DeMagnetizing Engineering

Mr. Delano White, The Gaskins Foundation

Delano White is the Executive Director of The Gaskins Foundation a 501c3 non-profit organization. The foundation oversees, STEMulatesTM, a K-12 pre-college program that presents, engages and prepares youth to enter STEM fields using design, algebra and programming concepts. The program has been nationally recognized for preparing students academically and professionally.

Delano holds a degree in Chemical Engineering from The University of Michigan. While at Michigan, he also served as Chairman and C.E.O. of the National Society of Black Engineers (NSBE), As Chairman, he helped launch the Technical OutReach Community Help (TORCH) program and launched the NSBE 2025 initiative.

He is the author of three books, Diary of a Mad Businessman: A Layman's Guide to Starting a Business from the Ground Up, Instant Gratification: An Entrepreneur's Guide to Satisfying Every Customer, Every Time and his memoir Taking My Soul to the Laundromat: From Prison Walls to Executive Halls Each book was written for the purpose of sharing his life lessons with others. He currently resides in Cincinnati, OH with his wife Dr. Whitney B. Gaskins. He is an Associate Minister at the New Friendship Baptist Church. He has previously been awarded the Spirit of Detroit Award and the Distinguished Service Award (2007) from the Detroit City Council for his commitment to community uplifting. He was. awarded the Unsung Hero Award for creating STEM opportunities in the Cincinnati area and is the 2019 NSBE Golden Torch Award Pre-College Initiative Director of the Year.

Dr. Whitney Gaskins, University of Cincinnati

Dr. Gaskins is the Associate Dean of Inclusive Excellence and Community Engagement in the University of Cincinnati College of Engineering and Applied Science, the only African-American female currently teaching in the faculty of the College of Engineering

DeMagnetizing Engineering

Collaborators

Redacted for reviewer

Research Question

Do Black students from urban, public schools have access to engineering programs?

Current Research

- Importance of Algebra by 8th Grade
- Effectiveness of Bridge programs in preparing students for first year engineering experiences
- Financial support for socioeconomically disadvantaged students
- Creating cohort-based support programs for traditionally underrepresented students

Methodology

- Classified the high schools of 3810 traditionally excluded students (black, latinx, native American, pacific islander) that applied to the University to better understand the background of the population.
- Using those classifications, we compared the list to who is granted admission.
- Wanted to see if there is a trend in which type of high school leads to admission for traditionally excluded populations.
- Sources
  - National Center for Education Statistics
  - Niche.com

Methodology

- Classified the high schools.
  - Public, Private, Homeschool
  - Rural, Suburban, Urban
  - Magnet (yes, no)

- Project was originally entitled “DeMagnetizing STEM” and switched to “DeMagnetizing Engineering”

Definition of a Magnet School

- A school with superior facilities and staff and often a specialized curriculum designed to attract pupils from throughout a city or school district (Merriam Webster)
  - What is a Magnet School? - Public School review
  - Schools with Gifted programs/college prep should be considered “magnet” on the basis that they attract gifted students even though they may not explicitly be a magnet school.
    - #2 school in Ohio (urban, public school) is an example of a “magnet” school that is not nationally classified as a magnet school
- US news Definition - “the school receives funding for thematic programs intended to attract economically and racially diverse students from outside local attendance zones.”
- For the sake of consistent data collection, NCES website will be used moving forward to classify schools

Preliminary Results

- 95% of the Black students who applied to the engineering programs attended a private, suburban, or magnet high school or were on a magnet track
- High performing students in urban areas are selected out of neighborhood schools

Surveys

- 67 surveys collected at National Society of Black Engineers conferences.
  - 2022 Great Lakes Regional Conference (November, 2022)
  - 2023 Annual Convention (April, 2023)
- Preliminary findings
  - Students in engineering programs are exposed to Algebra by 8th Grade
    - Confirms established research
  - Nearly 70% of students who attend neighborhood schools were in some form of a magnet track
  - Nearly all students had access to AP courses

Survey Prompts

- Did you attend a public or private school?
- Was your school considered a magnet school?
- If your school is not a magnet school, were you on a specialized track?
- What were the racial demographics of your school?
- In what city did you attend junior and senior high school?
- Did your school offer AP chemistry?
- Did your school offer AP physics?
- What was the highest level of math you completed in high school?

Initial Takeaways

- The monolithic view of Black students in engineering programs is misguided

- Outreach programs are not reaching a wide audience

Limitations

- Survey information was self-reported
- Only one organization was interviewed

Continuing Research Studies

- Collect more surveys and begin conducting interviews of Blacks engineering students about pathways to engineering
- Study how high school math and science preparation impacts first year engineering experience?
- What is the pathway for non-magnet students to matriculate into engineering programs?
- Does our perception of current Black engineering students align with reality?
  - Are the needs of Black 2nd Generation students different than 1st Generation
  - Are these students disconnected from social justice movements
- Are the pathways for non-traditional students to enter engineering programs

Broader Impacts

- There are inequities in STEM educational systems, especially those for underrepresented minorities
- Data highlights those inequities
- Championing change to the educational system
- Informal education programs and NGOs are necessary
  - Need to recognize they don’t serve all demographics
- The Supreme court ruling will impact accessibility to engineering programs and potentially increase the divide

The Roadmap to STEM

START

6th grade
STEM Focused

STEMulating Saturdays focus (K-6)
K-3: Present STEM to students *(STEM curiosity)*

4-6: Engage students in STEM activities to learn foundational concepts *(STEM efficacy)*

Math: Algebra by 7th Grade (3-6)
ALEKS (weekly participation with parents)

Tutoring: All grades

Pre-Algebra Ready

#NUMERACY

Technology: Coding (K-6)
K-4: Code.org

5-6: Scratch

Engineering/Science: (K-6)
STEMTime weekly project

Afterschool STEM Club

STEMulating Saturdays

What STEM-Focused Means (Skill sets of a graduating 6th grader)
Completed a capstone project

Ready to take Pre-Algebra in 7th

Ready to take Python Class in 7th

Additional Metrics
- Students at or above grade level in Math
- Student self-efficacy (based on STEM efficacy survey)
- Students should be spending an hour each week completing
  - Online math projects (using iReady or ALEKS)
  - Coding projects
  - STEMTime hands-on projects

STEMulates program

FINISH

12th grade
STEM Ready

Additional Metrics
- Students at or above grade level in Math
- Student self-efficacy (based on STEM efficacy survey)
- Students should be spending an hour each week completing
  - Online math projects (using iReady or ALEKS)
  - Coding projects
  - STEMTime hands-on projects

By the end of the 12th Grade, students will:
Score 26 on ACT

Apply and be accepted into college/STEM program

Have completed a/an

Pre-Calculus/Calculus introductory course

Chemistry introductory course

Engineering design course

ACT

By the end of the 10th Grade, students will:
Score 22 on ACT - **ACT Boot Camp**

Compete in a high school engineering competition

By the end of the 8th Grade, students will:
- Compete in a regional/national design competition
- Complete an Algebra course
- Be proficient in a Coding language (Python, java, etc.)

STEMulating Saturdays focus (7-12)
7-12: Prepare students for STEM careers *(skill building)*

STEMulates assistance

Questions