

IDENTIFYING AND NURTURING BLACK FEMALES IN STEM FIELDS: **HIDDEN FIGURES NO MORE**



Joy Lawson Davis, Ed.D.
Gifted Education Consultant, Creative Positive Futures
Former member, NAGC Board of Directors
profjoy1022@gmail.com

Adrienne Coleman, Ed. D.
The Illinois Mathematics and Science Academy
Director of Equity and Inclusion
acoleman@imsa.edu

IN SCHOOLS TODAY..

- *Black students are 4 times less likely to be referred for gifted programs when their teachers are White*
- *Black students are underrepresented in gifted programs nationwide*

Sources: Ford, 2011; Grissom & Redding, 2015

SYSTEMIC ISSUES STILL TO OVERCOME

- *Racism in schools that manifests in discriminatory practices*
- *Low expectations of students of color*
- *Cultural mismatch between students and teachers*
- *Majority of classroom teachers are middle class white females*
- *Continuing underrepresentation of Black students in gifted education programs*
- *Lack of Black STEM leaderships in school districts nationwide*

STEM (SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS)

an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy (National Center on Gifted and Talented, 2013).



STEMTalks

DIVERSIFYING STEM MATTERS

“The National Academy of Sciences suggests that, without the participation of individuals of all races and genders, the increasing demand for workers in STEM fields will not be met, potentially compromising the position of the United States as a global leader” (NSF, 2014).

*“The additional benefit of developing a STEM-literate and well-trained domestic workforce is that this ensures that we adequately address challenges related to healthcare improvement, national production capacity, and research excellence”
(Allen-Ramdial & Campbell, 2014).*

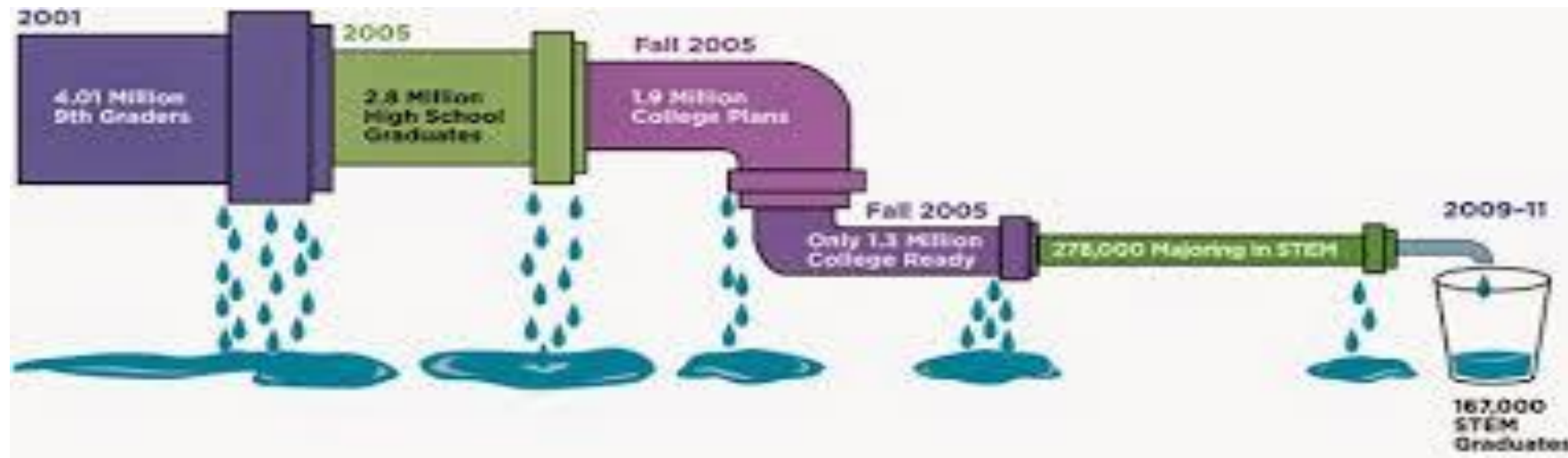
The National Action Council for Minorities in Engineering (2017) believes that “diversity in STEM leads to improved decision-making, enhanced innovation and problem-solving”

“We don’t want to just increase the number of American students in STEM. We want to make sure everybody is involved... That means reaching out to boys and girls, men and women of all races and all backgrounds. Science is for all of us. And we want our classrooms and labs and workplaces and media to reflect that.”

- Former President Barack Obama

STEM EDUCATION → CAREER PIPELINE

- While 32 percent of White students and 47 percent of Asian students scored at proficient or above in *MATH*, only 7 percent of Black students and 12 percent of Hispanic students did (NAEP, 2013).
- While the average score in Science was 163 for White students and 159 for Asian students, it was 129 for Black Students and 137 for Hispanic Students (NAEP, 2011).



STEM EDUCATION

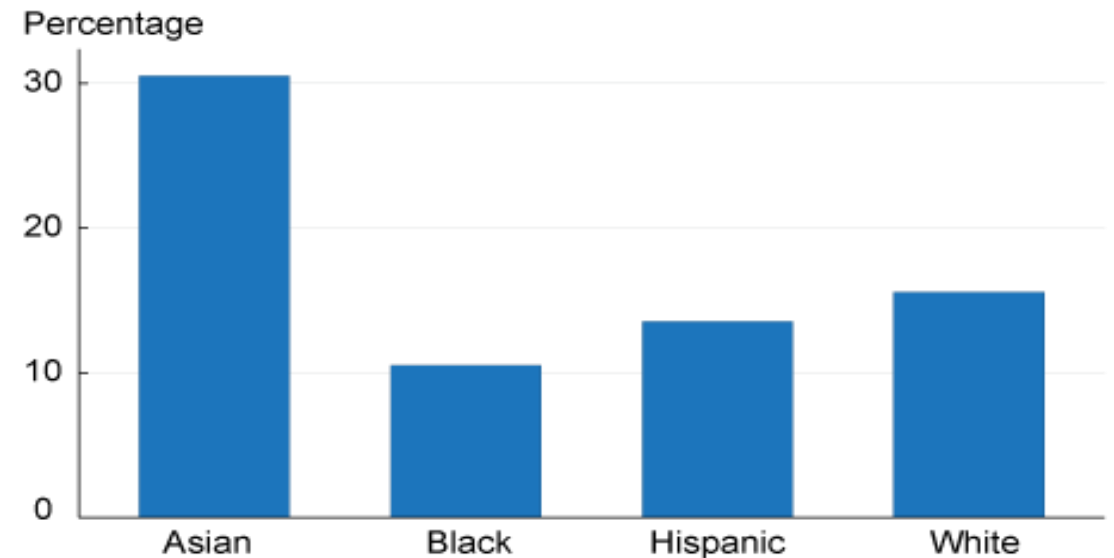


CAREER PIPELINE

Fewer than 10% of Black and Latino students complete the high school mathematics sequence, which includes algebra, geometry, trigonometry, and pre-calculus.

Latino and Black students are academically four years behind their White counterparts and score below approximately 75% of White America in mathematics.

Percentage of Bachelor's Degree Recipients Majoring in STEM Subjects



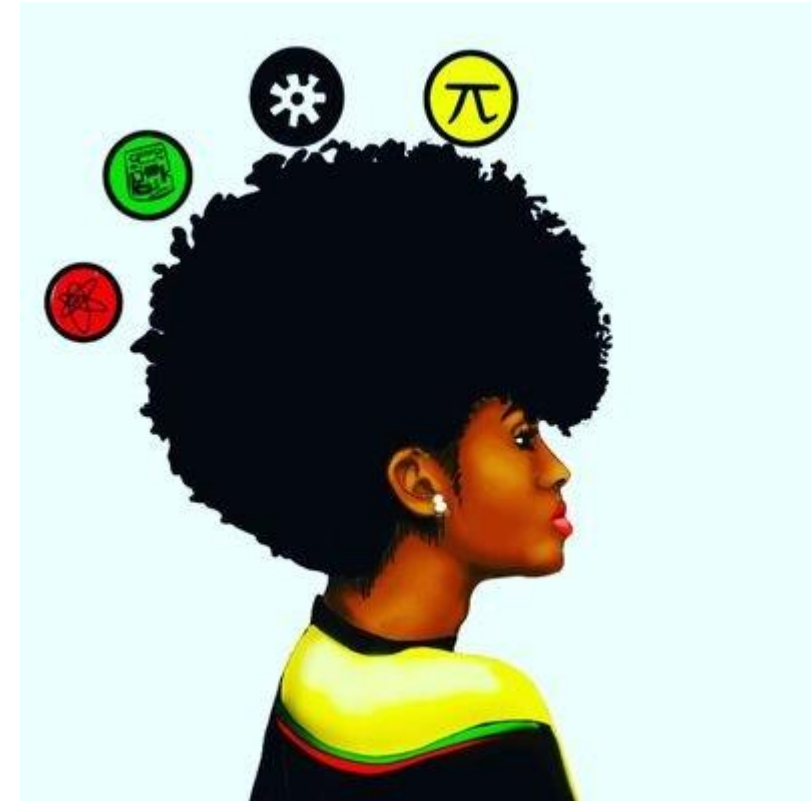
Source: Author's calculations from Integrated Postsecondary Education Data System (IPEDS) data for July 1, 2012 – June 30, 2013. The majors included are those with a two-digit Classification of Instructional Programs (CIP) code in the following categories: computer and information sciences and support services, engineering, biological and biomedical sciences, mathematics and statistics, and physical sciences.

- The 2015 U.S. News/Raytheon STEM Index indicates a slow progression in addressing these inequities that are a result of “early bias, discrimination and social expectations”.
- Lack of STEM exposure in K-12
- Lack of a STEM mentor
- Mathematics phobia
- Failure of students to see the application of science to their lives
- Funding inequities in K-12 system

BIAS TOWARDS BLACK FEMALES IN STEM

[HTTPS://WWW.WASHINGTONPOST.COM/WP-SRV/NATION/BWR.FINAL_BLACK_WOMEN_IN_THE_US_2014REPORT.PDF?NOREDIRECT=ON](https://www.washingtonpost.com/wp-srv/nation/bwr.final_black_women_in_the_us_2014report.pdf?noredirect=on)

- Black Females make-up 2% of professionals in science and engineering careers
 - 77% of Black Woman in STEM report having to provide more evidence of competence than others to prove themselves
 - 48% of Black Women in STEM report they've been mistaken for either an administrative assistant or custodial staff
 - Black Women in STEM felt they have more leeway in terms of expressing emotion so long as they aren't perceived as “angry Black woman”



3 BLACK D.C. STUDENTS FACE RACIST BACKLASH IN NASA COMPETITION

<https://www.nbcnews.com/tech/tech-news/racist-trolls-hacked-nasa-competition-stop-black-teen-girls-winning-n871121>



THIS COULD HAPPEN ANYWHERE-

- Black female enters a science classroom for highly able or gifted students.
- The other students are White males.
- She is highly gifted, ranks in the top 3% of her peers nationally in Science & Math
- She is very excited about the summer course/program
- She notices that her peers are quiet, looking at her and looking away...
- When they get close enough to talk, one asks:

ARE YOU SURE YOU BELONG HERE?



NATIONAL SURVEY RE: BEHAVIORS TOWARD BLACK FEMALE STUDENTS IN STEM CLASSES *

- Respondents: mothers, grandmothers, aunts of Black girls
- Some identified for gifted programs
- Chose to participate because their Black girls had been criticized, ostracized, doubted, even bullied because of their high intellectual capacity

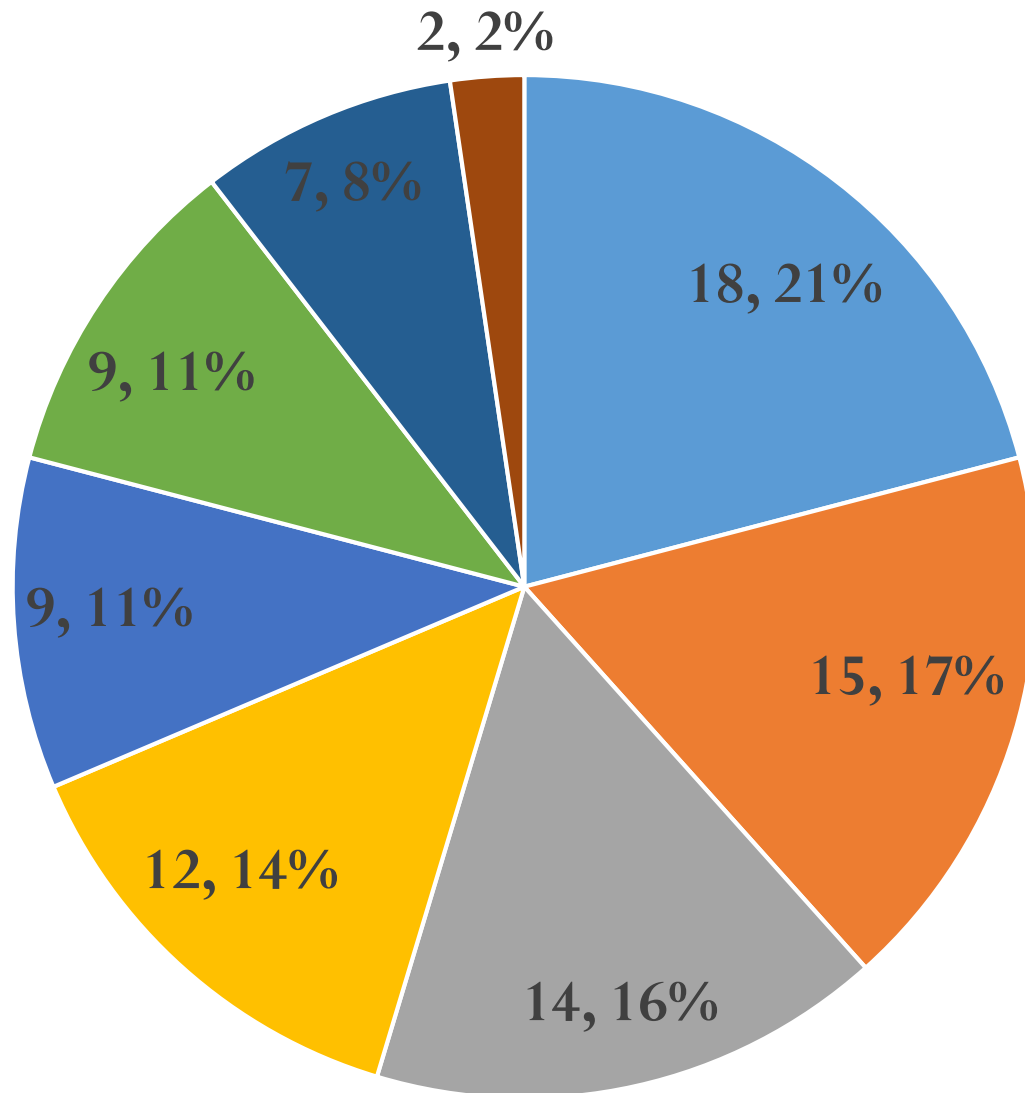
*Davis, J.L. (2016) Are you sure you belong here? Black girls in advanced learner programs: facing stigma, stereotyping, and myths. (Unpublished survey)

BEING A BLACK GIFTED FEMALE IS NOTHING NEW

- The first published study of a Black student with genius potential was that of an 8 year old girl in Chicago
- The Case of “B”(Witty & Jenkins, 1934)
- IQ measured over 200 on a series of traditional tests and case study
- Study was the first published documenting proof that Blacks were as intelligent as Whites; that the earlier studies of White superiority were unfounded and discriminatory

FACTORS THAT MOTIVATE GT BLACK FEMALES TO ENGAGE IN STEM

Black Female Students and their Parents (nt = 32, ns=30, nr=86)



- Obligation to Black/Latino Community/Break Negative Stigma
- STEM Passion/Enjoyment
- Future Success/STEM is a Prominent, Progressive Field
- Learning: Discovery of Knowledge
- Solve Problems/ To Advance Humanity
- Family/ Teacher Influence
- Money
- Challenge/ Competitive Nature of STEM

I feel like what motivates me is knowing that there's not many of us, like black females engaged in STEM education or who have the opportunity to engage in STEM education, so I feel like we're the ones kinda carrying the torch for the rest of us and you can look around and you see like it's only like 10 of us in here, but if you ask all the Asian females, all the Indian females, to sit in a room and do a Student Inquiry and Research about STEM education, they wouldn't even fit in this room, so I feel like knowing that has really encouraged me to do better and to do my best because having the opportunity to be able to go to a school like this and be able to learn the stuff we learn and have access to the materials we have access to like, I feel like that's what motivates me.

Diversifying STEM Education to Career Pathway

Through qualitative research methodologies, students engaged in STEM, their parents, STEM educators, STEM professionals, and Community Organizations that implement STEM programming were asked to provide their perspectives and share their stories related to the intersection between race and STEM. N = 415

- The Motivation of Black and Latino Students to Engage in STEM, n = 281
 - 106 high school students, 86 middle school students, 27 STEM educators, 51 parents and 11 college students.
- Diversifying STEM Think Tank, n = 134 from 64 organizations
 - To understand from the perspectives of STEM professionals, Educators, and Diversity/Inclusion Officers strategies to diversify and strengthen the STEM education to career pipeline.

Critical Race Theory

Attempts to understand American education and reform, acknowledging the unique perspective and voice of people of color as victims of oppression in racial matters and valuing their story telling as a legitimate way to convey knowledge.

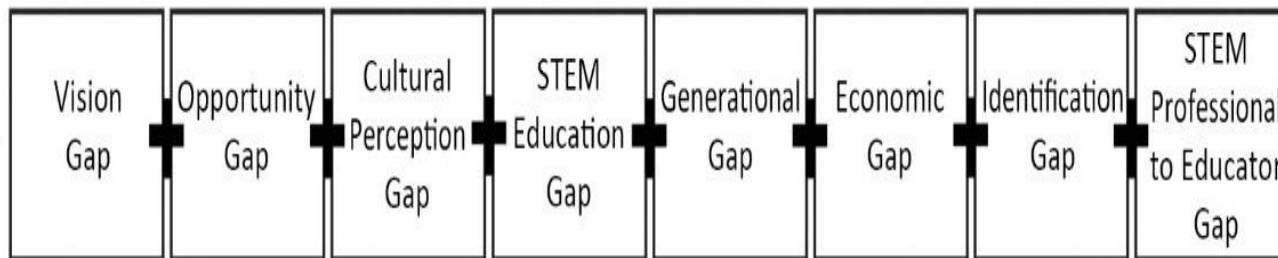
Source: Khalifa, Dunbar, & Douglas, 2013



D-STEM Equity Model

The Systemic Problem

Racial Inequity in STEM Education and Careers

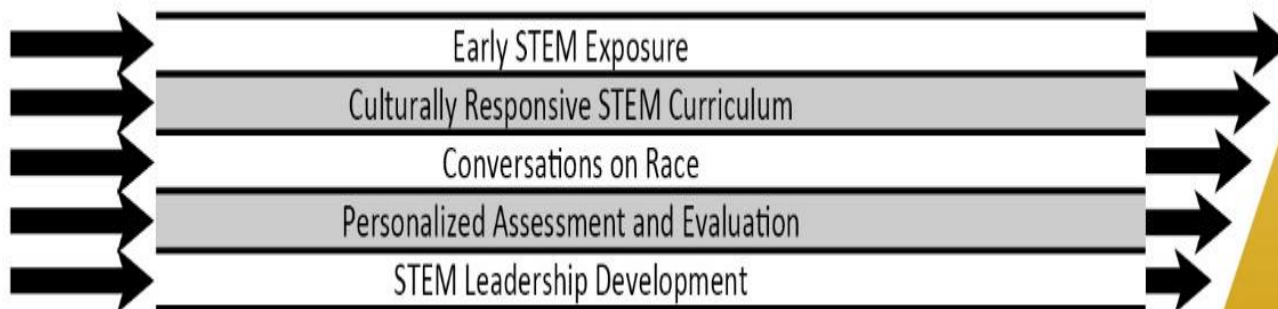


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Racial Equity
in STEM Education
and Careers

STEM Motivation

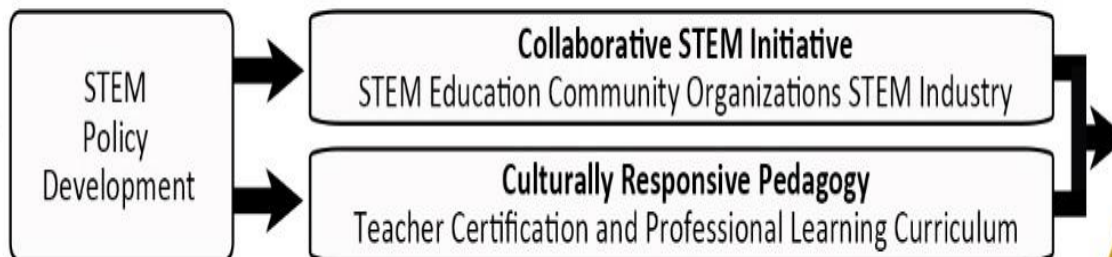
Factors that generate interest in and motivate Black and Latino students to engage in STEM education, majors and careers



Increase in motivation
of Black and Latino students
to engage in STEM education

Bridging the Racial STEM Divide

Policy-driven mandates to form stakeholder collaboration and funding



Racially-based collaborative stakeholder approach to STEM programming (PreK-16) mandated by policy that addresses problems collectively and is driven by STEM motivation factors, with an emphasis on developing culturally-responsive teachers

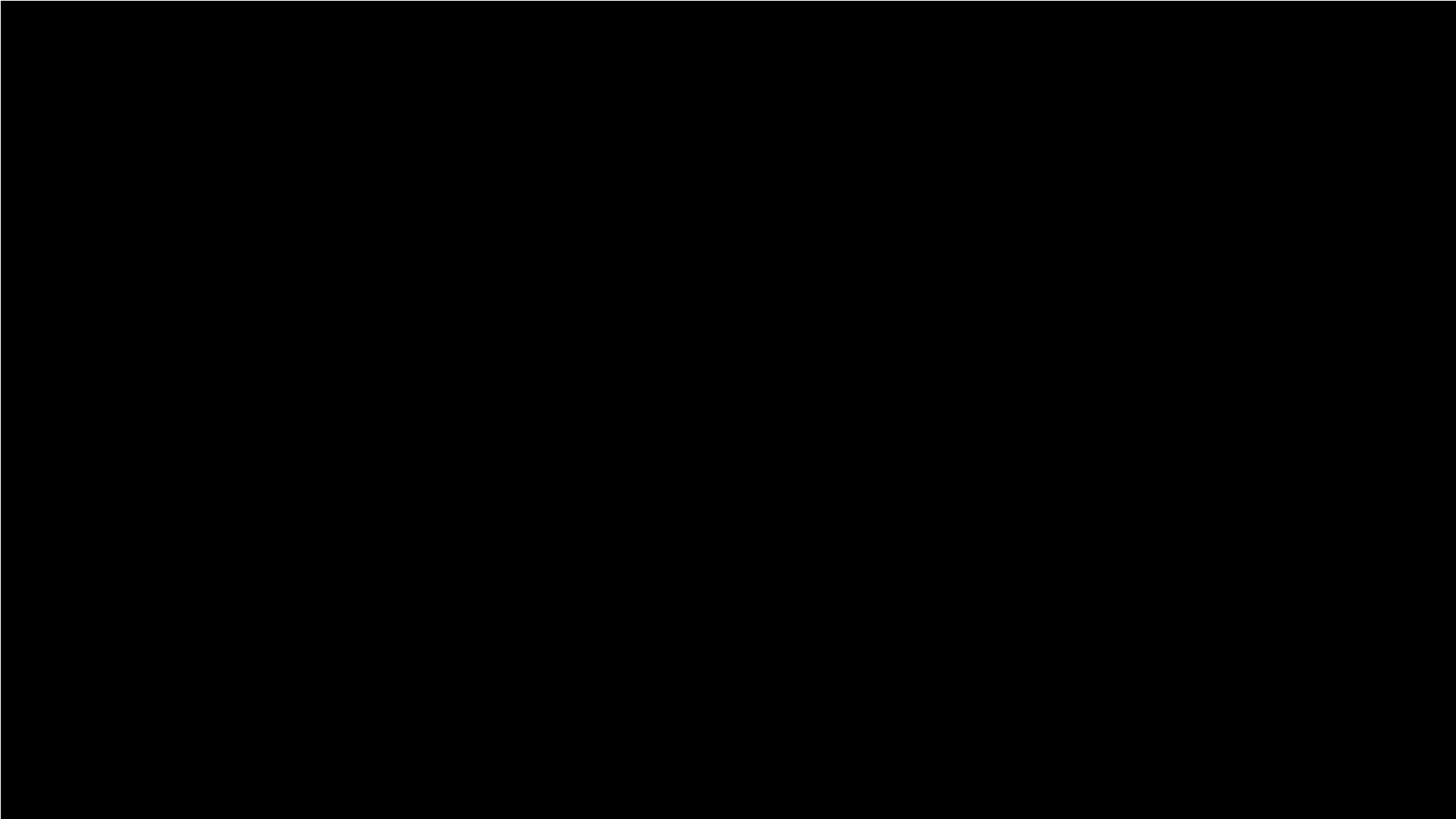


Diversified STEM Education to Career Pathway

SCALABILITY...

1. Include Black community in conversations by hosting meetings IN the community (at churches, community centers)
2. Engage STEM related organizations with an interest in Black student achievement
3. Identify the most prominent barrier to diversifying STEM that exists for the respective group(s) and prioritize in bridging the gap.
4. Based on the data collected, modify the language in the D-STEM equity model to include identified problem, motivation factors, bridging component, which include diversifying STEM policy development as well as identification of stakeholders and the most prominent barrier.

IMSA Black and Latino Students – STEM Motivation



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