Mathematica®
Progress Together

A Road Map for Building Evidence that Drives Learning and Improvement

The right evidence at the right time can help organizations design and rapidly improve solutions to pressing social challenges—whether these solutions are new or evolving programs, products, or practices. If you are a developer, researcher, or funder, insights from rapid learning can help you accelerate innovation at any stage of designing, refining, piloting, or validating a solution. Mathematica's measurement and evaluation (M&E) approach and associated toolkit tailor learning in four phases to fuel evidence-based, equitable innovation. Find the tools here: https://mathematica.org/features/advancing-educational-equity.

Evidence-based, equitable innovation starts by identifying a need, problem, or challenge in partnership with a community in focus—the community whose goals should drive design. The M&E approach engages this community as collaborators throughout all phases of research and design.

Phase 1: Design the solution
Develop a solution with a well-defined theory of change

Progress is not always linear.
The evidence determines when a solution should move to the next phase, stay within a phase and continue development, or return to a prior phase.

Phase 2: Refine the solution
Successfully implement the solution in the community in focus and refine the solution based on lessons learned

Phase 3: Assess for early evidence of success
Demonstrate that the solution is associated with improved outcomes for the community in focus in a single context

Phase 4: Validate effectiveness
Demonstrate with a high degree of confidence that the solution improves outcomes for the community in focus in multiple contexts

How does each phase support learning?

In this table, we present the primary objective of each phase of the M&E approach, as well as examples of how to generate evidence to meet these objectives. This approach can generate evidence in many settings or contexts; these examples focus on students. Community members and developers (potentially with support from a research partner) work together throughout these phases to design and refine the solution, co-develop research questions and the study approach, and co-interpret findings.[1]




	Phase 1[2] Design the solution	Phase 2 Refine the solution	Phase 3 Assess for early evidence of success	Phase 4 Validate effectiveness
Primary objective by phase	Develop a solution with a well-defined theory of change that documents the links between solution components and desired outcomes	Refine the solution based on lessons learned and generate evidence that the solution is successfully implemented with the community in focus	Generate evidence that the solution is, at minimum, **associated with** improved outcomes for students in a single context (for example, one school or district)	Generate evidence that the solution **leads to** improved outcomes for students, across multiple contexts (for example, at least two districts)
How to generate evidence to meet each phase's objectives				
Example research questions	How does the proposed solution address the problem previously defined with the community in focus? Who would benefit from the proposed solution? What would success look like in the short and long term?	Are students completing modules as assigned? If not, what barriers do students report? To what extent do students in the communities in focus find the solution easy to use?	Do students who participate in the solution perform better in math than similar students who do not participate?	Do students who participate in the solution perform better in math than similar students who do not participate? Is the solution more effective in particular sites or for students who share certain characteristics?
Example study designs	Human-centered design and equitable community engagement	Qualitative user experience (e.g., focus groups, interviews), surveys, and quantitative descriptive analysis	Randomized controlled trial (RCT) or quasi-experiment design (QED) preferred; correlational analysis (pre/post) with statistical controls also acceptable	Rigorous QED or RCT required
Sample size guidance[3]	Not applicable	At least one school and at least five students or teachers from the community in focus	If assigning individual students to treatment and comparison groups: 100 to 200 students If using correlational analyses: 50 or more students	If assigning individual students to treatment and comparison groups: 350 to 500 students

[1] The Engaging Communities as Research Collaborators tool offers specific strategies for engaging community members as part of a research team and including their experiences, perspectives, and expertise throughout the research process.

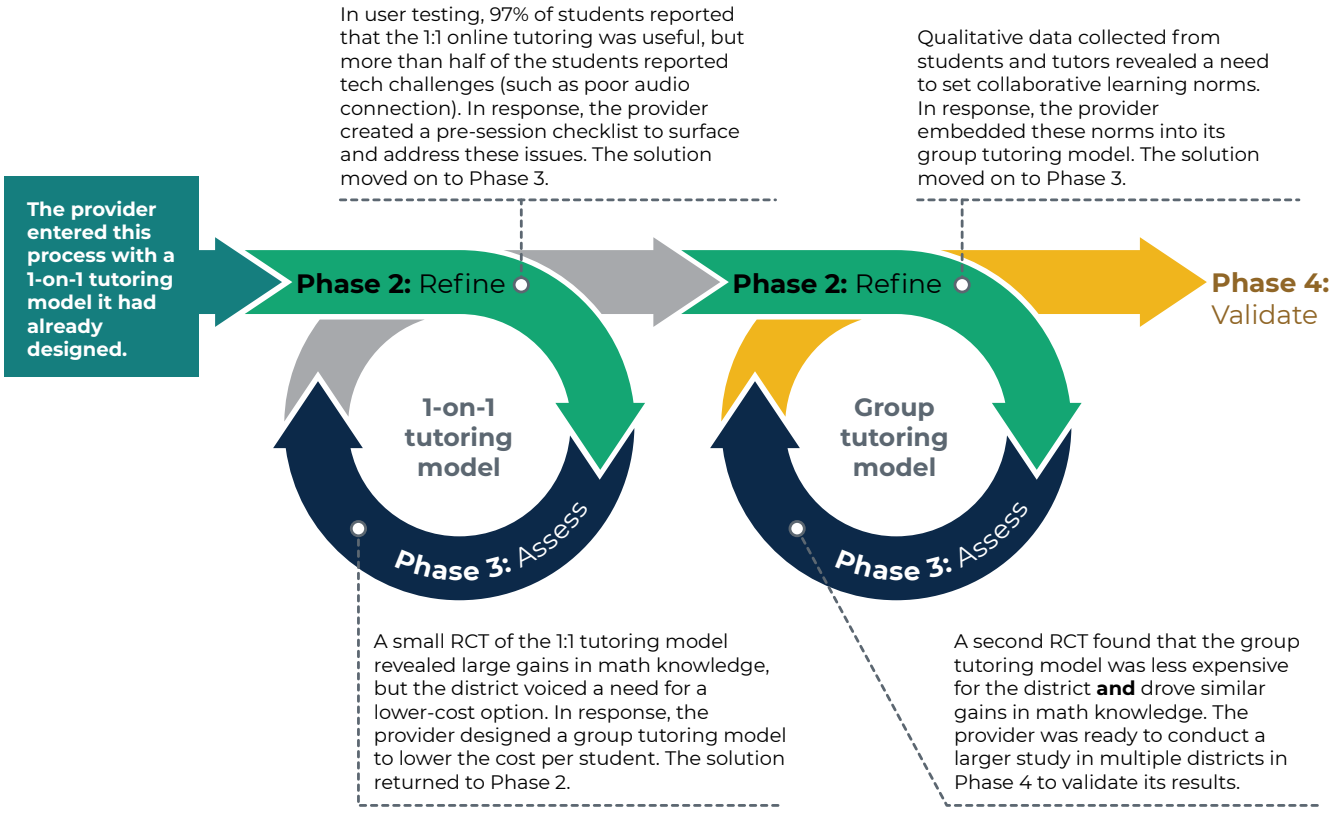
[2] You can find detailed study guidance for each phase by clicking on the phase heading in each column.

[3] The Sample Size Guide provides more detailed instructions, including appropriate sample sizes by phase when assigning classes or schools (rather than students) to treatment and comparison groups. A power analysis should be conducted for randomized controlled trials and quasi-experimental designs.

The approach in action

A tutoring provider used Mathematica's M&E approach to refine and test its online tutoring, which was designed for middle school students who are Black, Latino, and/or experiencing poverty. The provider started with a **one-on-one** (1:1) online tutoring model and then, based on evidence and district demand, shifted to a small-**group** online tutoring model with four students working together with a tutor.

The provider's learning and improvement cycles—first refining the tutoring model using evidence (Phase 2) and then assessing in small studies whether the updated model improved student math outcomes (Phase 3)—show how the M&E approach informs which phase a solution should enter next to ultimately drive positive outcomes for students. The graphic presents a selection of evidence the tutoring provider collected and the way it used each piece of evidence to improve the model.



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