
Balance the Equation: A Grand Challenge for Algebra 1



Overview

Today, Algebra 1 serves as a gatekeeper, rather than a gateway, to future success. In the Bill & Melinda Gates Foundation's first-ever U.S. education Grand Challenge, we sought to identify partners to design solutions to make Algebra 1 more accessible, relevant, and collaborative for students who are Black, Latino, English Learners, and/or experiencing poverty.

We were excited by the field's response to this call to action when we launched this Grand Challenge in October 2020. We received 416 applications from organizations across 26 countries around the world. Of these, 55 percent were from organizations that self-identified as minority-led, and 82 percent were from organizations that had not received funding from our foundation before. This past spring, we announced the initial group of 15 Phase 1 grantees. Each of these grantees received a \$100,000 planning and prototyping grant to develop, test, and refine their solution.

This summer, we invited these grantees to apply for Phase 2 funding, which would support a subset of our Phase 1 grantees to pilot their solutions in U.S. schools. After a review process that included feedback from foundation staff as well as outside subject matter experts and thought leaders, we selected 11 organizations for Phase 2 grants.

Our Phase 2 grantees represent a diverse and impressive cohort of organizations. Specifically, 9 of these 11 organizations are self-identified as minority-led and roughly 45 percent of them were first-time grantees to the foundation in Phase 1.

Our Phase 2 grantees are split into two cohorts: Cohort 1 will pilot their solutions this fall, while Cohort 2 will continue prototyping and begin piloting their solutions in Fall 2022. At the end of Phase 2, the learnings across our grantees' pilot studies will tell us more about the features of approaches that can achieve improved outcomes in mathematics for students and teachers.



Background About Why Algebra 1

Algebra 1 is one of the most important on-track indicators of students' future success. For students who do not complete Algebra 1, their chances of graduating from high school are one in five. Black and Latino students, students who speak a language other

than English, and students experiencing poverty in the United States are particularly affected by this, and the way our current systems are structured puts these students at a disadvantage in pursuing well-paid, in-demand careers.

Quick Statistics



Only 20% of students who do not complete Algebra 1 graduate from high school.



9 of 11 grantees, or roughly 82%, are minority-led organizations.



Roughly 45% of these grantees are new to the foundation.



Balance the Equation: A Grand Challenge for Algebra 1 Grantees

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- 1 BetterLesson
 - 2 The Black Teacher Collaborative
 - 3 ConnectED: The National Center for College and Career
 - 4 Howard University Middle School of Mathematics and Science, in partnership with Howard University
 - 5 Mastory
 - 6 The Rhode Island Department of Education
 - 7 The University of California at Los Angeles (UCLA) Curtis Center for Mathematics and Teaching
 - 8 The University of Florida
 - 9 Village Education Tutors Foundation
 - 10 The Young People's Project
 - 11 Zearn
- Germany

Balance the Equation: A Grand Challenge for Algebra 1 Grantee Summaries

BetterLesson

BetterLesson Inc. will pilot professional learning opportunities for teachers seeking to create positive and affirming mathematics classrooms; they will also design rigorous, culturally-connected Algebra I activities for Black and Latino students. The content of traditional Algebra I lessons tends to reflect the inequities experienced by Black and Latino students, thereby failing to engage their strengths and inhibiting learning. BetterLesson will collect input from students to develop and test new activities on the Desmos platform that provide multiple access points and engage through creativity, exploration, and collaboration, such as sketching and free-form writing. They will also provide direct support and training to teachers via workshops and individual coaching to help them employ effective teaching strategies; including using these new activities in their classrooms. BetterLesson will partner with Desmos on this project.

The Black Teacher Collaborative

The Black Teacher Collaborative (BTC) will pilot a teacher training program for Black teachers to help them produce more affirming Algebra I classes for Black students to facilitate their learning and development. Their teacher training program will adapt traditional teaching practices for mathematics and make them more relevant for Black students, such as creating racially-relevant examples to better teacher principles and operations of inequalities. BTC will pilot test their approach in classrooms. The success of their

approach will be evaluated by using test scores and grades to measure the effect on student performance, and by using student surveys to measure the effects on student confidence and the development of a positive racial mathematics identity. Partners on this project include Transcend.

ConnectED: The National Center for College and Career

ConnectED: The National Center for College and Career will pilot a set of Professional Learning experiences focused on improving the Algebra I performance of multilingual students learning English. New approaches to teaching mathematics support students to think, talk and write about their mathematical reasoning — not merely to apply formulas and solve for right answers. The language that students generate while they are making sense of mathematics is rich with information about student learning, that information tends to be hard for math teachers to capture and analyze. ConnectED's proposed intervention will build teachers' confidence with simultaneous formative assessment of language and mathematics, which is especially important for English Learners. ConnectED will partner with Envision Learning Partners (ELP) on this project.

Howard University Middle School of Mathematics and Science

Howard University Middle School of Mathematics and Science, in partnership with Howard University, will pilot a program that teaches mathematics by

applying it to the everyday lives of their female Black students in Washington DC, in order to spark their interest and improve their achievement scores and attitudes towards the subject. The abstract nature of mathematics lessons makes it inaccessible for many Black students, and this leads to fewer pursuing higher degrees. They will develop new lessons that apply mathematics to issues directly relevant to their female black students, such as using algebra to explore poverty and wage gaps, and algorithms to understand the effects of social media.

Mastory

German-Hungarian startup Mastory will pilot an e-learning system to engage Black and Latino students and students experiencing poverty in interactive storyline games. While students are immersed in a real-time sci-fi adventure, they learn to deal with mathematical topics from the core curriculum and experience their importance in emotionally meaningful contexts. Current methods for teaching abstract concepts in mathematics often fail to explain why they are relevant to real life, and particularly to the lives of priority students, causing many of them to disengage. Using their proven method, Mastory will provide teachers with software, hardware, and content that translates algebra lessons into a unique social experience for the students to engage with, be motivated and succeed. Partners on this project include the Freie Universität Berlin.

The Rhode Island Department of Education

The Rhode Island Department of Education (RIDE) will pilot an “Algebra Readiness Course” to better prepare multilingual learners in Providence for Algebra I. RIDE has developed and piloted a summer course that uses student-centered pedagogy and real-world examples to strengthen students’ pre-algebra skills while also promoting their social-emotional growth. RIDE will expand the course to a full academic semester, improve the curriculum to be more culturally-responsive, and provide in-depth professional

development and coaching to help teachers build their skills to better support multilingual learners. These supports are designed using RIDE’s recently-released Blueprint for Multilingual Learners, as well as the insights of parents and the multilingual learners themselves. Partners in the development of this initiative included the Providence Public School District, WestEd Carnegie Math Pathways, English Learners Success Forum, Young Voices, and Parents Leading for Educational Equity.

The University of California at Los Angeles (UCLA) Curtis Center for Mathematics and Teaching

The University of California at Los Angeles (UCLA) Curtis Center for Mathematics and Teaching is partnering with the Barack Obama Global Preparatory Academy, Charles Drew Middle School, Fieldkit, and South LA aerospace engineers and university mathematician to pilot The Applied Mathematics Mentorship Program (AMMP) – a program designed to motivate South Los Angeles students of color to improve their performance in mathematics. Under the mentorship of undergraduates, professors, and engineers of color, students will be placed into small research teams to investigate local mathematics problems. Problems to explore could include the environmental science of their community, Covid-19 data visualization, or aerospace engineering projects underway in the South LA area.

The University of Florida

The University of Florida will enhance the wide-reaching Algebra Nation interactive mathematics learning platform with instructional videos incorporating high-quality, culturally responsive educational material and online resources to better engage students experiencing poverty and Black and Latino students. Together with students, they will create Culturally Responsive Math Nation (CR-MN) Algebra 1 units, leveraging the Illustrative Math curriculum and the Algebra Nation platform; for

example, a culturally responsive interactive learning module may embed bivariate statistics in different sociopolitical contexts such as salary trajectories of vocational jobs versus college degrees. These will be designed to enhance students' understanding of algebraic concepts as they relate to their cultural and community context. Students will be able to contextualize their own learning experience in stories that are meaningful to them, developing their identities as mathematicians simultaneously with their understanding of how to leverage Algebra 1 knowledge to find success in education and career.

Village Education Tutors Foundation

Village Education Tutors Foundation will pilot a culturally relevant and virtual one-on-one mathematics instruction and coaching program geared towards African American and Latina students educated in underserved communities by providing whole child learner models that foster academic and mental health wellness. They will recruit highly qualified teachers, including bilingual teachers, and equip them with high-quality teaching material and online tools to create an equitable and safe space for students to develop into critical thinkers and lifelong learners through instruction tailored to meet the needs of each student. Teachers will also be trained to provide social and emotional support to help students cope with everyday challenges found within our U.S. economy such as economic insecurity, health care inequity and other social determinants of health.

The Young People's Project

The Young People's Project (YPP) will pilot a formal certification program and online learning platform to support high school students from communities experiencing poverty to create and use interactive math games to more effectively teach algebra to their younger peers. YPP developed a program for teaching algebra whereby middle and high school students are employed as Math Literacy Workers (MLWs) to develop interactive games to improve their own math literacy,

and to use them to improve the literacy of their peers. In doing so they also learn to develop their voices as agents of change in education. The MLWs will use a formative diagnostic assessment tool, Math Mapper, built on a foundation of validated learning trajectories, to strengthen topic areas that need further development, and to develop a deeper understanding of mathematics and how students learn it. This system will enable the provision of formal credentials, through the Territorium platform, that can facilitate access to funds for paying the workers. Partners on this project include: The Math Door, Broward County Public Schools, Boston Public Schools' Teacher Cadets, Territorium, and the Center For School Climate and Learning.

Zearn

Zearn, the nonprofit educational organization behind the top-rated Zearn Math curriculum, will pilot acceleration paths for middle school students to catch-up and move forward in their math learning. The core of this work is just-in-time math learning activities that help students connect unfinished learning into the context of new learning. These activities include videos with on-screen teachers, math problems with interactive digital experiences, and supportive digital manipulatives that help students visualize and make sense of the math. The materials and activities will be developed together with students, especially priority students, and will be designed to motivate learning, foster growth mindsets, and promote inclusivity.