Critical Issues in the Mathematics Education of Black Children

The Lighthouse Almanac

A peer-reviewed journal published by the Benjamin Banneker Association, Inc.
About The Lighthouse Almanac

... “In an era when books of any kind were a luxury found in a few households, almanacs were common. They included scientific information, such as weather forecasts, tide tables, lunar and solar eclipses, and the times of the rising and setting of the sun and moon; they were also infused with mild poems, proverbs, and bits of general information.

What made Banneker’s Almanacs innovative – aside from the fact that they were produced by a black man in an age when African Americans were considered incapable of scientific, mathematical or literary accomplishment – was the inclusion of commentaries, literature, and fillers that had a political and humanitarian purpose.”

(excerpt from PBS’ “Africans in America: Benjamin Banneker’s Almanac” https://www.pbs.org/wgbh/aia/part2/2h68.html)

Following the tradition of Benjamin Banneker’s Almanacs, this peer-reviewed journal from the Benjamin Banneker Association, Inc (BBA) is an inclusive periodical written for and by PK-12 educators and administrators, college/university faculty, community leaders and organizers, parents, and anyone invested in the teaching and learning of mathematics for all children, particularly Black children/children of African ancestry.

The Lighthouse Almanac is a journal that is a compendium of knowledge from the lived experiences of those committed to helping children thrive as learners of mathematics.

Through The Lighthouse Almanac, BBA demonstrates our long-standing dedication to advocating for equity and access, as we chronicle the research, practices, and collective actions of many individuals committed to this purpose.

We anticipate you will find The Lighthouse Almanac to be a valuable resource for guiding your efforts and hope you will consider sharing your experiences with us in an upcoming edition.

~ Brian Lawler and Brea Ratliff

Brian Lawler
Editor-in-Chief

Brea Ratliff
Founder of The Lighthouse Almanac
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BBA Past President
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*edited by Michael Soguero for the We the People – Math Literacy for All Alliance*

Mathematics Literacy for the Information Age and Knowledge Economy: Leveling the Playing Field for Students in the Bottom Academic Quartile
*edited by B.J. Walker for the We the People – Math Literacy for All Alliance*

The Benjamin Banneker Association, Inc.

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The Benjamin Banneker Association, Inc. would like to express our sincere appreciation to the following individuals who reviewed the submissions for this issue.

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Purpose and Goals of the Association

The purpose of The Benjamin Banneker Association, Inc. are the advancement, stimulation, extension, improvement, and coordination of the learning and teaching of mathematics for all students at all levels, with special emphasis on students of African ancestry.

The goals of the Association shall be
(a) to serve as advocate for the educational and professional needs of its members,
(b) to serve as advocate for the educational and developmental needs of students of African ancestry, and
(c) to provide educational solutions and policy alternatives to the educational issues which affect the participation and success of students of African ancestry in mathematics learning.

In executing these goals, The Benjamin Banneker Association shall promote and provide opportunities for networking among individuals, institutions, groups, and agencies operating for the betterment of the educational systems of these United States and Territories and promote and provide opportunities for students of African Ancestry to participate and excel in mathematics learning.

Toward this end The Benjamin Banneker Association shall do the following:
• Serve as a resource for The Benjamin Banneker Association membership,
• Develop programs and activities that encourage and support scholarly and professional activities of The Benjamin Banneker Association membership,
• Develop programs and activities that encourage and support participation and excellence in mathematics learning among students of African Ancestry
• Disseminate educational information to The Benjamin Banneker Association membership,
• Identify fiscal and material resources that support The Association's programs and activities and Collaborate with other interest groups when purposeful in seeking the goals of The Association.
Limited Access to Physical and Intellectual Resources and the Perpetuation of Informal Segregation in Mathematics Education in NYC Public Schools: Six Case Studies

Laurel Cooley
Sarah Hannaford-Simpson
Rushna Shahid

In recent years, the National Center for Education Statistics documented that U.S. public schools were majority non-white students (2018a, 2018b). For decades, New York City (NYC) public school demographics have been ahead of these national trends (Kucsera & Orfield, 2014), while NYC private schools are often over 90% White. Home to the largest school district in the country, most of NYC’s public schools are high-needs (for definition, see United States Department of Education [USDOE], 2014), serving mainly low-income students of colors and ethnic minorities. In 2012, the New York Times reported that half of NYC’s 1600-plus public schools were over 90% Black and Latinx, and among the most segregated in the country (Fessenden, 2012). Segregated public schools provide a landscape in which policies and resource distribution can have comparatively stronger effects on non-dominant populations, producing under-resourced schools that fail to provide necessary educational opportunities.

In this paper, we present data from six of these typical NYC schools serving a majority of Black and Latinx students, describe systems that track students into these schools, and illustrate the lack of physical and intellectual resources that affects mathematics teaching and learning. The focus on schools that serve both Black and Latinx students is not indicative of an assumption that Black and Latinx students are the same, or that any student is less than unique. In the NYC public school system, however, Black and Latinx students are routed similarly by systemic structures and ultimately share their educational experiences with respect to teacher quality, school resources, coursework offered, support services, etc.

We report on a one-year qualitative examination, drawn from a larger 10-year study. This paper provides a contextual understanding of NYC’s high-needs schools and is part of a group of qualitative research papers focused on mathematics teachers trained through the NYC Teaching Fellows, a fast-track selective alternative route program (Cooley, 2019; Cooley et al., 2019, under review). Qualitative case study research methods are employed to examine the following research question:

What are some of the structural obstacles present in NYC’s public school system that help to perpetuate informal segregation and impact mathematics instruction and learning opportunities for Black and Latinx students?

This research question explores the nature of segregated schools in NYC, structures that track Black and Latinx students into under-resourced schools, the type of mathematics teachers serving these students, the mathematics courses offered, and the resources these schools provide or fail to provide. We begin below by presenting the nature of the informal segregation in NYC public schools and some of the structures that keep the segregation in place.

The NYC Context – Segregation Systems in Place

In part to address public school racial segregation, NYC implemented a new process in 2003 by which students could apply to attend up to one dozen high schools. Despite these efforts, high schools remain stubbornly segregated. Those admitted to the most-sought-after schools remained disproportionately upper- and middle-class, White and Asian. Figure 1 illustrates the geographic segregation of NYC’s public high schools.

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1 This research has been partially supported by National Science Foundation awards 0333753, 1535219 and 1535251.
2 Numbers reflect reported statistics; private schools are not required to report student demographics.
Note that the dark blue zones represent areas in which the high schools have 91–100% Black and Latinx students. These percentages lessen slightly with the lighter shades of blue and light green and the lightest colors represent areas in which schools have a majority of White and Asian students.

![Map of NYC high school racial makeup](image)

**Figure 1:** Racial makeup of NYC high school students by school zones.  

This persistent segregation is largely because middle schools offering advanced programs provide strong advantages in the high school application process. NYC middle schools in which high percentages of students complete advanced coursework are significantly more likely to serve primarily non-minority and high-income students (Subramanian et al., 2016).

Acceptance into these prestigious middle schools depends on test scores and success in elementary school. This stratifying process begins early; students may be tested for gifted and talented programs for kindergarten. However, only 25 percent of those that apply qualify with the majority from areas serving mostly upper- and middle-class White and Asian students (Wheaton, 2015). Furthermore, while a universal pre-kindergarten program recently instituted in NYC is diverse in its total population, a one-sixth of preschool classrooms more than 90 percent of the first-year students come from the same racial or ethnic group (Potter, 2016). Figure 2 shows the concentration of minority youth in NYC public elementary schools, reflecting a predictive pattern of the high school segregation indicated in Figure 1.

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3 Adapted from Hemphill et al. (2016).
Leveling the playing field in the mathematics education of Black students through collaboration, mastery, and peer interaction

Maila Brucal-Hallare
Anne Fernando

Across the nation and throughout almost all kinds of educational institutions, mathematics professors who teach freshman-level pre-calculus and calculus courses encounter an academic issue that seems to unify all of us: students do not have sufficient academic preparation for college-level mathematics (Mulvey, 2009). At Norfolk State University (NSU) in particular, we observe that our Black students come under-prepared in their mathematics background. For example, some students in our freshman calculus level courses demonstrate poor algebraic factorization skills while some students in the freshman pre-calculus level show a lack of mastery in basic arithmetic skills. Moreover, we also observe that many of our students do not know how to study, do not know how to be successful in their mathematics courses, and find it difficult to balance the mismatch between their high school experiences and college expectations. Indeed, we have various anecdotes from college freshmen who claim that in high school, mastering the material was not the goal as much as good behavior, showing up for class, and keeping a passive albeit successful-enough position as a student. They also shared that they have not had Black teachers as role models and they have not encountered the frustration and struggle of studying and learning mathematics and subsequently, they have not experienced the joy of learning that results from such frustrations and struggles. A consequence, STEM majors often postpone enrolling in higher-level mathematics courses due to their inability to demonstrate mastery of prerequisite mathematics skills.

While we do not claim to offer solutions to these mathematics education issues in our university, this report highlights two projects at the NSU Department of Mathematics that aim to “level the mathematics playing field” for STEM students while they pursue their mathematics training. As a mid-size Historically Black College/University (HBCU), we have a mostly-homogeneous group of students in the cultural sense but not necessarily in the mathematics-playing-field sense. Differences in the amount and speed of learning mathematics skills and concepts are apparent during the first week of classes.

The two National Science Foundation (NSF) funded projects that we report here are called SUMMIT-P and TIP, both of which have a general aim to help our STEM students become successful in their mathematics courses. In Synergistic Undergraduate Mathematics via Multi-institutional Interdisciplinary Teaching Partnerships (SUMMIT-P), a national consortium of ten universities nationwide, NSU is the only HBCU member institution. In Targeted Infusion Project (TIP), NSU is one of many HBCU members across the nation. While NSU-SUMMIT-P’s driving force is improving the calculus curriculum by developing partnership and colleagueship between the mathematics and engineering departments, NSU-TIP’s main thrust is improving the quality of learning in the STEM classroom through mastery and peer interaction.

In this paper, we first report on the program structures of SUMMIT-P, followed by a report on those of TIP. Then we present an analysis and summary of recommendations of structural and pedagogical strategies that we found to be effective in addressing some cultural contexts of mathematics learning at NSU.

Improving Mathematics Learning by Collaboration

The SUMMIT-P consortium (http://www.summit-p.com) consists of ten universities around the nation that maintain constant communication and close collaboration with a general goal of revising and improving the curriculum for lower division undergraduate mathematics courses. The collaboration happens in two levels: an inter-collaboration among member institutions and an intra-collaboration between selected
Finally, the students watched videos for their calculus final exam review created by upper-level engineering students (see Figure 3), an example of peer learning. The videos were specially prepared, not by strangers from the internet, but by their NSU peers, with whom they share classes in their general education requirements. Such familiarity creates a stronger Black university community. We ensure that students cheer each other on and celebrate their successes.

**Figure 3.** Peer learning: a screenshot of a video created by upper-level students for freshman

The NSU SUMMIT-P program during the Spring 2019 semester was quite successful in motivating our students to appreciate and experience calculus, in creating an opportunity to communicate directly with their future engineering faculty, and in providing teaching and inspirational support to our students. As a small HBCU, we strive to maintain a strong collegial bond that is rooted in applicable mathematics, where students and faculty from different departments are united by a shared vision of strengthening the mathematics education of our students at NSU. Figure 4 reports some of the positive feedback from our students.

During the Fall 2019 semester, the SUMMIT-P calculus class welcomed four engineering faculty professors who presented concrete applications of mathematics in various areas of engineering, namely, graphical analysis in biomedical engineering, optimization in deep learning, parameter analysis in thin films and optic devices, and reduced-order models in wireless power transfers. It is important to note that these engineering topics do not appear as calculus textbook examples. These engineering applications modules were carefully integrated into the calculus curriculum so that students see that a calculus class does not consist of drill-based instruction focusing on basic computational skills but a powerful opportunity to use mathematics thinking to solve real-life actual engineering problems. By the end of the semester, two students from the class have initiated long-term research projects with the visiting engineering faculty professors. Indeed, we believe that one success of SUMMIT-P at NSU was that we were able to initiate an early connection between first-year engineering students and their engineering professors. Our HBCU students respond positively to this early research collaboration between professors and students. The research output may not go too far due to the still-developing mathematics background of the freshman student, but the academic connection and relationship has started and will hopefully advance looking forward.

As part of the SUMMIT-P consortium, NSU contributes to social justice and leveling the playing field:

(1) by offering our Black students high-quality mathematics instruction and training that are comparable to what their peers receive in other institutions;

(2) by increasing awareness of the challenges and issues that students and professors encounter in an HBCU; and

(3) in NSU specifically, by providing a special, close connection between the students and faculty of the Mathematics and Engineering departments.
The Impact of Implementing A Social Justice Task in Middle School Mathematics Classrooms

Kendra Nwosu
Kristopher Childs
Natalie Holliman
Tanisha Pride

I believe that education is the civil rights issue of our generation. And if you care about promoting opportunity and reducing inequality, the classroom is the place to start. Great teaching is about so much more than education; it is a daily fight for social justice. – Secretary Arne Duncan (United States Department of Education, 2009b, p. 6)

Change the Perspective

In the past 50 years the academic achievement gap between the haves and have nots has persisted (Hanushek et al., 2019). Collectively educational leaders in the mathematics community ask, “How might we, the mathematics education community, make a difference in the teaching and learning of mathematics ‘that promote rich, rigorous, and relevant mathematical experiences’ for all students?” (National Council of Teachers of Mathematics [NCTM], 2014, p. 2). The mathematics community, as a collective, is committed to improving educational environments to impact all student learners, not just the privileged. As one advocates for better approaches that benefit every student, a social justice approach to mathematics instruction should be considered. In order for teachers to embed teaching mathematics for social justice into their mathematics lessons, they must be equipped with the tools to locate and/or create lessons and develop resources by crafting their practice through a three-lens approach that includes lesson planning about social justice, with social justice, and for social justice (Benjamin Banneker Association [BBA], 2017). For the purpose of this article we will focus on teaching about social justice through a mathematics lesson.

What is Social Justice Mathematics Teaching?

Educators who lesson plan to teach “about social justice” must realize that these “practices are founded on the belief that mathematics is the tool to be used to challenge the status quo that is adversely impacted by the lack of social justice” (BBA, 2017, p. 1). The National Council of Supervisors of Mathematics and TODOS: Mathematics for all (2016) defines teaching mathematics for social justice as:

A systemic approach that includes fair and equitable teaching practices, high expectations for all students, access to rich, rigorous, and relevant mathematics, and strong family/community relationships to promote positive mathematics learning and achievement. Equally important, a social justice stance interrogates and challenges the roles power, privilege, and oppression play in the current unjust system of mathematics education—and in society as a whole. (p.1)

Teaching about social justice through mathematics empowers all students to go beyond what society tells them they can achieve and creates change in an inequitable system (Bell, 2007). In the classroom this plan can be supported through the use of high cognitive demand tasks, with a focus on social justice. The purpose of this paper is to describe how a group of researchers implemented a social justice focused mathematics task in middle school mathematics classrooms, reflect on the experience, and provide implications for future use.
Why social justice teaching?

According to Gutstein (2003), social justice pedagogy has three main goals: “helping students develop sociopolitical consciousness, a sense of agency, and positive social and cultural identities” (p. 3). Social justice teaching through mathematics requires fair and equitable teaching practices, unrestricted access to mathematical support, and relevant subject matter. It has been well documented that students in schools that are predominantly Black/Brown and/or poor, experience inferior opportunities to learn mathematics (Berry et al., 2014). Critical mathematics pedagogy attempts to address this injustice. This pedagogy includes the theories and practices of critical teaching and social justice but uses mathematics as a tool to identify and take action against social injustices (Gutiérrez, 2013; Stinson et al., 2007). The essential characteristics of a critical mathematics pedagogy approach are to develop a sense of political awareness in students and motivate them to take action (Gutiérrez, 2013). If students are aware of their position in society and in history, they can push for changes of unjust practices. In mathematics, this looks like students having the ability to analyze and use real-world data to advocate for just practices (Gutiérrez, 2013). When the scenario is relevant to students’ lived experiences, then content retention is increased.

Creating relevant scenarios builds upon teaching via problem solving. This pedagogical approach embodies building upon the experiences students bring into the classroom setting, allows students the opportunity to engage in mathematics tasks through multiple pathways, and allows students to engage in authentic discourse (Carpenter, et al., 1989; NCTM, 2014; Schroeder & Lester, 1989, Smith & Stein, 2011). In order to simplify the experience for the teacher-researchers facilitating the tasks, we identified six stages of effective mathematics instruction to be used as a lesson planning tool to guide instruction: standard, student learning outcome, task selection, task implementation, task discourse, assessment (Figure 1).

![6 Stages of Effective Mathematics Instruction](image)

Figure 1. Six stages of effective mathematics instruction.
ICU CARE: A Framework for Creating More Equitable Math Classrooms

Pamela A. Seda

Educating all students has been at the center of school reform efforts for several decades, yet school math structures and system policies have been resistant to change. While the student population in the United States is becoming increasingly more diverse, the teaching profession is becoming less so (D’amico et al., 2017), resulting in many students sitting in math classrooms with racial, cultural, ethnic, and socioeconomic backgrounds that are different from their teachers. Too often, teachers assume that all students share the same ways of thinking, behaving, and working in school. When these assumptions do not match the realities of their students’ lives, a cultural mismatch ensues, often resulting in depressed academic achievement and lack of positive mathematics identity for marginalized students.

Why is an equity framework important?

Implementing “reformed” instructional strategies without attending to inequities that have been ignored for decades, socio-economic discrimination and racist structures will continue to resist improved outcomes for marginalized students. Without an intentional and deliberate focus on equity and access, even well-meaning teachers will perpetuate inequitable practices that produce the current achievement gaps. In today’s educational landscape, teachers have so many things that demand their attention that it is easy for them to be overwhelmed. An instructional framework provides a structure for teachers and educational leaders to reflect on their practices and strive to change systemic barriers and policies that prevent all students equitable access to advanced mathematics learning.

The ICU CARE framework grew out of my dissertation research (Seda, 2008), where I applied design principles from the multicultural teacher education literature (e.g. Zeichner et al., 1998) specifically to the mathematics classroom. This framework not only provides a starting place for what teachers can do to create more equitable mathematics classrooms, but also how to accomplish that goal. It provides a structure for the myriad of instructional decisions that must be made by teachers daily. Teachers using this framework are not expected to blindly follow a script, but rather understand the reasoning behind each framework principle, so they can assess the efficacy of their own efforts as they implement each principle. The principles of the ICU CARE framework are as follows:

ICU CARE Framework Principles

1. Include others as experts
2. Be Critically conscious
3. Understand your students
4. Use Culturally relevant curricula
5. Assess, activate, and build on prior knowledge
6. Release control
7. Expect more
Use Culturally relevant curricula – Use instructional materials in ways that help students see themselves as doers of mathematics and help them overcome the negative stereotypes and messages regarding who is mathematically smart.

Where am I in this picture? That is the natural question we ask ourselves when viewing a group photo. Likewise, students ask themselves the same questions in mathematics classrooms. For many students, negative stereotypes and messages tell them that they do not belong in the picture of successful mathematicians. They hear messages like “I can’t do math. Math is hard. Math is boring and has nothing to do with real life.” Negative stereotypes often limit students’ views of themselves and their abilities to be successful in careers that require mathematics. Culturally relevant teachers understand that the mathematical experiences of students in their classes will either reinforce or challenge those negative views. Therefore, they use curriculum materials to help expand students’ vision of themselves as doers and creator of mathematics. They ask themselves, “Are there people who look like my students positively portrayed in the materials we use?” Culturally relevant teachers understand that teachers who strictly adhere to one type of strategy will invariably disadvantage some students whose primary learning style is different from that of the teachers. Therefore, a variety of strategies and assessments that take a student’s cultural background into consideration are important for increasing the academic achievement of diverse learners.

Examples:

- Acknowledge the racial and ethnic identities of your students.
- Use references that consider students with varying cultural and linguistic backgrounds.
- Use mathematics materials where people of color, females, etc. are favorably portrayed, such as Mathematicians of the African Diaspora (Williams, 2019) and Biographies of Women Mathematicians (Riddle, 2019).

Assess, activate, and build on prior knowledge – Value the prior knowledge that students bring to the classroom, both personal and cultural, and use that knowledge as a resource for creating new knowledge.

Negative stereotypes and biases cause many teachers to wrongly assume their students have no prior knowledge about a topic and thus fail to attempt to find out what they already know about a topic. Research has shown that a learner’s prior knowledge can interfere with a teacher’s attempts to accurately deliver new information, because learning proceeds primarily from prior knowledge, and only secondarily from the materials presented by the teacher (Roschelle, 1995). Teachers that fail to identify prior knowledge, including misconceptions at the beginning of instruction, do so at the peril of their students’ learning.
Black Girl (Math) Magic: Her Voice

Lesa M. Covington Clarkson
Elena A. Contreras Gullickson
Being a girl is kinda like having power... everybody would have like these different cultures and, like, these different ways of thinking. I really like that because I like a lot of people’s ideas. – April

The “magic” of African American women is ubiquitous in the media recently. The message creates a positive image for women who have traditionally been marginalized by curriculum, society and careers. The first line of Mahogany L. Browne’s (2016) poem, *Black Girl Magic*, describes the common message perpetuated by the media when she begins, “Black Girl, they say you ain’t ‘posed to be here...’”. A similar critical filter about who is welcome to participate in Science, Technology, Engineering and Mathematics (STEM) careers and discourse permeates educational spaces (Date, 2005). Moreover, “negative stereotypes can impair engagement and confident performance of girls and women in [STEM]” (Halpern et al., 2007, p. 19). This highlights the need for a space with the potential to transform the pervasive message that STEM fields are intended for white males. This is one of the goals of a near-peer mathematics tutoring program called Prepare2Nspire (P2N). As described previously, P2N prepares under-served students to succeed on grade level, high-stakes, mathematics exams and to inspire them to continue their study of mathematics. The mission of P2N is to (1) develop mathematics confidence, content knowledge, connections, communication skills, and community through cascading tutoring/mentoring and technology, and to (2) create a STEM pipeline for urban underrepresented youth to postsecondary opportunities. (Covington Clarkson & Contreras Gullickson, 2018, p. 31)

For a more detailed description of this program see further discussion in Covington Clarkson and Contreras Gullickson (2018). One of the inherent messages of P2N is self-efficacy. Ultimately, this is the message conveyed in Browne’s (2016) *Black Girl Magic* poem, “You are a Black Girl worth remembering....” Being a Black girl holds power and beauty that cannot be contained. This article uses the lens of “Black Girl Magic” to expound on the mathematical experiences of African American female P2N participants.

**Theoretical Lens**

Often missing in critical conversations about success in mathematics are the voices of African American females. As such, this research interrogates factors they face in mathematics. This research aimed to reframe the factors as sources of agency. These factors include racial identity, gender, and the importance of role models. Each factor was explored through a lens of perpetuating narratives of success for African American female secondary and post-secondary students in mathematics. Collins (2000) asserts that there is value in examining the voices and experiences of Black women. This assertion provides a theoretical lens for this research.

**Racial Identity**

In order to begin to understand the ways in which African American female scholars break through some of the challenges they face as students of color, we must first understand what those challenges look like. One challenge young Black female scholars face in schooling is figuring out who they are in that setting. Doing so entails understanding that their blackness plays a role in how they navigate academia. Sellers et al. (1998) define racial identity as a multidimensional construct that represents individuals’ perceptions of the importance and meaning of race in their lives.
This summer, the national “We the People: Math Literacy for All” Alliance, took a very public, very meaningful step forward in service of a movement whose time has come: Math literacy as a civil rights issue.

During July 16–18, 2019 at the University of the District of Columbia, a coalition of youth, teachers, principals and superintendents representing eight local Alliance sites came together for three powerful days of sharing, planning and community-building. Each team led creative and engaging sessions highlighting their particular approach to serving young people and building math literacy, and all representatives had a chance to set programmatic priorities, strengthen collaborative infrastructures, and plan for the continued growth of the Alliance.

Teams attended from the Florida Local Alliance for Math Literacy & Equity and Broward County Schools, FL; the June Jordan School for Equity, San Francisco, CA; the Fannie Lou Hamer Freedom High School, Bronx, NY; the PreK–16 Historically Black Colleges and Universities project, New Orleans, LA and other sites; the Ohio Math Literacy Institute, Mansfield, OH; Excel High School, Boston, MA; the Baltimore Algebra Project, Baltimore, MD; and Flint Community Schools, Flint, MI.

This meeting of the Alliance was particularly exciting because it coincided with a public briefing on Capitol Hill that addressed congressional leaders, staff, and the public to spotlight the fact that school districts nationwide are struggling and therefore failing to provide large numbers of students, mostly young people of color living in poor economic circumstances, with opportunities to become math literate.

We believe that every student should have the resources and support to achieve math literacy. Specifically, our campaign calls for direct federal investment and involvement to support structured opportunities for students at risk of or currently performing in the lowest quartile on state standardized exams. This direct federal investment could support a variety of nationwide initiatives, including wider access to STEM activities, a focus on supporting students through the transition from arithmetic to algebra, structured opportunities for students to be involved in how the teaching and learning of math is taking place, the addition of more engaging content like computer science and coding to
Mathematics Literacy for the Information Age and Knowledge Economy:
Leveling the Playing Field for Students in the Bottom Academic Quartile
edited by B.J. Walker for the We the People – Math Literacy for All Alliance

In mid-2017, two national convenings, supported by NSF INCLUDES Design and Development Launch Pilot award #1649342 and NSF INCLUDES Conference award #1650533, launched a new national “We the People – Math Literacy for All” Alliance. The Alliance’s shared goal is that students in grades K–12 who on state tests perform in the bottom quartile in mathematics should graduate from high school able to do college mathematics without remediation or pursue careers without their mathematics education being an obstacle. We recognize that achieving this goal requires confronting long standing issues of social justice and the quality of public education in this country. It requires, as a civil right, a new standard for education in the 21st century and citizenship in a democracy. We believe that meeting this goal requires collective action from organizations, groups and individuals working at the national, state and community levels, inside and outside of formal school environments. We believe this bottom up work requires an alliance that can build effective collaborative structures that achieve the greatest shared and collective impact.

In July 2019, the Alliance held a public briefing on Capitol Hill to launch a national campaign, Math Literacy for All 2020 (see https://www.youtube.com/watch?v=fBj0pZ_avko). The campaign will advocate for Math Literacy for All legislation to:

- enhance educational opportunity in schools that are disproportionately serving minorities and all students at the bottom academic quartile;
- offer schools the direct funding needed to change what are now minimum expectations about what and how mathematics can successfully be taught, to whom, and by whom; and
- coordinate funding across multiple federal agencies (such as the U.S. Department of Health and Human Services and the U.S. Department of Labor) to address a broad spectrum of academic as well as social-emotional needs many of these students have, that if better met, would enhance their ability to stay on grade level and leave high school ready to apply mathematics in college and/or career.

The Math Literacy for All legislation is an important ask because we live in a nation of unequal opportunity. Poverty, race and geography all contribute to inequities that effectively deny millions of our young people their constitutional right to full citizenship and to participation in the modern knowledge economy. The result is that as many as 40% to 70% of high school graduates entering college are not ready to take college math without remediation. We seek legislation that must accomplish two critical things:

- affirm that the protections of the 14th Amendment guarantee equal access to quality education, and
- deploy federal resources directly to local school districts and their communities, to provide additional time, attention and expertise to those students performing at the bottom on standardized mathematics tests.