effect size:

Outcome measure: Iowa Test, Math Computation, Level 7 and 8, Form C

Scale of outcome measure: Continuous

Normed or state test: Yes

Same outcome measure in treatment and comparison groups: Yes

Confirmatory question 5: Outcome Measure 1

Outcome domain: Teacher Outcome Domain - Teacher ability to predict their own students' performance

Minimum detectable effect size:

Outcome measure: Teacher Ability to Predict Student Success

Scale of outcome measure: Continuous

Normed or state test: No

Test-retest reliability: N/A

Internal consistency:

Inter-rater reliability:

Same outcome measure in treatment and comparison groups: Yes

Comments:

Psychometric reports for teacher and student outcomes available here:

MPAC: https://doi.org/10.17125/fsu.1493238666

K-TEEM: https://doi.org/10.1086/692912

TAPSS: https://doi.org/10.17125/fsu.1507903318

Section VII: Analysis Plan

Baseline data collected prior to start of intervention:

Yes

Description of baseline data:
Teacher K-TEEM; Teacher B-MTL; Student mathematics achievement;

Covariates you plan to include in the model:
English Language Learner Status, Free and Reduced Lunch Status, Gender, Grade, Race, Special Education Status, Student Pretest

Covariates you plan to include in the model:
Aggregate of Baseline Scores, Aggregate of Individual Characteristics

Covariates you plan to include in the model:
Aggregate of Baseline Scores, Aggregate of Individual Characteristics

Analytic model:

Example three-level model used for student-level outcomes:
Level-1 Model (within classroom),

,
is the achievement of child i in classroom j in school k
is the intercept for classroom j in school k
are p = 1, , p child characteristics
are the corresponding level − 1 coefficients predicting the outcomes in classroom jk
is a level-1 random effect

Level-2 Model: For each classroom effect,

,
is the intercept for school k
is a classroom characteristic predicting effect
(each may have a unique set of level-2 predictors)
is the corresponding level-2 coefficient
is a level-2 random effect

Level-3 Model: For each school effect,

,
is the intercept term in the school-level model for
is a school characteristics predicting
(each may have a unique set of level-3 predictors)
is the corresponding level-3 coefficient
is a level-3 random effect

Plan to handle cases with missing outcome data:
Delete cases with missing data for the outcome being analyzed

Planned multiple comparisons adjustment, confirmatory question 4 (Teacher Outcome Domain):
No

Comments:

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Section VIII: Additional Information

Links:

No links have been added yet.

Files:

File Name: 453.pdf

Description: What Works Clearinghouse Registry Entry

Comments:

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