

2024 BLACK STUDENTS AND STEM REPORT

From classroom to career

How interventions in middle and high school can help Black students succeed in STEM careers



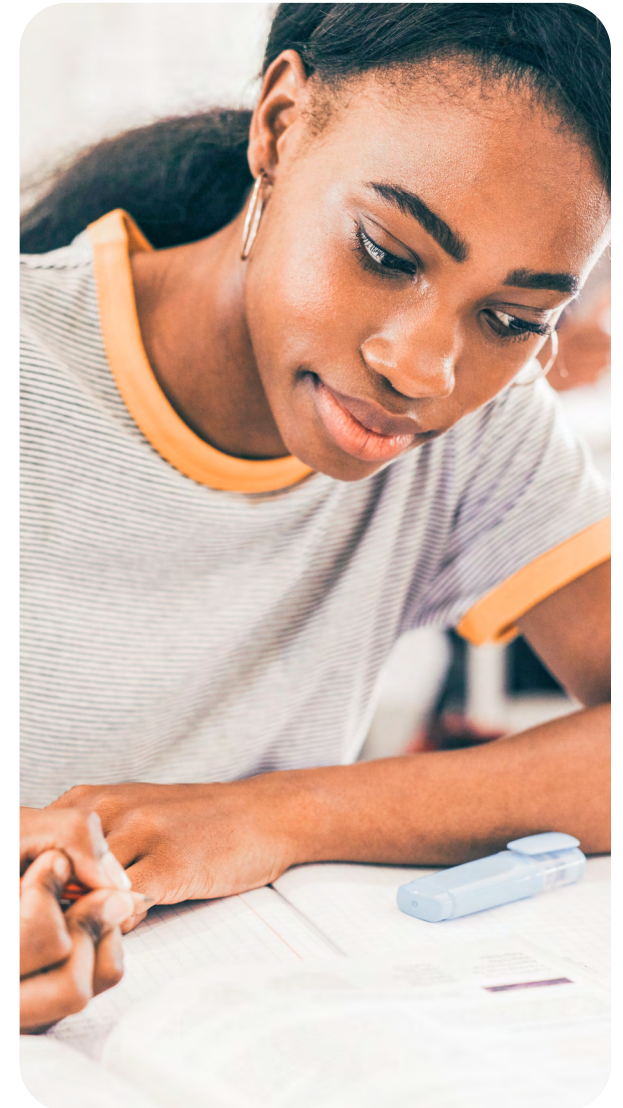
Black Girls Do
STEM





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How to use this report

This report analyzes anonymized data from 328,000 Black U.S. middle and high school students from 2019 to 2023. The data reveals top career cluster recommendations based on scientifically-backed aptitudes and interest measurements.

The report combines data from YouScience® and Black Girls Do STEM to highlight Black student career exposure gaps for in-demand careers and provides examples of programs and curricula helping to close this gap.

YouScience uses AI-powered algorithms and brain games to identify best-fit career matches for students without consideration of race or gender.

Black Girls Do STEM provides students with the opportunity to build confidence in their abilities to become STEM professionals through hands-on academic programs focused on curating curiosity and culture.

Aptitude

is defined as an individual's natural ability to learn or perform skills regardless of environment. Knowing aptitudes is one of the most powerful accelerators to help empower individuals to leverage their natural gifts and find success.¹ Aptitudes expand a student's understanding of what's possible beyond what they know and have been exposed to.

Interest

is self-reported activities someone wants to know or learn about. While interests are important, for career guidance they are limiting and have proven to reinforce biases and stereotypes because having an interest in a particular career relies heavily on a student's direct exposure to that particular career field.¹

STEM careers

include professions in science, technology, engineering, and mathematics. In this report, we examine career clusters in Health Science, Advanced Manufacturing, Finance, Architecture & Construction, and Computers & Technology under the STEM umbrella.

Career exposure gap

is a measurement of the difference between a student's aptitudes and their interests—it identifies which careers a student hasn't been exposed to and which ones might be a good fit. Without addressing this gap, many students flounder in school as they try to figure out their path. They may also find it difficult to understand the value of postsecondary education, which can lead to changing majors, incurring additional debt, dropping out of school, and ultimately struggling to find fulfillment in their career as they miss out on in-demand opportunities where they could thrive.





Unlock opportunity for all

The future of the American workforce is in STEM and skilled-labor jobs. These are, and will increasingly be, high-wage, high-demand, and high-influence careers that shape and build nations. However, Black students are currently underrepresented in these critical STEM career fields.

As of 2021, only 9% of the workforce in a STEM-related field was Black, an increase from 7% in 2011.² While directionally positive, new solutions are needed to help Black students learn about and explore STEM-related education and careers earlier. Further, research shows that, currently on average, Black workers in STEM-related fields earn lower wages and are overrepresented in careers likely to be impacted by automation.³

Nearly all current efforts to solve this representation gap are focused on encouraging college-age students and adults already in the workforce to change directions and choose STEM fields. This has proven largely unsuccessful because individuals tend to believe that it is too late to shift career direction at that time. The problem needs to be solved systematically at an earlier age.

Low participation in STEM careers originates in middle and high school. It is at this time in life that students explore coursework, engage with counselors and teachers, explore skills and trades, and imagine future careers. It is here that decisions on whether to pursue STEM careers are made. Without proper tools and interventions, this time is precisely when students begin to opt out of STEM-related careers.

This report is organized around three insights:

First, Black students have the aptitude for STEM-related careers and deserve the support and tools to discover, research, explore, and pursue these opportunities. More broadly, this creates a stronger, more diverse workforce which benefits all.

Second, we highlight a troubling reality: Black students have a high aptitude for STEM-related careers but lack interest, likely in part due to a lack of Black individuals currently represented in these careers. Students can not be interested in careers to which they have no exposure. This creates the detrimental exposure gap. The impact of this gap on students, and on five key STEM industries, will be discussed throughout this report.

Finally, we provide practical solutions—such as those offered by YouScience and Black Girls Do STEM—that can help change the trajectory of Black students as early as middle school. One solution is to provide Black students with tools, support, resources, and guidance. This approach helps them overcome societal noise and stereotypes, encouraging their pursuit of STEM-related coursework and careers.

Recognizing and confronting the exposure gap head-on and adopting the recommendations presented in this report will likely increase Black students' interest in and pursuit of STEM careers.



The need to inspire STEM participation earlier

Analysis shows that there is a startling discrepancy between the interest in STEM-related careers versus the obvious aptitude for it—thereby widening the talent shortage and weakening the economy. A lack of interest in middle and high school tends to translate into low participation in STEM-related coursework, internships, mentoring, exposure, and counseling. As a result, more Black students opt out of STEM opportunities as they pursue higher education and careers.

The failure to support and develop a diverse workforce in STEM careers from an early age perpetuates significant problems.

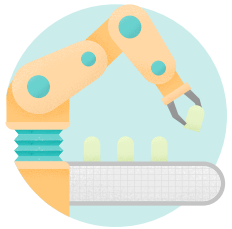
- 1. Innovation deficits:** without diversity in STEM, the development of new innovations, research, and technologies may not fully address or even recognize the needs of diverse populations, leading to biased outcomes and inequitable solutions.
- 2. Earnings disparities:** as employers in all industries place an increasingly higher economic value on individuals with STEM training, those underrepresented in STEM fields will experience even greater educational and economic inequalities, restricting access to high-paying, in-demand jobs, and limiting social mobility.

- 3. Economic disruptions:** STEM workers are critical for businesses to compete—failing to engage a broader segment of the population in STEM careers dramatically slows economic development and innovation and threatens the country's ability to compete globally.

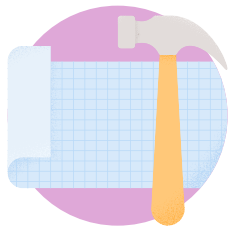
“Black Girls Do STEM has prepared me for real life. It has introduced me to things I’m willing to try in the future. At my school, we have a lot of STEM-related classes, and I’m going to expand the knowledge I received from Black Girls Do STEM.”

—Jariyah, student

STEM CAREER FIELDS



Advanced Manufacturing



Architecture & Construction



Computers & Technology



Finance



Health Science



Advanced Manufacturing

Manufacturing has changed drastically over the years and is now referred to as Advanced Manufacturing due to technological advances. Traditional assembly lines are long gone but the stigma attached to manufacturing careers remains, despite many in-demand Advanced Manufacturing careers requiring engineering and computer skills. Advanced Manufacturing careers are STEM careers⁴ with tremendous economic opportunities.

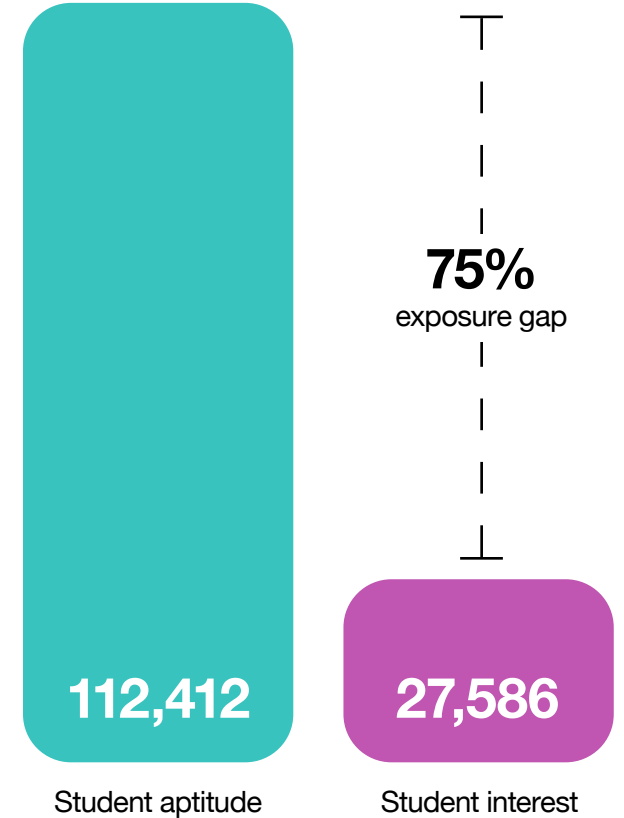
Example careers:

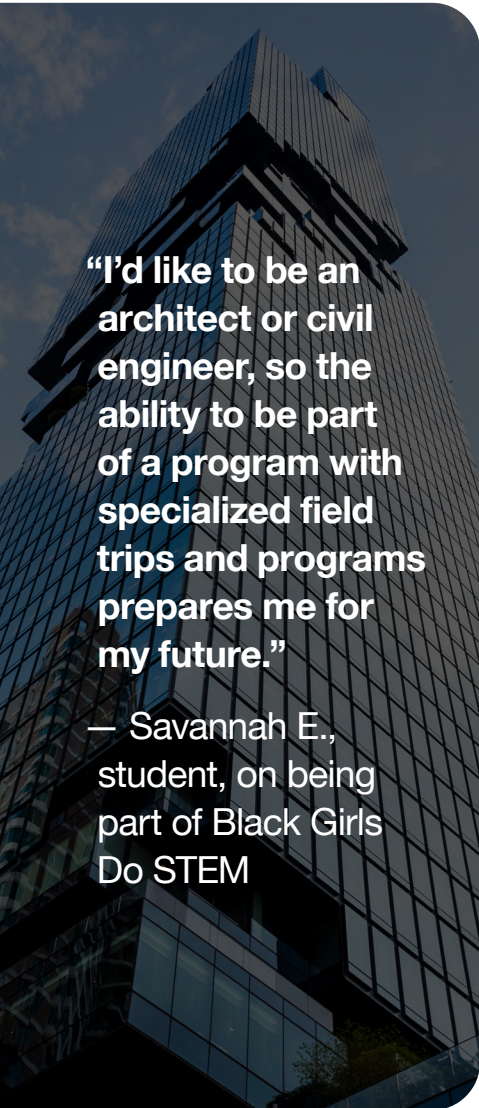
Industrial engineers, electrical engineers, mechatronics engineers, machinists, manufacturing technicians.

Black representation:

As of 2022, Black workers made up 10.8% of the manufacturing workforce.⁵ Within Advanced Manufacturing, automotive is the highest-paying industry for Black workers.

9.4% of workers in installation, maintenance, and repair occupations are Black despite representing 13% of the working U.S. population.⁶





“I’d like to be an architect or civil engineer, so the ability to be part of a program with specialized field trips and programs prepares me for my future.”

— Savannah E., student, on being part of Black Girls Do STEM

Architecture & Construction

Architecture & Construction is one of the most in-demand and sustainable career clusters now and in the future. The retirement of experienced workers, the housing shortage, and the decades long push for “academics” and away from skilled trades have contributed to significant earnings increases. The construction industry alone is expected to increase by 32% between 2020 and 2030 from \$580 billion to \$2.4 trillion.⁷

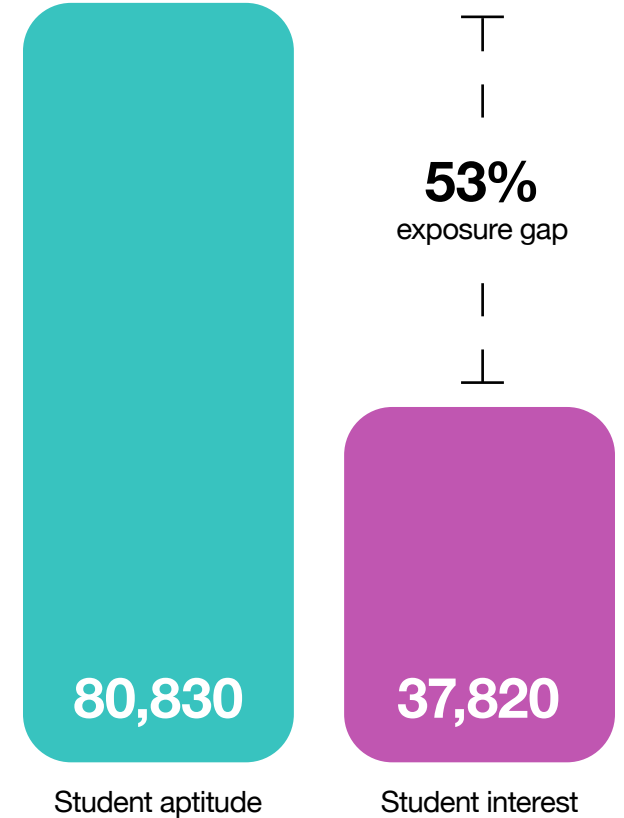
Example careers:

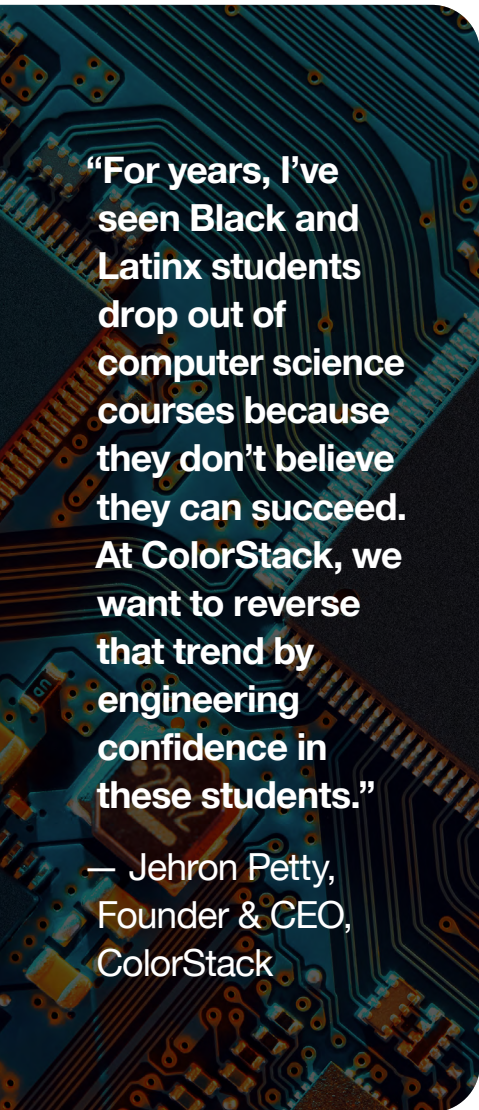
Architects, construction managers, electricians, facility managers, plumbers and pipefitters, cost estimators, interior designers.

Black representation:

As of 2022, only 2% of the licensed architects in the U.S. identified as Black.⁸ In construction, Black workers make up just 6% of the workforce.⁹

6.1% of workers in architecture and engineering occupations are Black despite representing 13% of the working U.S. population.⁶





“For years, I’ve seen Black and Latinx students drop out of computer science courses because they don’t believe they can succeed. At ColorStack, we want to reverse that trend by engineering confidence in these students.”

— Jehron Petty, Founder & CEO, ColorStack

Computers & Technology

Computers & Technology transform our lives in powerful ways. Black students participating in these careers can make significant contributions, but so far, the ratio pursuing these careers is discouraging. Careers in these fields are some of the highest paying and in-demand jobs available. There are millions of unfilled technology jobs, with roughly 377,500 openings projected each year, on average.¹⁰

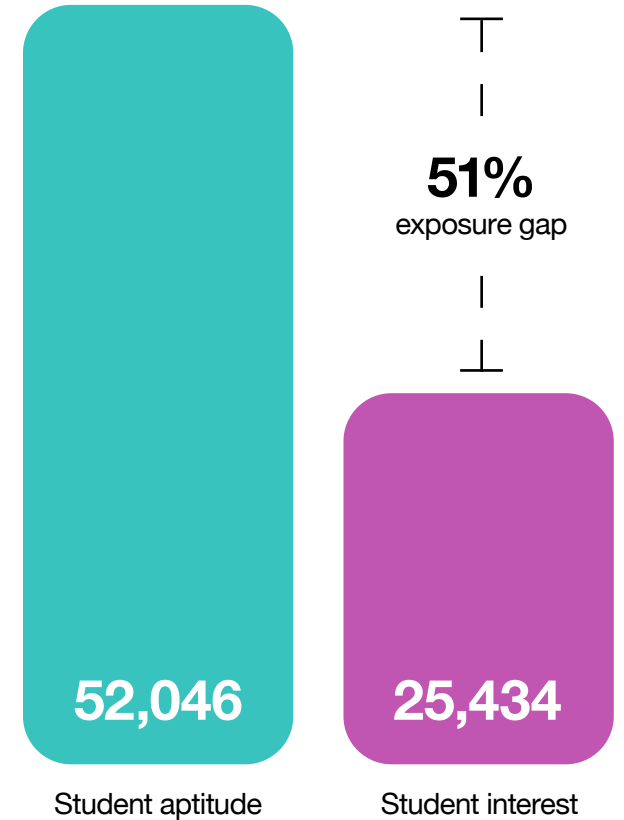
Example careers:

Computer programmers, software developers, information systems engineers, cyber security analysts, aerospace engineers.

Black representation:

Between 2014 and 2021, the number of Black professionals working at large tech companies increased just 1%.¹¹ From 2020-2021 less than 10,000 Black students earned a degree in Computer and Information Sciences.¹²

9.2% of workers in computer and mathematical occupations are Black despite representing 13% of the working U.S. population.⁶





Finance

Finance plays a vital role in the global economy and is a major contributor to economic outcomes of all communities. Not only can those with an aptitude for these careers find high-wage opportunities, but they can also make a difference in the world that impacts generations. Jobs in this sector are predicted to increase faster than the average for all occupations from 2022-2032.¹³

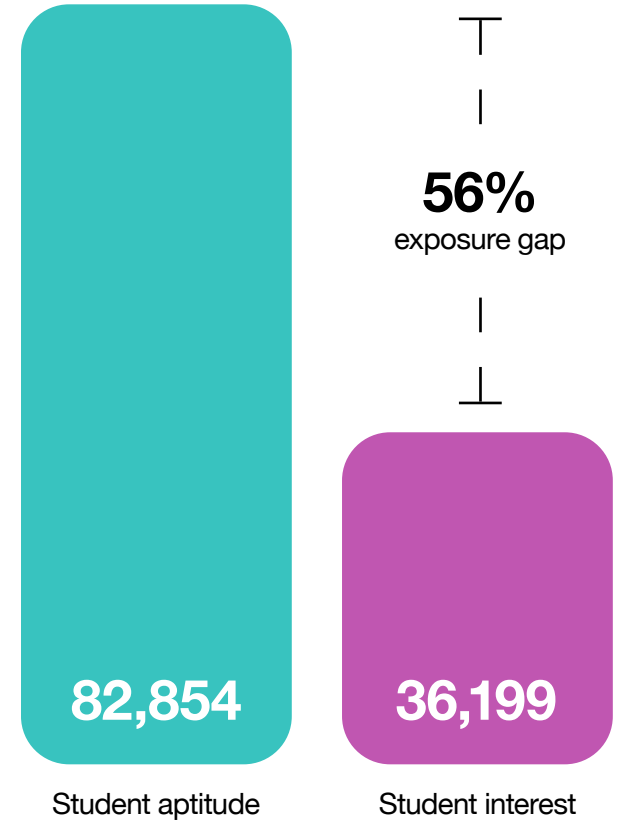
Example careers:

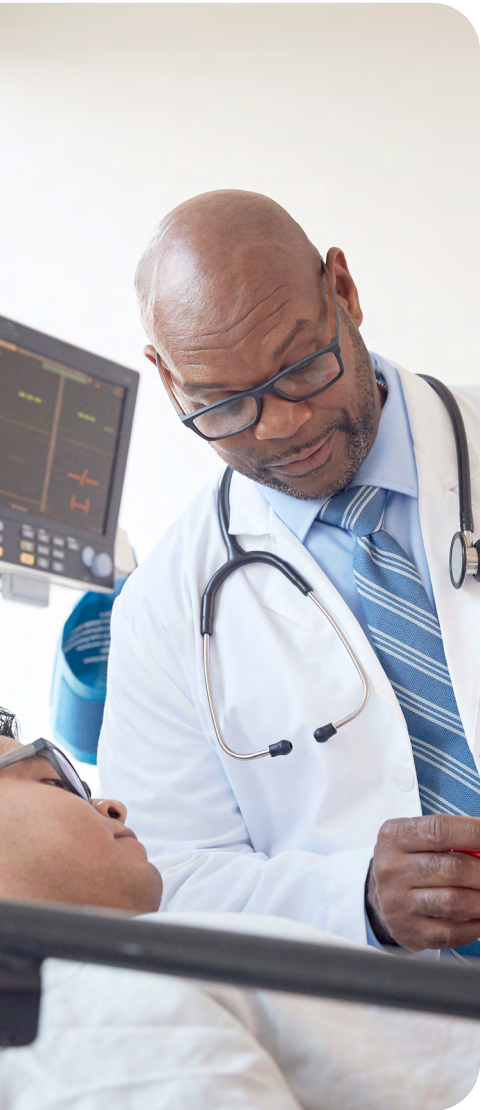
Accountants, financial analysts, market research analysts, personal financial advisors, property appraisers.

Black representation:

From 2007 to 2018, Black workers accounted for 13% of all finance staff and are the industry's biggest ethnic minority. However, during that same span, Black workers saw their roles in senior finance jobs fall from 2.87% to 2.62%.¹⁴

7.6% of workers in chief executive and financial management occupations are Black despite representing 13% of the working U.S. population.⁶





Health Science

Health Science careers are in high demand now and will continue to be so into the future. Not only is there a national nursing shortage,¹⁵ but there are increased shortages in all healthcare areas including doctors, surgeons, and technicians. The rapid retirement rate of the Baby Boomer generation¹⁶ and their increasing medical services needs are accelerating the shortage for skilled health workers.

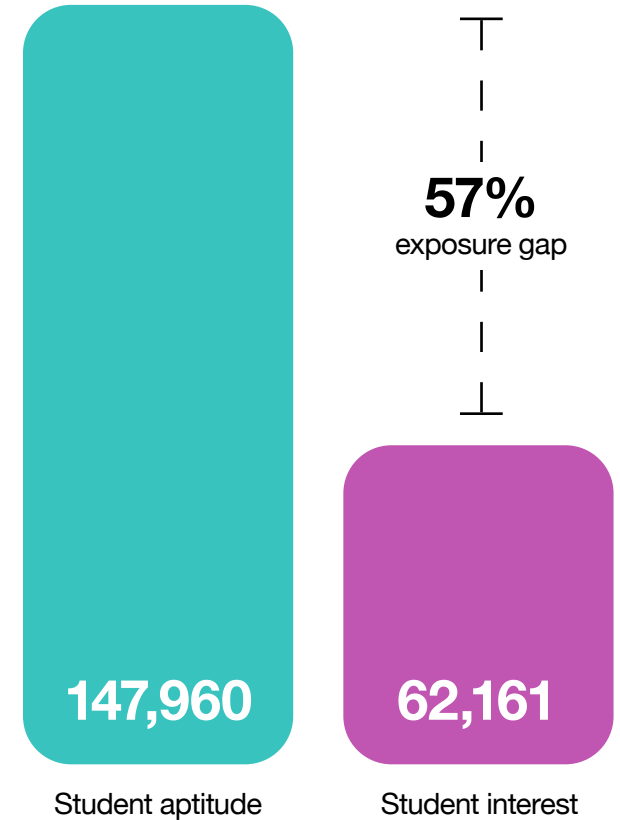
Example careers:

Physicians, pharmacists, laboratory technicians, nurses, dentists, nutritionists.

Black representation:

Less than 6% of physicians,¹⁷ 4% of dentists,¹⁸ and 3% of nutritionists¹⁹ in the U.S. are Black. This contributes to 25% of Black Americans believing that the medical profession is not open to them.²⁰ Solving the underrepresentation of Black professionals in healthcare will better support underserved communities and will help avert a healthcare labor crisis.

7.3% of surgeons and other physicians are Black despite representing 13% of the working U.S. population.⁶





SOLUTION

Use aptitudes to empower discovery

Black students are currently filling fewer seats in critical industries than they should. Data shows a significantly higher aptitude than interest in these careers for Black students. We believe the difference comes from the exposure gap. Students will be able to overcome these issues with access to the right resources.

To solve this problem, we need more personalized career pathways for Black students, that allow for true aptitude discovery and matches each student to their best-fit personalized education and career opportunities. YouScience suggests the following solutions:

- **Aptitude measures** are the foundational tool to help students discover their best-fit postsecondary education and career pathways. This is one of the most critical steps to close the exposure gap for students and increase their spectrum of career exposure.
- **Collaborative planning** between family and educators—including counselors—empowers students to apply their aptitude knowledge in course planning, CTE participation, and in obtaining industry-recognized certifications. When students have this support, they are better prepared to enter the workforce or pursue postsecondary education and training that's suited to their aptitudes and interests.
- **Interdisciplinary education** where schools and districts work together to create personalized pathways and integrated programs through the lens of relevant career clusters.
- **Career-connected learning** to help students connect learning to the real world. Programmatic approaches should be implemented on both the state and local level.
- **Education-to-career planning tools** aid counselors and teachers in helping students create personalized plans for postsecondary education and training based on each student's unique aptitudes and interests.
 - See how Alabama educators use YouScience to connect students to industry. ([video](#))²¹
- **Industry-recognized certifications** quantify student knowledge and skills that directly connect the classroom to employers. Emphasis needs to be placed on stackable certifications—which support outcome-based education efforts and provide students with meaningful credentials as they graduate.
- **Work-based learning**, internships, and apprenticeships connect students with business and industry partners to gain real-world work experiences while they are in school.





SOLUTION

Help see beyond stereotypes

When it comes to careers, currently male and female students overwhelmingly limit their opportunities based on historically-derived gender stereotypes. This is particularly true for Black female students and STEM careers.

Our data shows a significant exposure gap for Black female students—they have the overwhelming aptitude for STEM careers, but lack interest in those opportunities. With our collective effort, we can support more Black female students in pursuing STEM degrees and careers.

It is critical that more corporations support and work together with organizations like [YouScience](#), [Black Girls Do STEM](#), and [ColorStack](#) to further the work of breaking down stereotypes and barriers.

Top career exposure gaps for Black female students

88%

have more aptitude than interest in **Advanced Manufacturing**

73%

have more aptitude than interest in **Computers & Technology**

72%

have more aptitude than interest in **Architecture & Construction**

“When Black girls are seen, heard, and valued enough to be allowed space to learn, fail, and grow where culture, confidence, and community are created, they can begin to uncover who they really are, discover what skills are inherently in them, and who and what they want to be. Black Girls Do STEM is that space, directing them to uncover their own STEM capabilities and how they can and will benefit the world.”

—Cynthia Chapple, Founder of Black Girls Do STEM



SOLUTION

Engage with intentional pathways

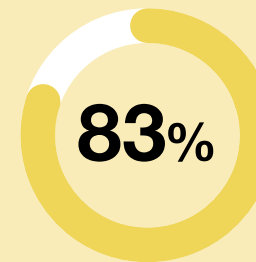


Black Girls Do STEM is a 7-year intentional pathway program designed to expose and cultivate interest in STEM careers for Black female students. The program recruits Black middle school girls and works with them through high school in two programs: STEM Saturday Academy for middle schools and Empowerment, Preparation, and Placement (EPP) for high schools. In the 2022 program year, 100% of Black Girls Do STEM girls report learning about a STEM career they had no prior knowledge of.

The pathway programs supported by Black Girls Do STEM build upon each other to first create interest and engagement in the middle school program and then foster deeper connections to STEM careers through the high school program. The EPP program options are as follows:

- 1. Mentoring program:** Students are paired with a mentor, typically a Black woman in the BGDSTEM Network. Having a positive STEM role model promotes the formation of scientific identity and has been shown to result in higher grade point averages, increased self-efficacy, and more clearly defined academic goals.
- 2. SAT/ACT preparation and tutoring:** Students are provided test preparation as well as math and science tutoring. This narrows the opportunity gap by ensuring that grades and standardized test scores are not a barrier to university admission.
- 3. University tours:** Students tour HBCU colleges and universities to explore the benefits of higher education.
- 4. Internship/Externships:** Students are hosted by industry partners for internships/externships to get first-hand experience within the STEM industry while still in high school.

Black Girls Do STEM by the numbers



*Defined as living in a household where their parent or legal guardian has no educational background in STEM and/or works in a STEM career



SPOTLIGHT

Help students navigate from classroom to career

Myla H. started the Black Girls Do STEM program as a 6th grader. She completed her third year in the STEM Saturday Academy in 2022 and made the transition to the Empowerment, Preparation, & Placement program. She participated as a research intern on the Black Genome Project, which prepared her for the immersion program at the University of Health Sciences & Pharmacy in St. Louis last summer.

“In 6th grade, I didn’t really know what I wanted to do and didn’t have much knowledge of careers regarding STEM, but with Black Girls Do STEM and the different programs I’ve done, I can say that I understand STEM-based careers a lot deeper, and I know what I want and don’t want in a career. I feel a lot more confident saying that I want to be an orthopedic surgeon.”

— Myla H., student





About us



YouScience®

YouScience is the leading technology provider dedicated to solving the skills and exposure gap crisis for students and employers. Its end-to-end platform, YouScience® Brightpath, connects education with career applications designed to help students unlock their potential for future pathways. YouScience leverages proven research, artificial intelligence, and industry input to help individuals identify their aptitudes, validate their skills and knowledge, and get matched with real-world educational and career pathways in high-demand occupations. YouScience is the preferred choice of individuals, parents, educators, and counselors to guide and support educational and career pathways, currently serving more than 9,200 educational institutions and millions of users nationwide.

To learn more about Brightpath, visit www.youscience.com/brightpath.



Black Girls Do STEM

Black Girls Do STEM envisions a “new normal” where there is equitable representation of Black women across all STEM fields. The goal is to create a cradle-career pathway to strengthen and diversify the pipeline of skilled workers entering today’s dynamic labor market. BGDSTEM specifically targets Black girls who have been traditionally under-represented in STEM fields. BGDSTEM works to advance 21st century skills necessary to complete rigorous academic programs and obtain family-wage employment. By creating a culturally affirming learning space, BGDSTEM gives room for cognitive and mental resilience. BGDSTEM programs provide a seven-year continuous pathway for Black girls beginning in 6th-12th grade and through university and workforce entry.

To learn more about Black Girls Do STEM, visit www.bgdstem.com.



¹ https://resources.youscience.com/rs/806-BFU-539/images/Discovery_TheScienceBehindYouScience_Report.pdf?version=0

² <https://jbhe.com/2023/02/african-americans-making-progress-in-stem-fields-but-a-large-racial-gap-remains>

³ <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-in-black-america>

⁴ <https://www.manufacturingusa.com/studies/attracting-STEM-talent-careers-advanced-manufacturing>

⁵ <https://www.bls.gov/cps/cpsaat18.htm>

⁶ <https://www.bls.gov/cps/cpsaat11.htm>

⁷ <https://www.oxfordeconomics.com/resource/future-of-construction>

⁸ <https://www.npr.org/2023/03/12/1160836191/black-african-american-architects-architecture>

⁹ <https://www.jacksonlewis.com/insights/creating-solutions-racism-problem-construction-industry>

¹⁰ <https://www.bls.gov/ooh/computer-and-information-technology/home.htm>

¹¹ <https://www.ciodive.com/news/kapor-center-report-IT-technology/621113>

¹² https://nces.ed.gov/programs/digest/d23/tables/dt23_322.30.asp

¹³ <https://www.bls.gov/ooh/business-and-financial/home.htm>

¹⁴ <https://www.ft.com/content/887d064a-bd5e-4ce6-9671-9057e12bd5c7>

¹⁵ <https://www.aha.org/news/headline/2023-04-13-study-projects-nursing-shortage-crisis-will-continue-without-concerted-action>

¹⁶ <https://www.pewresearch.org/short-reads/2020/11/09/the-pace-of-boomer-retirements-has-accelerated-in-the-past-year>

¹⁷ <https://www.cnn.com/2023/02/21/health/black-doctors-shortage-us/index.html>

¹⁸ https://www.ada.org/-/media/project/ada-organization/ada/ada-org/files/resources/research/hpi/hpigraphic_0421_1.pdf

¹⁹ <https://www.cdrmet.org/registry-statistics>

²⁰ <https://www.pewresearch.org/science/2022/04/07/black-americans-views-about-health-disparities-experiences-with-health-care>

²¹ https://www.youtube.com/embed/lvBlIw6_2M?si=CRYSnxigDMpvMasj?rel=0