



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Center for Educational Outreach



Annual Impact Report 2022 - 2023

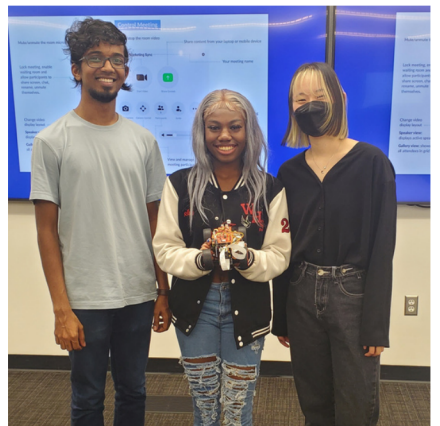
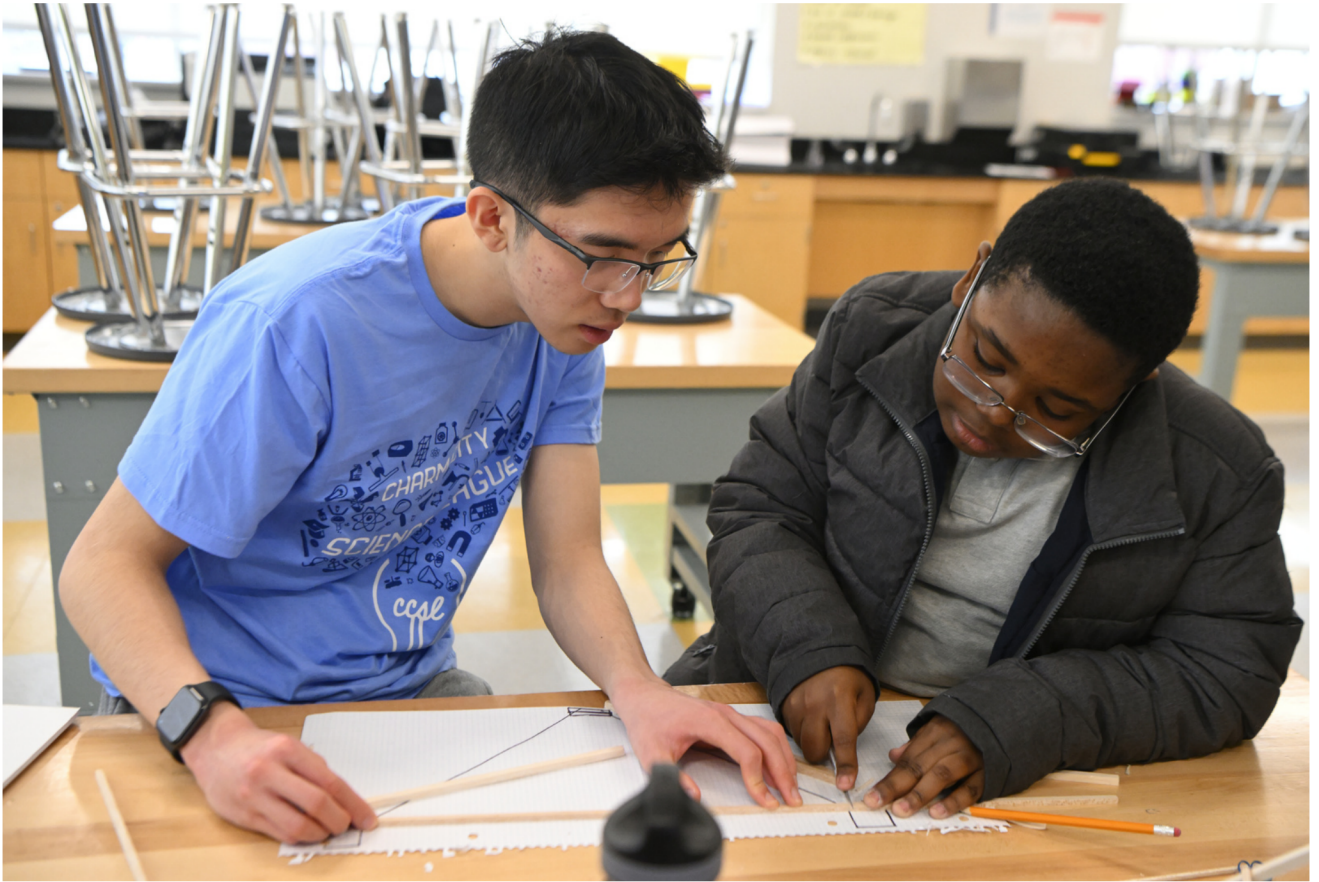
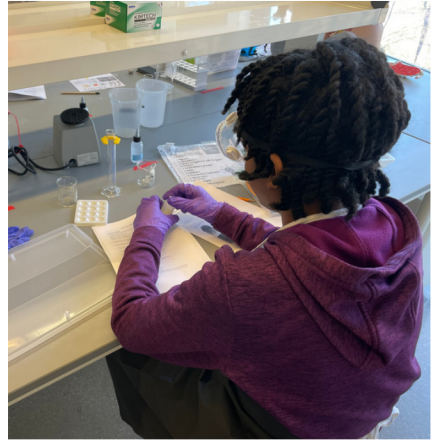


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About Us

The Center for Educational Outreach strives for all students to have access to science, technology, engineering, and math (STEM). We believe STEM education is meaningful for the student, valuable to society, and important for the future.

Vision

Our vision is to increase the number of underrepresented youth pursuing STEM careers.

Mission

Our mission is to engage JHU faculty, staff, and students to inspire and prepare K-12 students in STEM education and careers.

Principles for Community Engagement

These principles for community engagement, informed by consultations with community-engaged colleagues and community leaders, guide the university's collective work in equitably and authentically engaging in community-campus partnerships:

- Shared visions and values
- Mutuality and respect
- Transparency and communication
- Shared decision-making
- Commitment

Goals



Engage PK-12 Students in Baltimore City in High-Quality STEM Programming

We strive to design, host, and support hands-on programs and projects that provide opportunities for PK-12 students to explore STEM inside and outside of the classroom.



Engage JHU Faculty, Staff, and Students in Community Centered STEM Outreach & Partnerships

We strive to create pathways for the JHU community to share their passions and research with the next generation of STEM professionals.



Provide Resources and Professional Learning Opportunities for PK-12 STEM Educators

We create access points for educators to stay abreast of research based pedagogy and leverage resources to make STEM learning more accessible in their classrooms.

2022 - 2023 COMMUNITY IMPACT



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Center for Educational Outreach

OUR MISSION & VISION

The Center for Educational Outreach strives for all students to have a love of science, technology, engineering, and math, or STEM. We engage JHU faculty, staff and students in STEM outreach and programming that addresses the opportunity gap in Baltimore City and engages our local community in quality STEM outreach.



113

TOTAL PK-12
SCHOOLS REACHED

PK-12 STUDENT IMPACT



1,335

BALTIMORE CITY
STUDENTS

1,718

NON-BALTIMORE CITY
STUDENTS



3,053

PK-12
STUDENTS

PK-12 STUDENT IMPACT



61

BALTIMORE CITY
SCHOOLS

52

NON-BALTIMORE CITY
SCHOOLS

4,547

TOTAL

VOLUNTEER HOURS



VOLUNTEER HOURS

We engage JHU faculty, staff, and students, as well as community volunteers, in a variety of STEM programming. Together, we provide quality STEM learning opportunities to PK-12 students through events like the Hopkins Robotics Cup, Maryland Science Olympiad tournaments and more!



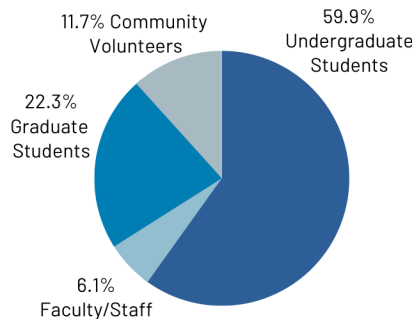
\$144,594.60

VOLUNTEER
ECONOMIC IMPACT

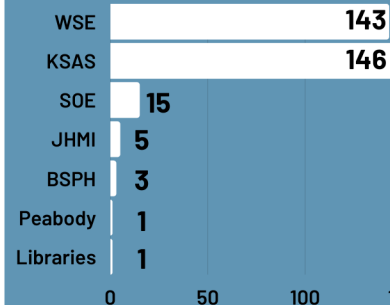


359

VOLUNTEERS &
EMPLOYEES ENGAGED



JHU AFFILIATES



35,379

K - 5 STUDENTS
REACHED THROUGH
SABES CURRICULUM

TEACHERS & CURRICULUM

Our SABES curriculum is the K-5 science curriculum for Baltimore City and reaches students in school and through after school programming. We also support teachers through our long-term programs, professional development opportunities, and through resource support like providing STEM material kits.

128

TEACHERS ENGAGED
IN PROGRAMMING

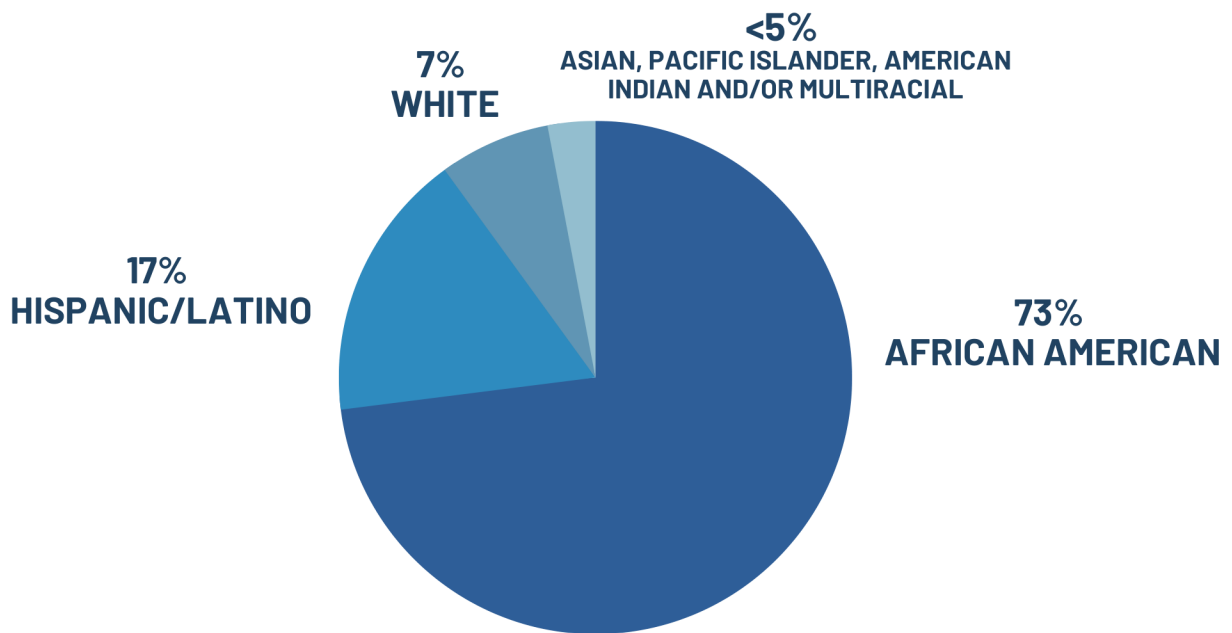



About Our Community

We aim to leverage resources and create bridges for students often underrepresented or excluded from opportunities to explore and excel in STEM education. The communities we serve are full of students who are eager to learn and flourish when provided access to opportunities and tools to succeed in STEM.

In particular, our office focuses our efforts on engaging and impacting students and families in the greater Baltimore City community. Many of our long-term programs directly serve students from the Baltimore City Public Schools district while some one-day events have a broader reach to include students across Maryland.

2022 - 2023 BALTIMORE CITY PUBLIC SCHOOLS STUDENT DEMOGRAPHICS




75,955
TOTAL STUDENTS ENROLLED

60.7%
LOW INCOME STUDENTS*


12%
ENGLISH LANGUAGE LEARNERS

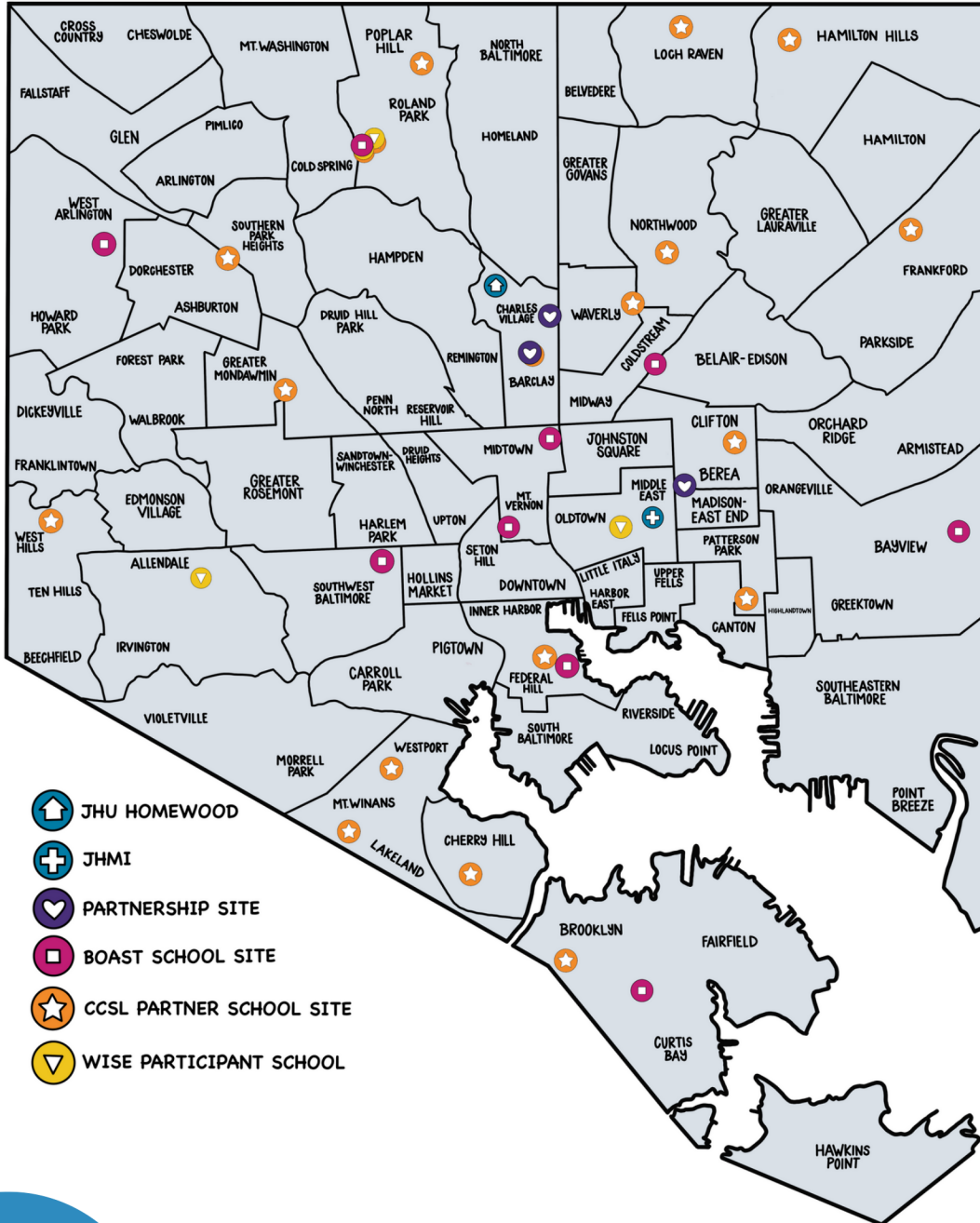
14%
STUDENTS WITH DISABILITIES







* Baltimore City Public Schools provides free breakfast and lunch to all students and does not collect applications for free or reduced lunch. This percentage is calculated based on which students are homeless, in foster care, or participating in low-income family resources like Temporary Assistance for Needy Families (TANF) or Supplemental Nutrition Assistance (SNAP). Medicaid participation is excluded.

SOURCE: Baltimore City Public Schools - <https://www.baltimorecityschools.org/district-overview>

Where We Serve

Baltimore City Program Sites



-  JHU HOMEWOOD
-  JHMI
-  PARTNERSHIP SITE
-  BOAST SCHOOL SITE
-  CCSL PARTNER SCHOOL SITE
-  WISE PARTICIPANT SCHOOL

61 Baltimore City Schools Had Students Engage in Program & Event Offerings

SOURCE: Baltimore Neighborhood Indicators Alliance Map Gallery - <https://bniajfi.org/mapgallery/>

OUR PROGRAMS

IN SCHOOL

HENDERSON-HOPKINS MATH TUTORIAL PROGRAM (HMTP):

The Henderson-Hopkins Math Tutorial Program is a high-quality, in-school math tutoring program. Paid Johns Hopkins University graduate and undergraduate students provide small group tutoring to more than 200 4th - 8th grade students in mathematics.

GRADES:
4 - 8

BARCLAY HOPKINS STEM PARTNERSHIP:

The Barclay Hopkins STEM Partnership brings faculty and students from JHU's Whiting School of Engineering to engage with youth and teachers of Barclay Elementary/Middle school, a Baltimore City K-8 public school, to promote STEM education. 2022-2023 marked the completion of year 8 of this 10-year partnership.

GRADES:
K - 8

STEM ACHIEVEMENT IN BALTIMORE ELEMENTARY SCHOOLS (SABES):

The SABES curriculum developed originally through an NSF-grant project has been adopted as the elementary science curriculum in the Baltimore City Public Schools district and serves over 28,000 students annually.

GRADES:
K - 5

OUT OF SCHOOL

GRADES:
9 - 12

WHITING INTERNSHIP IN SCIENCE & ENGINEERING (WISE):

WISE is a paid research opportunity for Baltimore City high school students who are mentored by Johns Hopkins University (JHU) researchers. WISE aims to increase the diversity of students pursuing STEM in college by developing their knowledge of a specific STEM field and fostering connections with STEM professionals.

GRADES:
9 - 12

BALTIMORE ONLINE ALGEBRA FOR STUDENTS IN TECHNOLOGY (BOAST):

The Baltimore Online Algebra for Students in Technology (BOAST) Program is a free, after-school program for high school students who are interested in STEM fields and careers and want to apply their math skills to solving real-world challenges.

GRADES:
3 - 12

CHARM CITY SCIENCE LEAGUE (CCSL):

CCSL is a STEM mentoring program that pairs over 65 JHU undergraduate student volunteer mentors with Baltimore City based Science Olympiad teams. Mentors engage over 200 K-12 students through weekly, hands-on after-school sessions at 19 school sites & support students and coaches at local tournaments.

GRADES:
3 - 5

STEM ACHIEVEMENT IN BALTIMORE ELEMENTARY SCHOOLS (SABES):

The SABES afterschool program uses curriculum, independent STEM projects and STEM mentor visits to engage students in grades 3-5 at community sites. Students also complete Student Driven Projects to create solutions to address areas of improvement in their local community.

Partnership Sites

**HENDERSON
HOPKINS**

Math Tutorial Program Site



STEM School Partnership



SABES Afterschool Site

BOAST Program

Baltimore Design School
 Baltimore Leadership School for Young Women
 Benjamin Franklin High School
 Digital Harbor High School
 Forest Park Senior High School
 Patterson High School
 REACH! Partnership High School
 Vivien T. Thomas Medical Arts Academy
 Western High School

WISE Program

Baltimore Polytechnic Institute
 P-Tech at Dunbar High School
 Garrison Forest School
 Green Street Academy
 Western High School



Charm City Science League (CCSL) Program

Baltimore City College
 Baltimore International Academy East
 Baltimore Polytechnic Institute
 Barclay ES/MS
 Cherry Hill ES/MS
 Coppin Academy
 Dr. Nathan A. Pitts-Ashburton ES/MS
 Federal Hill Preparatory School
 Fort Worthington ES/MS
 Hampstead Hill Academy

Lakeland ES/MS
 Maree G. Farring ES/MS
 Mercy High School
 Mergenthaler Vocational Technical HS
 Reginald F. Lewis High School
 Roland Park ES/MS
 Thomas Jefferson ES/MS
 Western High School
 Westport ES/MS

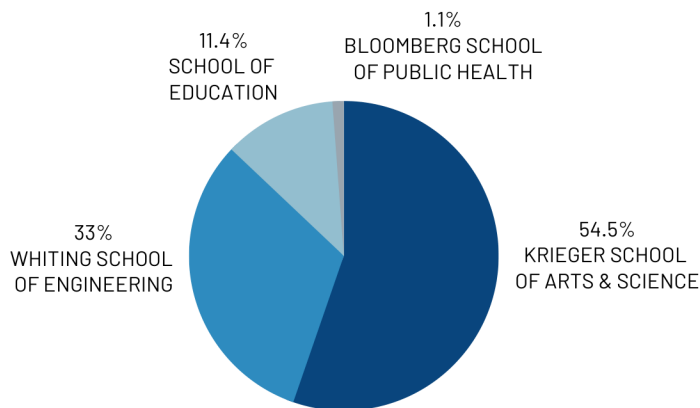
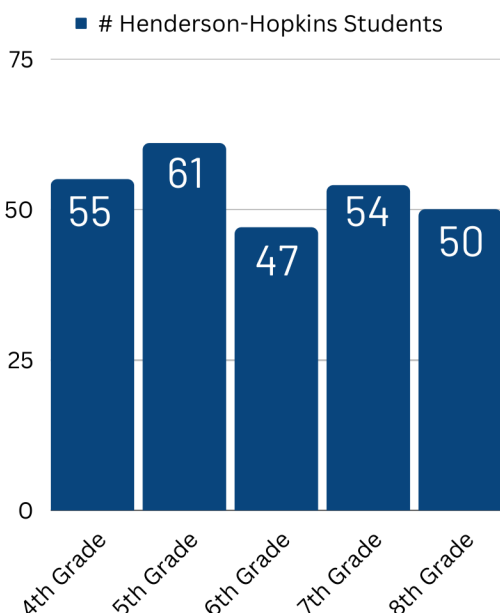
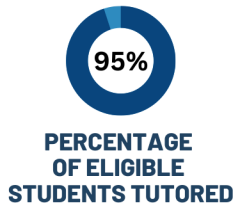
Henderson-Hopkins Math Tutorial Program

Launched in Fall 2023, the Henderson-Hopkins Math Tutorial Program is working to address pandemic learning loss for Baltimore City Public School students in mathematics. The program pairs paid Hopkins graduate and undergraduate student tutors with Henderson-Hopkins students to provide small group, personalized tutoring, during the school day to all 4th - 8th graders. Students receive tutoring support twice a week for 16 weeks. Our program seeks to increase participating students' self efficacy, attitudes, and confidence in mathematics.

During the inaugural year, the program provided mathematics support to 267 Henderson-Hopkins students and employed more than 85 JHU student tutors from 4 JHU school divisions. Next year, the program will expand to include tutoring services for students in grades 3-8 and increase the number of tutoring hours offered per student.

"Our students' math skills are improving, but there are other immeasurable benefits, too. Our students know that there are Johns Hopkins students who care about them. They've built relationships with them, so they start to envision themselves as college students too. That's really important."

- PETER KANNAM, HENDERSON-HOPKINS PRINCIPAL



JHU TUTOR AFFILIATIONS



Barclay Hopkins STEM Partnership

This 10-year STEM partnership was initiated in 2015 as part of the Homewood Community Partners Initiative. The partnership engages students and families at Barclay Elementary Middle School, a public PK-8 school located near the JHU Homewood Campus. It leverages resources of JHU's Whiting School of Engineering to engage the Barclay community in enhanced STEM experiences as part of a quality science program. We provide variety of STEM enrichment programs and events throughout the year, along with professional development for its science teachers.

Working with faculty, staff and students from JHU, the partnership runs science curriculum-aligned campus visits, field trips, and school-day and after-school day STEM enrichment programs. During the year, we also host special events posing STEM challenges to Barclay students and families, such as our annual Science and Engineering Expo in the Spring.



Our annual Family Engineering Day, held in November, brought families with elementary-age students to the JHU Campus for a one-day Safety Helmet Design Challenge.

JHU Clark Scholars led activities to learn why the brain needs protection for activities like cycling and soccer. Families applied this knowledge to design and test a safety helmet, consulting with JHU student coaches. A neighborhood sponsor of this event, Trek Bikes Baltimore, donated and fit new bike helmets for participants.



252

**ELEMENTARY
STUDENTS**



154

**MIDDLE SCHOOL
STUDENTS**



60

JHU VOLUNTEERS



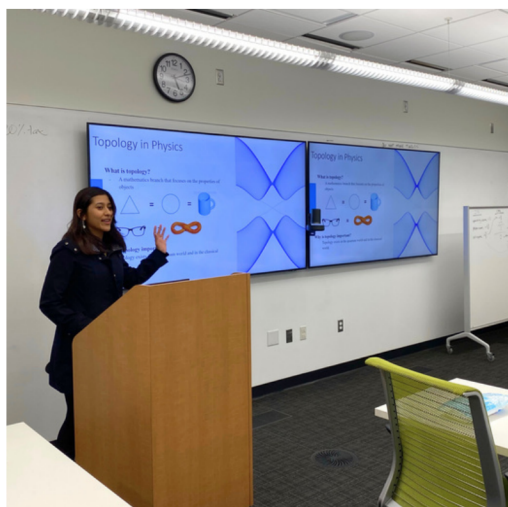
232

**VOLUNTEER
HOURS**

Whiting Internship in Science and Engineering

The Whiting Internship in Science and Engineering (WISE) program is a paid research learning opportunity for Baltimore City public high school students who are mentored by Johns Hopkins University (JHU) researchers. WISE is offered after school in the fall and spring or daily over four consecutive weeks in the summer. Each student explores a subject in laboratory, computer, or field settings. At the close of each program, WISE students present their research and experiences to fellow WISE students, their research labs, their families, and Hopkins community members. WISE started at Garrison Forest School, a private school for girls in Baltimore County; The Center for Educational Outreach continues to support the program administratively.

	CITY SCHOOLS STUDENTS	FACULTY MENTORS	GRADUATE STUDENT MENTORS	GARRISON FOREST	FACULTY MENTORS	GRADUATE STUDENT MENTORS
SUMMER 2022	10	8	12	n/a	n/a	n/a
FALL 2022	2	2	2	11	11	12
SPRING 2023	4	3	6	7	7	10



"I was able to jump into physics and see it's components, as someone to potentially major in physics!"

- Fall 2022 WISE student starting at JHU in Fall 2023

Baltimore Online Algebra for Students in Technology



YEAR 3 OF 4

The Baltimore Online Algebra for Students in Technology (BOAST) Program is a free, hybrid after-school program and research study for 9th-11th grade students with a burgeoning interest in STEM fields who want to apply their algebra skills to solve real-world challenges.

The objective of this program is to make possibilities for any student who aims at becoming an engineer to have a toolbox of skills, mathematical experience, and self-efficacy to achieve that dream.



27

HOURS OF
AFTERSCHOOL
MEET-UPS



3

FULL DAY
FIELD TRIPS



10

ROLE MODEL
VIDEOS



36

OFFICE
HOURS

IS THE PROGRAM VALUABLE TO YOUR STUDENTS?

"Yes - those who did it, absolutely. For example, this program has created a curious mind in [one student]."

- ALGEBRA II TEACHER



90

CITY SCHOOLS
STUDENTS
ENROLLED



9

BALTIMORE CITY
SCHOOLS SERVED



Charm City Science League

Charm City Science League (CCSL) is a JHU undergraduate-led program that envisions a future where every student has the opportunity to excel in STEM careers and form beneficial relationships with mentors. This year, 68 undergraduate mentors engaged 204 Baltimore City students in active learning and scientific inquiry through Science Olympiad, a national STEM competition.

In 2022-2023, CCSL mentors led weekly, STEM-focused after-school mentoring sessions at 19 partner school sites during the first fully in-person season since 2019. Mentors also created online curriculum resources and over 100 material kits for partner schools. CCSL hosted on-campus events, including an invitational tournament in February which engaged 183 students from 13 middle schools in Maryland and Washington D.C. At local regional and state tournaments, CCSL mentors served as tournament test writers and volunteers. This year, CCSL also successfully piloted supporting elementary (Div. A) teams at 3 Baltimore City school sites for the first time.

The CCSL program has historically been overseen by the Center for Social Concern (CSC) in partnership with the Center for Educational Outreach (CEO). Next year, CCSL will officially transition to CEO as a departmental program and will be renamed Charm City STEM League.



204

CITY SCHOOLS STUDENTS



214

MENTORING SESSIONS



68

UNDERGRADUATE MENTORS



3,669

VOLUNTEER HOURS



19

BALTIMORE CITY SCHOOLS SERVED



TEAMS SUPPORTED:
3 DIV. A TEAMS (GR. 3-6)
10 DIV. B TEAMS (GR. 6-9)
7 DIV. C TEAMS (GR. 9-12)

"I loved every activity with all my heart. I loved working with my team and learning new things. For me, today was perfect. We got our own freedom for whatever we wanted to learn. All the mentors were super nice."

SURVEY RESPONSE: 6TH GRADE EVENT PARTICIPANT

29

CITY SCHOOL TEACHERS/COACHES



3

COACHES CLINICS SUPPORTED



"[CCSL Mentors] provide an extra layer of support that was crucial to our team's success."
-MIDDLE SCHOOL COACH



Middle School Team Mentoring Session



CCSL Mentor Group Photo - Fall 2022



Building Balsa Bridges During a Mentoring Session

STEM Achievement in Baltimore Elementary Schools



SABES began as an NSF-funded collaboration between JHU and Baltimore City Public Schools (City Schools) seeking to improve STEM curriculum and instructional delivery in grades 3 – 5. It focused on community engagement in nine schools within three specific neighborhoods: Greater Homewood, Greektown/Highlandtown and Park Heights. SABES continues to operate beyond initial grant-funding to date in an independent partnership with City Schools and local after school programs. With additional funding from the Maryland State Department of Education (MSDE), the writing team was able to expand the curriculum to include grades K-5.

SABES IN SCHOOL CURRICULUM

The SABES curriculum allows students to problem solve real-world challenges. Each unit is written around a phenomenon-driven question and story line. Students complete an Engineering and Design Challenge where they define the problem, develop possible solutions, and then optimize the best solution. The K-5 SABES curriculum is undergoing revisions and will be comprised of 30 units and 714 lessons, with 17 units having already been rewritten by June 2023.



35,379
K - 5 Students
Reached Through
SABES Curriculum

This year 11 new units were launched, and the final 6 units are set to roll out by April 2024. All lessons are written, reviewed, and updated to align with Next Generation Science Standards (NGSS), Common Core Literacy Standards, and researched-based instructional practices. Each unit developed contains a 100+ page teacher guide, student resources, presentations, and student assessments. All elementary teachers in Baltimore City Public Schools use the turnkey SABES curriculum for science instruction.



407
NEW LESSONS
LAUNCHED



SABES AFTERSCHOOL

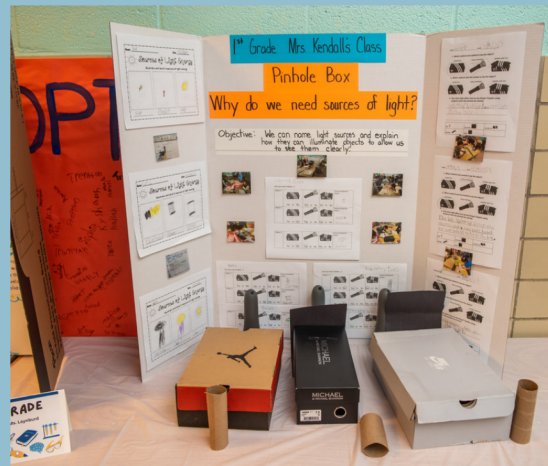
The STEM Achievement in Baltimore Elementary Schools (SABES) After-school Program curriculum consists of units from the Engineering Adventures (EA) curriculum in addition to independent STEM projects. Throughout the school year, students complete engaging, inquiry-based STEM projects. Partway through the year, classes break away from the structured curriculum to work on Student Driven Projects, during which students identify an area for improvement in their local community and use STEM in order to address it. In 2022-2023, we offered one program site at the Village Learning Place in Charles Village.

PARTNER SITE :



26
AFTERSCHOOL
SESSIONS

8
CITY SCHOOLS
STUDENTS



ONE-DAY EVENTS

In addition to running several long-term programs year round, our office also coordinates, hosts, and sponsors a variety of one-day or short-term events to promote STEM. These programs run anywhere from 2-12 hours in length and provide more pathways for us to engage the community in STEM enrichment. Check out a selection of this year's one day events below:



MARYLAND STEM FESTIVAL

Wednesday, November 9, 2022 - Location: Franklin Square Boys & Girls Club

Our office participated in the Maryland STEM Festival by leading a hands-on engineering workshop for students at the Franklin Square Boys & Girls Club. During two engineering design challenges, 7 elementary students and 1 middle school student designed and tested wind-powered "Puff Mobiles" and shock absorption systems on lunar lander models destined for the moon.

HOPKINS ROBOTICS CUP

Saturday, January 28, 2023 and February 4, 2023 - Location: City Schools Professional Development Center

118 elementary school, 86 middle school and 130 high school students from Baltimore City competed in this VEX IQ and VEX VRC Championship tournaments hosted by our office in partnership with City Schools. Over 32 JHU and community members served over 240 volunteer hours as judges at the events and awarded top teams with awards. Funding for this event was provided by our long-term sponsor, Northrup Grumman.



READ
MORE
ABOUT
IT HERE



TOWER OF POWER

Tuesday, February 21, 2023 - Location: Virtual/Homewood Campus

Fourteen Maryland middle schools participated in a virtual spaghetti and marshmallow building challenge. The Summit School took first place with a tower measuring 59 inches. The top 5 teams advanced to compete in-person at the Homewood campus event and the Waldorf School of Baltimore took first place!

BARCLAY SCIENCE AND ENGINEERING EXPO

Thursday, April 20, 2023 - Location: Barclay Elementary/Middle School

50 Barclay students and 30 family members engaged in hands-on engineering activities and an egg drop challenge led by Clark Scholars and volunteers! Teachers also displayed posters featuring highlights of their STEM activities from the year. In total, 13 JHU volunteers served 43 volunteer hours at the event.



MARYLAND SCIENCE OLYMPIAD STATE TOURNAMENT

Saturday, April 22, 2023 - Homewood Campus

We hosted the annual State Tournament where 639 students from the top 48 middle and high school teams from across Maryland competed in over 40 different STEM topic events and engineering design challenges. This was the first fully in-person state tournament since 2019. Over 91 volunteers from JHU and the community served over 367 volunteer hours to run the event. Baltimore City had 11 teams qualify for the event, including 10 teams supported by JHU mentors from Charm City Science League.





In the News

Check out how our programs were captured this past year!

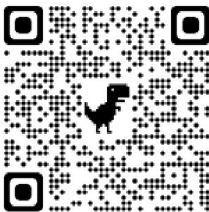


HELP WANTED: JHU TO HIRE 80 STUDENT MATH TUTORS FOR HENDERSON-HOPKINS

August 15, 2022 - JHU HUB

Learn about the launch of our Henderson-Hopkins Math Tutorial Program and our call to action to recruit tutors for our inaugural year.

<https://hub.jhu.edu/2022/08/15/henderson-hopkins-math-tutoring-program/>



JHU STUDENTS MENTOR BALTIMORE CITY MIDDLE SCHOOLERS PREPPING FOR MARYLAND SCIENCE OLYMPIAD

April 19, 2023 - JHU HUB

Learn more about CCSL partner school Cherry Hill Elementary Middle School's preparation to compete at the Maryland Science Olympiad State Tournament.

<https://hub.jhu.edu/2023/04/19/maryland-science-olympiad-mentorship/>



YOUNG SCIENCE AFICIONADOS

Spring 2023 - The Johns Hopkins Whiting School of Engineering Magazine

Read about Emily's journey as a mentor at Barclay Elementary Middle School through her participation in the Charm City Science League (CCSL) program.

<https://engineering.jhu.edu/magazine/2023/06/young-science-aficionados/>

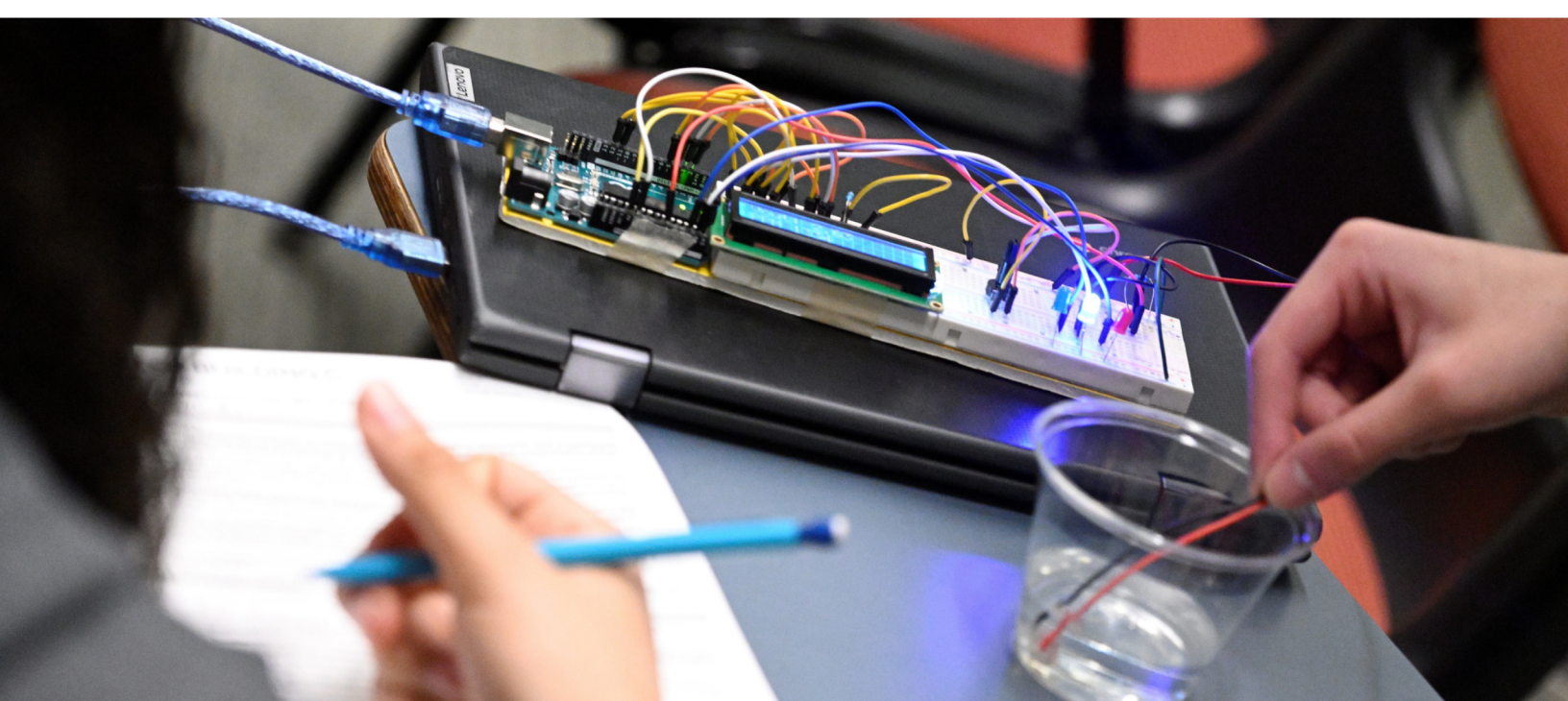
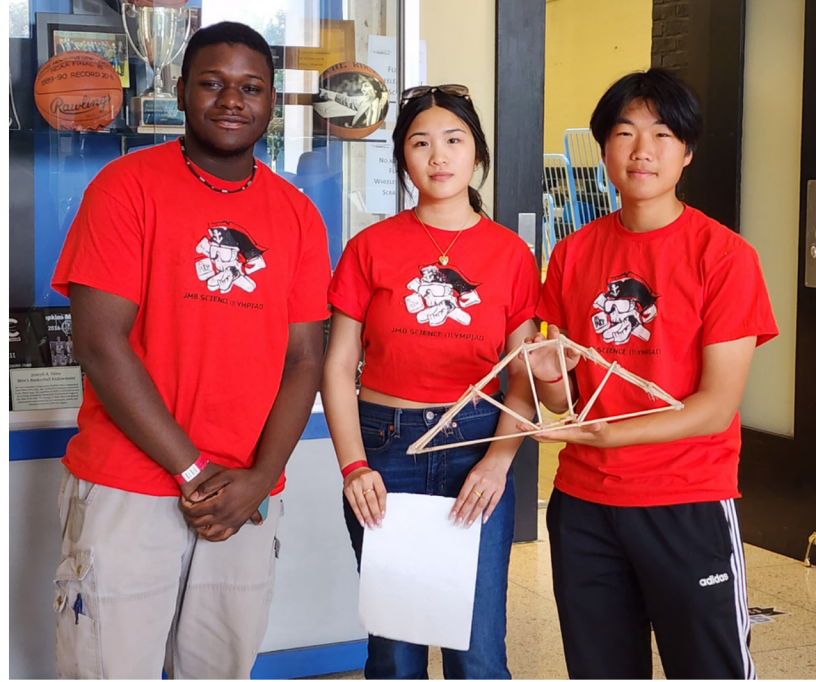
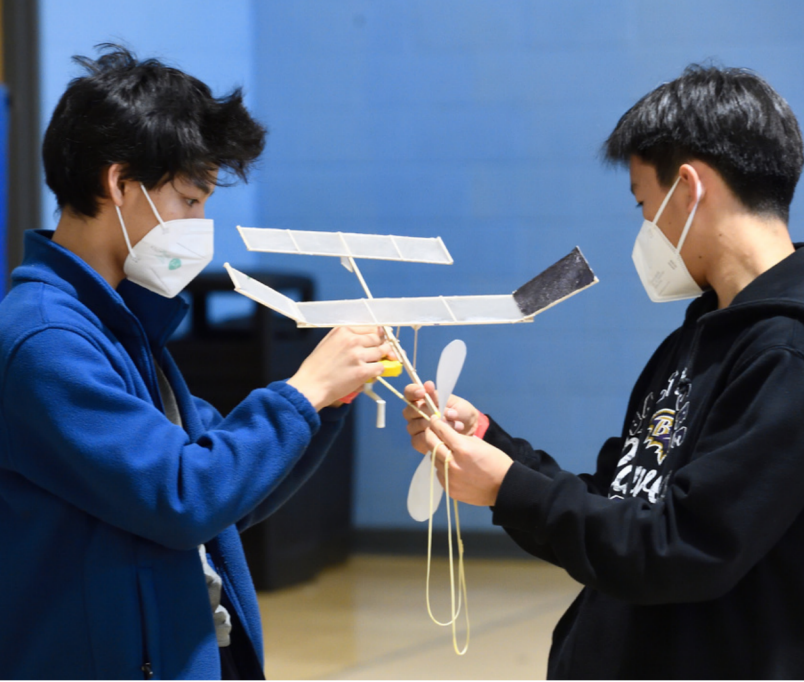


Awards and Honors

Recognizing Exemplary Outreach and Community Service

IRINI J. MAROULIS AWARD

This award was established by Maria Maroulis Cunningham (WSE '97, MME '01) to honor the memory of her mother, Irini J. Maroulis, and her dedication to community service and outreach. Each year, an outstanding female engineering student is recognized with the honor and this year's awardee was Civil and Systems Engineering undergraduate student Kristen Corlay Sanmiguel. <https://engineering.jhu.edu/news/whiting-school-honors-recipients-of-2023-teaching-and-mentorship-awards/>



Meet Our Team

Our team is comprised of former informal and formal K-12 educators, engineers, and champions for STEM education. We are passionate about using our unique skills and experiences to deepen our impact and serve as changemakers in the STEM education ecosystem in Baltimore City and beyond.

FULL TIME STAFF:



Alisha Sparks
Interim Executive
Director



Margaret Hart
STEM Outreach
Advisor



Adrienne Bantum
Budget Specialist



Katie James
Elementary Science
Curriculum Writer



Alexis Daniels
Baltimore OST
Program Manager



Liz Jenkins
Henderson-Hopkins
Math Tutorial Program
Manger



Amanda Valledor
STEM Outreach
Program Manager



John Van Beckum
Barclay Program
Manager

PART-TIME STAFF:

Emily Henkes Callahan - SABES Instructional Coach
Alli Reigel - BOAST Content Developer and Instructional Coach
Dr. Jaracus Copes - BOAST Hybrid Instructor

Benjamin Eric Roberts - BOAST Hybrid Instructor
Nantambu Kohlbatz - BOAST Hybrid Instructor
Tyair Manning - BOAST Hybrid Instructor

Partners and Sponsors

We could not do our work without the vital support of our current and former community partners and sponsors.

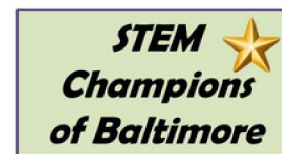
Thank you to all of our supporters and champions!

**BALTIMORE CITY
PUBLIC SCHOOLS**

**HENDERSON
HOPKINS**



Student Affairs
Center for Social Concern



**NORTHROP
GRUMMAN**



National
Science
Foundation

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A B E L L
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F O U N D A T I O N
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JOHNS HOPKINS
ALUMNI ASSOCIATION

Acknowledgements

Photo Credits: Will Kirk, Phil Laubner, Liz Bonilla, Greg Stansbury, Hartlove-Goodyear

Program Map Illustration: Amanda Valledor



We also thank our wonderful volunteers, faculty, staff, students, and JHU campus partners who make our programs and events possible!



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Center for Educational Outreach

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Johns Hopkins University

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STEMOutreach@jhu.edu

