

Registry of Efficacy and Effectiveness Studies

Study Title:

Exploring the Benefits of Dynamic Worked Examples

Registry ID: 1905.1v1

Version History

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Section I: General Study Information

PI name: Erin Ottmar

PI affiliation: Worcester Polytechnic Institute

Co-PI name: Avery Harrison

Co-PI affiliation: Worcester Polytechnic Institute

Co-PI name: Hannah Smith

Co-PI affiliation: Worcester Polytechnic Institute

Co-PI name: Jenny Yun-Chen Chan

Co-PI affiliation: Worcester Polytechnic Institute

Primary Funding Source(s):

There are no federal funds used in creating the experiment but we did take advantage of the NSF funded ASSISTments test bed that Dr. Neil Heffernan created.

Award Number(s):

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IRB Name:

Worcester Polytechnic Institute

IRB Approval Date:

2019-10-03

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2019-12-05

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Study Start Date:

2020-01-06

Study End Date:

2021-01-06

Intervention Start Date:

2020-01-06

Timing of entry:

Prior to implementation of the intervention

Brief Abstract:

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Keywords:

Worked Example, Algebra, Learning

Comments:

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Section II starts on the next page.

Section II: Description of Study

Type of Intervention:

Practice

Topic Area of Intervention:

Education Technology, Mathematics and Science Education

Number of intervention arms:

5

Target school level:

6, 7, 8

Target school type:

Rural, Suburban, Urban

Location of Implementation:

United States

Further description of location:

Computer based platform allows for a wide range of locations with a majority of users in the Northeastern United States

Brief Description of Intervention Arm 1:

extended static worked examples that shows the derivations of all operation steps

Brief Description of Intervention Arm 2:

controlled worked examples that shows the derivation line by line over time

Brief Description of Intervention Arm 3:

extended worked example that shows the derivation line by line over time

Brief Description of Intervention Arm 4:

extended dynamic worked examples that shows the derivations of all operation steps

Brief Description of Intervention Arm 5:

dynamic worked example that shows derivation in one line over time

Brief Description of Comparison Condition:

We are comparing different formats of worked examples for algebraic equations to a typical static fully worked out worked example which shows students how to solve for x in one image.

Comparison condition:

Business-as-usual

Comments:

-

Section III: Research Questions

Confirmatory research questions:

Question 1:

Did students show learning gains from pre- to posttest after completing the worked example learning intervention?

Exploratory research questions:

Question 1:

Which format of a worked example is most beneficial to students in an online platform?

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:

No

Probability of assignment to treatment:

.167

Unit outcome data measured:

Student

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

No

Comments:

-

Design Classification

Based on the responses above, this study has been classified as:

RT: 1-level

Section V: Sample Characteristics

Approximate number of students in the comparison condition: 30

Approximate number of students in the intervention condition1: 30

Approximate number of students in the intervention condition2: 30

Approximate number of students in the intervention condition3: 30

Approximate number of students in the intervention condition4: 30

Approximate number of students in the intervention condition5: 30

Were there certain students that were targeted for the study?

No

Were there certain students that were excluded from the study?

No

Comments:

-

Section VI: Outcomes (Input)

Confirmatory question 1: Outcome Measure 1

Outcome domain: Student Achievement - Mathematics

Minimum detectable effect size: .27

Outcome measure: learning gain

Scale of outcome measure: Continuous

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

Section VII: Analysis Plan

Baseline data collected prior to start of intervention:

Yes

Description of baseline data:

Pretest scores

Covariates you plan to include in the model:

Grade, Student Pretest

Analytic model:

$$Y_i = \beta_0 + \beta_x(\text{covariates}) + \beta_1(\text{condition}) + \varepsilon$$

The covariate would be the pretest score.

The condition would be the intervention assignment.

Plan to handle cases with missing outcome data:

Delete cases with missing data for the outcome being analyzed

Comments:

-

Section VIII: Additional Information

Links:

<https://my.vanderbilt.edu/cems/resources/materials/>

We select and adapt worked examples and algebraic problems from the previously developed materials.

Files:

No Files have been added yet.

Comments:

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