IES Learning Acceleration Challenges

Setting up Randomized Controlled Trials

August 23, 2022
Learning Acceleration Challenges

Agenda

• Introductions
• Overview
• Randomized Controlled Trial (RCT) requirements
  ○ Phase 1
  ○ Phase 2
• Q&A
Introductions

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Director of Collaborative for Student Growth, NWEA

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Founder, Datability
Overview
Phase 2 timeline

**Phase 2 commences**

- **By Nov. 1, 2022**
  - Participating students take NWEA MAP Growth Fall Assessment.

- **Early Nov. 2022**
  - Up to five finalists per challenge selected to progress to Phase 2.

- **Nov. 2022 - April 2023**
  - Finalists implement their interventions at schools or out-of-school-time programs.

- **By May 1, 2023**
  - Participating students take NWEA MAP Growth Spring Assessment.

- **By May 8, 2023**
  - Schools submit student- and school-level data.

- **June 2023**
  - Finalists submit Phase 2 submissions.

- **June - July 2023**
  - NWEA prepares evaluation reports.

- **Sept. 2023**
  - Winners announced.
Randomized controlled trials: Key components

Phase 1
1. Document how the intervention will be implemented for eligible students.
2. Determine your sample size (the appropriate number of students, classrooms, and schools that need to participate in your intervention).

Phase 2
1. Randomize students to treatment and control conditions, with support from NWEA.
2. Implement the random assignment and track whether students experience changes that could impact the evaluation, such as movement into or out of treatment or control conditions.
3. Track student participation with the intervention throughout the year.

Guidance and support will be provided to finalists on how to best work with their partner schools as part of the support provided by Abt Associates in Phase 2.
Phase 1
RCT requirements
1. Document how the intervention will be implemented for eligible students

There are several tradeoffs to consider in the implementation of your intervention:

- **Sample Size.** The larger the unit of implementation (e.g., entire schools), the larger the sample size you’ll need for the efficacy study.

- **Spillover.** In some settings it is possible that the intervention not only benefits the outcomes for students in the treatment condition, but also for the control condition. This can make the effect of your intervention appear smaller than it is. Implementation examples that are more prone to spillover include randomly assigning students to treatment and control within the same class or randomly assigning classes in settings where teachers are responsible for multiple classes during the school year.
1. Document how the intervention will be implemented for eligible students II

You first need to document how students will be grouped for the implementation of the intervention (treatment group) or continue to receive business-as-usual instruction (control group).

Approaches to randomizing participation may include (but are not limited to):

- Randomly assigning schools to receive the intervention.
- Randomly assigning whole classes to receive the intervention during normal instructional hours.
- Randomly selecting students to be pulled out of classrooms into smaller group settings during the school day.
- Randomly assigning students to treatment groups in out-of-school program settings.
2. Determine your sample size

• For the efficacy study, we assume an effect size of 0.3 standard deviations (SD) to guide the number of students needed (what is commonly referred to as the “sample size”).
• The number of students (and class, teachers, or schools) needed depends on the design and implementation of your intervention and the number of eligible students in your setting.
• Your effective sample size is based on whether you are randomizing students, classes, teachers, or schools (also known as “unit of randomization”).
• We provide guidance on how to anticipate the necessary sample size for three common randomization designs on Challenge.gov. These were calculated using the PowerUp! Tool available at https://www.causalevaluation.org/power-analysis.html.
2. Determine your sample size (Math Prize)

*Randomly assigning classes within a school*

<table>
<thead>
<tr>
<th>Eligible students per class</th>
<th>Schools</th>
<th>Classes needed</th>
<th>Total students</th>
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2. Determine your sample size (Math Prize) II

A School/B School design

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<tr>
<th>Grades</th>
<th>All A schools</th>
<th>All B schools</th>
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<tbody>
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<td>3</td>
<td>Treatment</td>
<td>Control</td>
</tr>
<tr>
<td>4</td>
<td>Treatment</td>
<td>Control</td>
</tr>
<tr>
<td>5</td>
<td>Control</td>
<td>Treatment</td>
</tr>
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2. Determine your sample size (Math Prize) III

A School/B School design

<table>
<thead>
<tr>
<th>Eligible students per grade</th>
<th>Grades</th>
<th>Schools</th>
<th>Total students</th>
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</thead>
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<td>675</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>9</td>
<td>810</td>
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</table>
2. Determine your sample size (Math Prize) IV

Randomly assign whole schools to either treatment or control

The benefit of this design is that it allows for more flexibility with the instructional design within a school (for example, cross-grade shared experiences for students), but it requires a much larger number of schools than other designs.

On average you will need 15 to 22 schools to detect an effect size of at least 0.30 standard deviations, assuming at least 15 to 50 eligible students per school.

In the Math Prize, you would need a minimum of 9 schools to have a sample size powered for the grand-prize threshold of 0.77 standard deviations.
## 2. Determine your sample size (Science Prize)

Randomly assigning teachers within a school

<table>
<thead>
<tr>
<th>Eligible students per teacher</th>
<th>Schools</th>
<th>Teachers needed</th>
<th>Total students</th>
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<td>6</td>
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<tr>
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<td>4</td>
<td>600</td>
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<td>45</td>
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<td>675</td>
</tr>
<tr>
<td>45</td>
<td>8</td>
<td>3</td>
<td>1,080</td>
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</table>
2. Determine your sample size (Science Prize) II

Randomly assign whole schools to either treatment or control

The benefit of this design is that it allows for more flexibility with the instructional design within a school (for example, cross-grade shared experiences for students), but it requires a much larger number of schools than other designs.

On average you will need 15 to 22 schools to detect an effect size of at least 0.30 standard deviations, assuming at least 15 to 50 eligible students per school.

In the Science Prize, you would need a minimum of 11 schools to have a sample size powered for the grand-prize threshold of 0.40 standard deviations.
2. Determine your sample size (Science Prize) III

Out-of-school-time program where students are randomly assigned to treatment or control

Eligible sixth graders

Random assignment of students

Treatment students

Control students

Program grouping

School 1

School 2
2. Determine your sample size (Science Prize) IV

Out-of-school-time program where students are randomly assigned to treatment or control

<table>
<thead>
<tr>
<th>Students per group</th>
<th>Groups per school</th>
<th>Schools needed</th>
<th>Total students</th>
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<td>300</td>
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<tr>
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<td>9</td>
<td>360</td>
</tr>
<tr>
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<td>40</td>
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<td>1,280</td>
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</tbody>
</table>
Phase 2
RCT requirements
1. Randomize students to treatment and control conditions

Finalists and their partner schools will need to provide NWEA with documentation on how the intervention is implemented, as well as a randomization roster, described below. NWEA will then provide schools with students’ intervention assignment (i.e., treatment or control).

NWEA will set up a secure file transfer protocol to provide NWEA with a randomization roster. This file must include:

- NWEA MAP Growth ID: This is the student ID that the school site uses as part of their rostering process with NWEA.
- Anonymized IDs that link students to their class (math or science depending on the challenge), teacher, and school. Anonymized means these IDs should not identify the students or teachers in the school.
- Course name: the name of their math or science course.
2. Track changing conditions

• Once you have the intervention assignments from NWEA, you may start implementing the intervention!
• You need to track whether students, classes, teachers, and/or schools change conditions (treatment vs. control) during the school year. This is very important to the integrity of the efficacy study. Phase 2 TA will be available to support finalists respond to any changes that affect treatment assignment.
• At the end of Phase 2, you will provide NWEA with a data set that documents any changes to treatment assignment during the school year. A simple example data set and documentation is available on Challenge.gov.
3. Track student participation

- Throughout the school year, you will want to track students’ engagement with the intervention.
- Depending on the design of the intervention, this could include the number of minutes students received the intervention, the number of lessons completed, completion toward a learning goal(s), or other measures of "dosage."
- At the end of Phase 2, you will provide this data to NWEA as part of the efficacy study. NWEA will prepare evaluation reports, which will be reviewed by judges as part of Phase 2 scoring.
Resources

You can find more resources about the Phase 2 efficacy study on Challenge.gov.

Additional resources

- IES Practice Guide: Assisting Students Struggling with Mathematics: Intervention in the Elementary Grades (.pdf)
- Challenge Overview for School Partners (.pdf)
- List of Acceptable MAP Growth Assessments (.pdf)
- Guide to RCTs for Intervention Providers (.pdf)
- Data Collection for Intervention Providers (.pdf)
- Data Sharing Agreement (.pdf)
Q&A

Please submit questions in the Q&A window in Zoom.

Apologies if we don’t get to your question. Please check the Challenge.gov page for each challenge, where we will publish an FAQ section with responses to many of the questions received today.

Published answers (not live answers to questions) will be considered final responses.

Additional questions may also be sent to Challenges.IES@ed.gov
Next steps

Follow the challenges on Challenge.gov:

• Math Prize: challenge.gov/?challenge=iesmathprize
• Science Prize: challenge.gov/?challenge=iesscienceprize

Register for the upcoming webinar:

• Cost Analyses and Implementation Planning — August 30, 2022

Submissions close at 5:59pm ET on September 30, 2022.
Email Challenges.IES@ed.gov with questions.