

PRUDENTIAL NEWARK
MATH INITIATIVE WORKING GROUP REPORT:

BRIDGING THE HIGH SCHOOL TO COLLEGE MATH GAP



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Welcome!

On behalf of Schools That Can (STC) Newark, I am pleased to present the Prudential Newark Math Initiative Working Group Report: Bridging the High School to College Math Gap. We have known for years that many Newark youth graduate high school significantly trailing their peers in math readiness. In 2019, only 15% of Newark Public School high school students passed the state mathematics exam, compared to 30% at the state level.¹ That same year, SAT math scores for students from Newark comprehensive high schools averaged 386 points, more than 150 points lower than the state average of 541.² Simultaneously, Newark is home to many businesses and several large corporations who are constantly looking for local talent with strong math and science skills. Additionally, data shows a lack of diversity in high paying STEM careers, including actuary sciences where nearly three-quarters of actuaries in the United States are white or Asian.³ This disconnect leaves many Newark graduates unprepared for these meaningful and high-skill, high-earning potential career options here in their community. The Prudential Newark Math Initiative is designed to address that challenge—help Newark youth build stronger math skills and an interest in math careers earlier so that they can pursue higher education and math careers in the future.

However, even for students who wish to pursue math careers, data shows African-American and Latino students are less likely to complete STEM majors in college, in part due to students feeling less prepared for college-level math, especially those from lower-income communities.⁴ Therefore, a key component of the Initiative has been the Math Working Group. Consisting of high school math teachers and college math professors, the Working Group met over several years to analyze the math gap Newark students often face when transitioning to college math. As a result of their work, the Working Group created this report highlighting recommendations of how the Newark schools and community-at-large can work to bridge that math gap for Newark youth. We therefore are pleased to release this report, not only as a guide for the work of the Math Initiative, but as a resource for all in our community committed to supporting our youth.


Erin Sweeney
 Executive Director
 Schools That Can Newark

¹Newark Public Schools District Summary <https://www.nps.k12.nj.us/departments/data-research/district-summary/>.

²New Jersey Department of Education, New Jersey School Performance Reports <https://rc.doe.state.nj.us/SearchForSchool.aspx>.

³DataUSA, <https://datausa.io/profile/soc/actuaries#demographics>, 2018.

⁴Inside Higher Ed, "Early Departures," <https://www.insidehighered.com/news/2019/02/26/latinx-black-college-students-leave-stem-majors-more-white-students>; Lynch, Matthew. "Why Low-Income Students Are Nowhere to Be Found in STEM." The Advocate, 16 Nov. 2017, www.theadvocate.org/low-income-kids-nowhere-found-stem/.

What is the Math Initiative?

Since its founding, Prudential has been a committed steward and anchor institution in the City of Newark, providing employment for thousands of residents. Yet, many residents do not meet the educational requirements necessary for higher-skill, math-intensive positions. Seeing this challenge, the team at Prudential convened community leaders several years ago to ask the question: how do we strengthen the math skills of Newark youth, thus preparing them for math-intensive, high-skill careers at firms like Prudential? From those convenings, Prudential emerged with lists of suggestions on how to strengthen math skills in Newark youth and create a citywide math culture in Newark. Prudential then partnered with nonprofit Schools That Can (STC) Newark to coordinate some of these efforts. Thus was born the Prudential Newark Math Initiative.



The Math Initiative has several initial programs:

1 Prudential expanded its outreach with Newark high school students, introducing actuarial sciences through classroom visits and workshops throughout the city. In 2019, Prudential launched the Prudential Actuarial Career Exploration (PACE) program, annually guiding roughly a dozen juniors with strong math skills and interest through a mini-internship and case study experience, then continuing to mentor them through senior year and into college. This will ideally create a stronger on-ramp to math careers at Prudential.

2 Acknowledging the need to strengthen math skills in early grades, a monthly math challenge program will launch in the 2020-2021 school year in all Newark Board of Education K-8 schools. The challenges, presented online through Discovery Education, will engage students in elementary and middle school grade bands with culturally relevant math-based problems they can solve each month, with recognition provided to the schools whose students participate.

3 Knowing that many Newark students who head to college find themselves significantly behind in math skills, STC Newark led a working group of high school math teachers and college math professors to discuss the transition between high school and college math. This report is the culmination of this working group and highlights three main recommendations for how to bridge this high school to college math gap.

The Math Initiative will continue to grow in scope and depth as programs expand and more students, teachers, and schools engage with them. The team continues to look at new ways to create a math culture, building off the success of Prudential's similar initiative in El Paso, Texas, which is already showing significant gains in hiring local talent.





RECOMMENDATION

#1

Increase student mastery of algebraic concepts for students in middle and high school to establish a solid foundation for future success in calculus and other higher-level mathematics.

What often makes higher-level mathematics more difficult is a lack of mastery in the basic algebraic concepts that are employed in these higher-level classes. When students begin calculus class, whether that is in their last year of high school or during their time in college, they often struggle because a solid algebraic foundation has not been established.⁴

POSSIBLE SUGGESTIONS:

- Ensure the algebraic foundations are solid in the last years of middle school and the first years of high school by adapting the current curriculum across the district.
- Ensure that students across the district have equal access to the same materials to place all students on the same level playing field.
- Include more real-world problems in lesson plans, in order to show students that the math they are learning is relevant to the world around them while also encouraging them to increase their engagement with math concepts.
- Work with college partners to understand where students struggle most in mathematics and use this information when adjusting the curriculum to ensure that students are walking into college-level math classes as prepared as possible.

⁴GreatSchools Staff. "Why Is Algebra so Important?" GreatSchools.org, 13 Feb. 2013, www.greatschools.org/gk/articles/why-algebra/.



RECOMMENDATION

#2

Develop a culture/mindset that makes math more do-able, engaging, meaningful, and attractive by creating a toolbox that includes resources for all students from kindergarten to high school. Provide professional development for teachers about careers in math and best practices.

Mathematics has a reputation for being difficult, which turns students away from it before they ever engage with it. By creating a toolbox with resources for students to access in their math classes, math will become more accessible for those students who prefer to see math in action, whether that be through graphing software such as Desmos or educational games that help younger students learn multiplication. Furthermore, professional development time for teachers can help establish familiarity with the toolbox and give teachers an opportunity to share best practices of how to make the students want to learn math.

POSSIBLE SUGGESTIONS:

- By including real world examples both in the lessons and throughout assignments, students will see the relevancy of the mathematics they are learning, which can encourage them to buy-in to math more.
- In place of a capstone project, math classes should consider a capstone project in which students use the mathematics they have learned to explain a concept in a related field; for example, explaining how a disease can spread through a community using exponential functions to model the spread.



RECOMMENDATION

#3

Expand math course electives for college freshmen and sophomores as a method to further math study.

Many college students take a college-level math class only if they have to. Whether it be for a requirement for their major or just for a general education requirement, students take just enough to pass the requirement and move on. If students in other classes were exposed to math that is related to the concepts they are studying, then students will be exposed to another version of mathematics that is both relevant to their field and can be more interesting for them.

POSSIBLE SUGGESTIONS:

- Consider offering more college classes that are not strictly math classes but that could integrate additional mathematical content to expose students to mathematics while helping students fulfill a college's mathematics requirements.
- Create mathematics-related minors to encourage students who are not math majors but who must take math classes for their major to explore additional math concepts through one or two additional mathematics classes.
- For those fields that do require a lot of mathematics, establish classes specifically built for teaching the math required for the major; for example, Mathematical Modeling in Biology for pre-med students, Data Analysis with R for those whose major requires coding in R, etc.



ACKNOWLEDGEMENTS

We want to take the opportunity to thank all of the people and organizations that have been involved in this process and recognize them for all of their hard work. The work being done by the group is imperative to the success of the young students of Newark and to understanding how we can implement changes that will benefit them in the future.

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