
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 thrilled by the field's response to this call to action. 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. After a review process that included feedback from foundation staff as well as outside subject matter experts and thought leaders, we selected 15 organizations for Phase 1 grants. This initial group of Phase 1 grantees represent a

diverse and impressive cohort of organizations. Specifically, 11 of these 15 organizations are run by a leader of color and 40 percent of them are new grantees to the foundation. Each of these organizations will receive a \$100,000 planning and prototyping grant to develop, test, and refine their solution.

This summer, we will identify 8-10 of our Phase 1 grantees to further fund in Phase 2, where their solutions will be piloted in U.S. schools. Our Phase 2 grantees will be split into two cohorts: Cohort 1 will begin their pilot studies in Fall 2021, while Cohort 2 will continue prototyping and begin their pilot studies 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.



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.

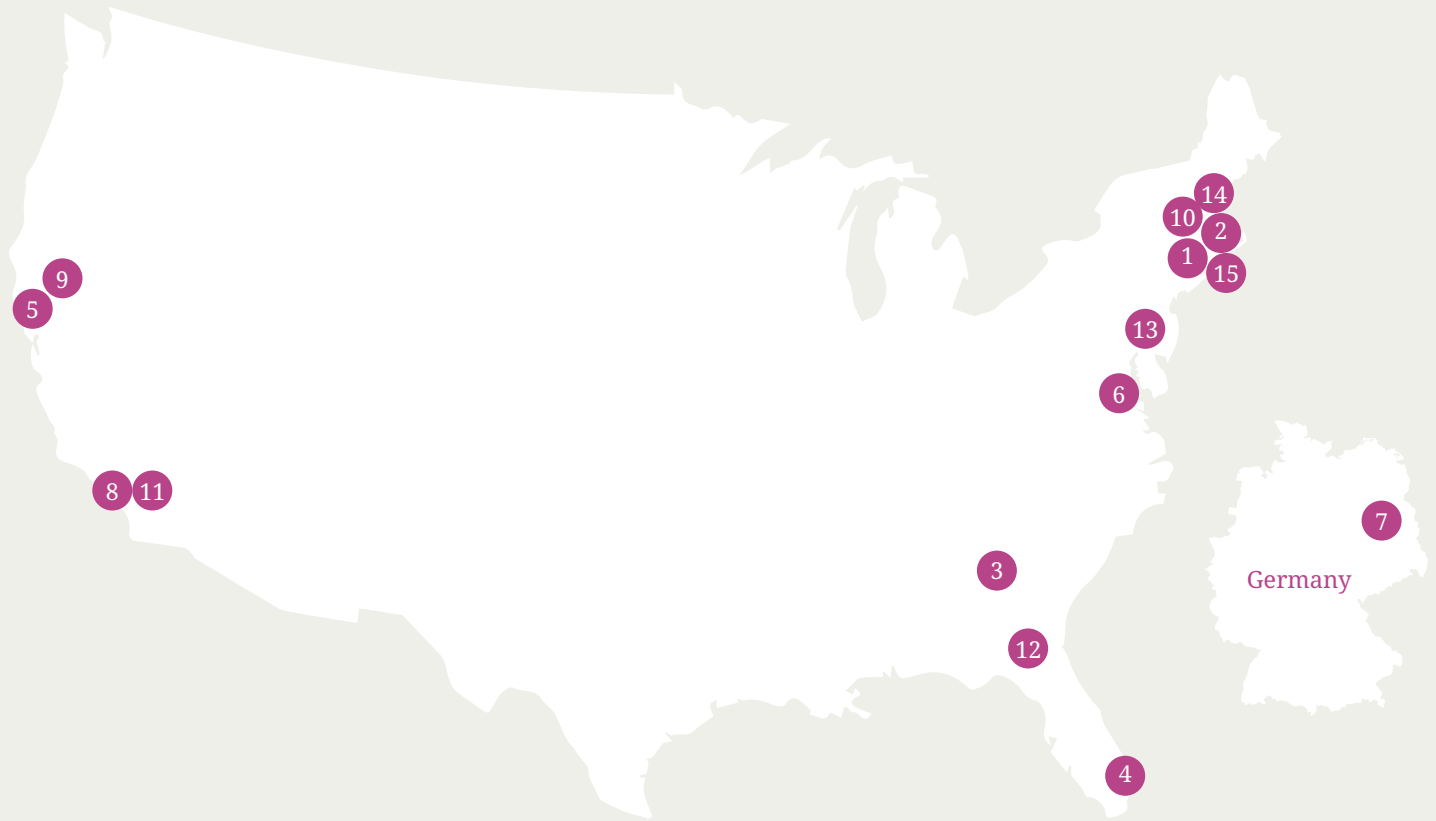


11 of 15 grantees, more than two-thirds, are minority-led organizations.



40% of these grantees are new to the foundation.

Balance the Equation: A Grand Challenge for Algebra 1 Grantees



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*This denotes the locations of the organizations funded. The work will happen in schools across the country.

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

Amplify Education

Amplify Education will develop a solution that leverages a visual approach to mathematics to help students gain a deeper conceptual understanding of data and statistics, making advanced concepts more accessible to students, especially English Learners. Interpreting and working with data is becoming increasingly important in American society, and by building on both algebraic and geometric concepts from earlier grades, Amplify will also enable students to better apply statistics to their everyday lives. Partners on this project include English Learners Success Forum (ELSF).

BetterLesson Inc.

BetterLesson Inc. will develop 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 using these new activities in their classrooms. BetterLesson will partner with Desmos on this project.

The Black Teacher Collaborative (BTC)

The Black Teacher Collaborative (BTC) will develop 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.

Broward County Public Schools

Broward County Public Schools and partners will enhance and pilot a set of tools and strategies that enable teachers and priority students to build classroom cultures and practices for the learning and teaching of mathematics that incorporate the needs of the entire class, with a particular focus on engaging priority students. This approach builds on the Algebra Project's Five-Step Curricular Process, which is a student-centered teaching framework for diverse populations that begin with a mathematically rich, concrete experience to be mathematized and make meaning of embedded, abstract mathematics concepts. Summer Induction Academies will be held so that students and teachers explore together multiple



ways of thinking about and doing mathematics, leveraged by instructional materials and activities such as games for teaching prime factorization of integers, to strengthen understanding of key mathematical concepts. Partners on this project include the Algebra Project, Broward College, ETS, Florida International University, Territorium and the Young People's Project.

ConnectED: The National Center for College and Career

ConnectED: The National Center for College and Career will develop a digital tool to improve 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. While 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. Our 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 develop 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 is developing 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 European Social Fund and Freie Universität Berlin.

The Partnership for Los Angeles Schools

The Partnership for Los Angeles Schools will work with teachers and students to develop and incorporate social justice and identity-affirming content into math curricula for students to improve their academic performance and further enhance their opportunity to attain their hopes and dreams as independent and confident lifelong problems solvers. The Partnership will develop prototypes that incorporate social justice into teacher supports to modify lessons, tasks, and assessments, and to build new classroom cultures that cultivate student genius. Their approach will transform mathematics into a problem-solving and identity-affirming journey, and will teach students the power of mathematics for both understanding and changing how the world works. They will pilot the project in seven secondary schools in their network.

Plan of Action for Challenging Times

Plan of Action for Challenging Times will use a student-driven approach to develop a program that leverages storytelling to improve the conceptual understanding of Algebra 1 for Black and Latino students. They will offer small group tutoring using a peer-led model to strengthen understanding of core algebraic concepts. They will also organize student groups and support them to use their own life experiences to create new stories for explaining specific concepts, and to develop them as learning tools for teaching other priority students. This will also create leadership opportunities and build self-confidence, and together will foster positive mathematics identities.

The Rhode Island Department of Education

The Rhode Island Department of Education (RIDE) will develop a pre-algebra “Readiness Course” to better prepare multilingual learners in Providence for Algebra I. In 2020, only 3% of multilingual learners (also called “English learners”) in Rhode Island achieved the SAT college readiness benchmark in mathematics. RIDE has developed and piloted a summer course that uses student-centered pedagogy and real-world examples to strengthen students’ math skills, while also promoting their social-emotional growth. RIDE will expand the course to a full academic semester, and layer on additional supports to help multilingual learners succeed. These supports will be designed using RIDE’s recently-released Blueprint for Multilingual Learners, as well as the insights of multilingual learners themselves. Partners on this project include WestEd Carnegie Math Pathways, English Learners Success Forum (ESLF), and the Equity Institute.

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 will create a mentorship program to motivate students at the Barack Obama Global Preparation Academy (BOGPA) to improve their performance in mathematics by positioning students on small research teams investigating a mathematics problem arising in the environmental science of their community, human biology or aerospace engineering, with mentorship by UCLA and SpaceX BlackX mathematicians of color. The mentorship program will be designed to rehumanize mathematics for BOGPA’s 98 percent Black and Latino students by engaging them as doers and creators of mathematics and by building “windows and mirrors” into their mathematics experiences to show mathematics is a socially useful endeavor for Black and Latino students. Students will present their solutions during a planned event attended by the BOGPA community and UCLA and SpaceX BlackX mentors.

The University of Florida

The University of Florida will develop an 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 relevant interactive learning modules leveraging the Illustrative Math curriculum and the wide-reaching 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. Algebra Nation will be a partner on this project.

Village Education Tutors Foundation

Village Education Tutors Foundation will develop 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 develop a formal certification program and online learning platform to support high school students 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 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 Math Literacy Workers 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, a nonprofit curriculum publisher and math platform, will develop an individually adaptive fluency product for middle school students that focuses on sharpening foundations from Grades 3–5, including fractions and operations, to promote a deeper understanding of complex concepts on the path to Algebra proficiency. The product will adapt a series of activities to individual students, particularly focused on supporting students who have been struggling in previous grades. The materials and activities will be developed together with students, especially priority students. They will be designed to motivate learning, foster growth mindsets, and promote inclusivity, and each student will receive a tailored series of activities to pursue.