

SUMMER 2022



STEM MIDDLE SCHOOL EXPLORERS 2022

KEY PARTNERS AND FUNDERS

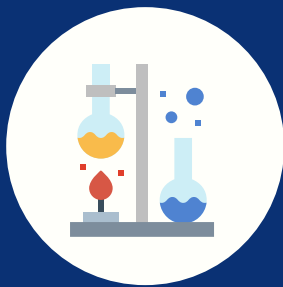
RUTGERS

New Jersey Agricultural
Experiment Station





PROGRAM OVERVIEW



LEARN ABOUT STEM

Millhill hosted the STEM Explorers Summer Program in person for 22 middle school students in Trenton. Students were engaged for 6 weeks in science lessons, creative activities, and experiments learning about nature, robotics, biomedical science, computer science, and engineering. Students went on field trips to the Liberty Science Center, The College of New Jersey (TCNJ) Robotics Lab, and Rutgers STEM Labs.



LEARN ABOUT YOURSELF

Students learned important social-emotional skills in lessons focused on knowing the their Strengths, Growth Mindset, Appreciating Different Perspectives, Teamwork, Empathy, and Disagreeing Respectfully.



LEARN FROM THE PROS

We thank Rutgers Cooperative Extension for introducing the youth to so many talented scientists. We also thank the science mentors from TCNJ, Rochester Institute of Technology, and the University of Richmond who coached and developed our STEM Explorers.

Our Goal: We are committed to a long term goal of building a pipeline of minority scientists coming from Trenton. Enjoy the report!

DEMOGRAPHICS



STEM
EXPLORERS

SEX

11



11



RACE/ ETHNICITY

19 AFRICAN AMERICAN

2 HISPANIC

1 MULTI-RACIAL

GRADE

7TH

8

8TH

11

9TH

3

INCOME

20/22

ARE LOW/VERY LOW
INCOME LEVEL

PROGRAM HIGHLIGHTS

We implemented the STEM Explorers Summer Program using the following core elements to ensure a dynamic and fun summer of science and social emotional learning for our youth.



EXPERIMENTS

Through creative hands-on experiments youth learned fundamental science concepts and discussed how it applies to the world around them.

Youth visited the Liberty Science Center, Watershed Institute, TCNJ Robotics Lab, and Rutgers STEM labs (Biotechnology, Biochemistry, Microbiology, and Engineering) seeing science in action.

FIELD TRIPS

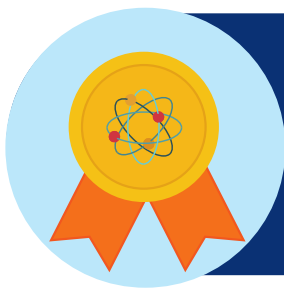


UP TO \$300 STIPEND

Youth received a stipend for their attendance and participation, earning up to \$300. For many it was the first check they ever received.

Rutgers hosted outstanding scientists who engaged with the youth in an inspiring way. College students from TCNJ, University of Richmond, and RIT mentored the youth.

SCIENTISTS & MENTORS



SCIENCE EXPO

The STEM Explorers created posters highlighting their summer experience and shared it with with 100 guests which included family, teachers, and funders. Everyone was so impressed!

1

WEEK

SOCIAL EMOTIONAL LEARNING

The STEM Explorers were introduced to social emotional learning, by discovering their strengths, appreciating different perspectives, and showing empathy to name a few. These skills will serve them well as they advance in school and life.



TEAMWORK

Princeton-Blairstown Center visited the Explorers! Through hands-on outdoor and indoor activities they learned about teamwork, collaboration, and thinking outside of the box to solve problems.

RESPECTFUL DEBATE

Explorers learned how to disagree respectfully by practicing with their fellow Explorers and learning different types of communication styles.



THE STEM EXPLORERS DEVELOPED THESE SKILL AREAS THROUGH THE 6-WEEK PROGRAM

SOCIAL EMOTIONAL LEARNING

"A growth mindset is when you have a strong mind and think about positive things. I learned that when you think positively, you'll have a better attitude and think better." - Aniyah



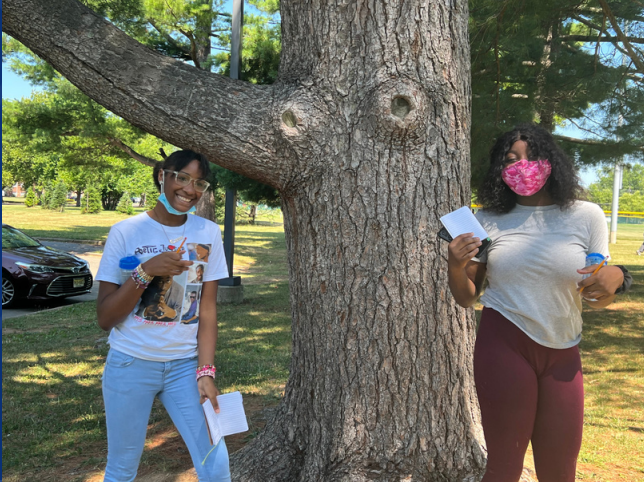
Strengths
Growth Mindset
Empathy
Appreciating Different Perspectives
Disagreeing Respectfully
Teamwork

2

WEEK

NATURE

Educators from the Watershed institute took the youth on a week-long nature journey. They identified different types of trees at Moody Park, competed to see who could build the best model dam, walked through the butterfly garden, and learned about the water cycle.



YOUTH FEEDBACK

"I found making the water dam interesting because we had a great team and we had to work together effectively to create the best dam." - Isaac

LIBERTY SCIENCE CENTER

The Explorers were able to see exhibits on the earth's energy, environmental preservation, view microbes through stunning artwork, visit a paleontological dig, and see over 100 animals. It was a memorable trip!

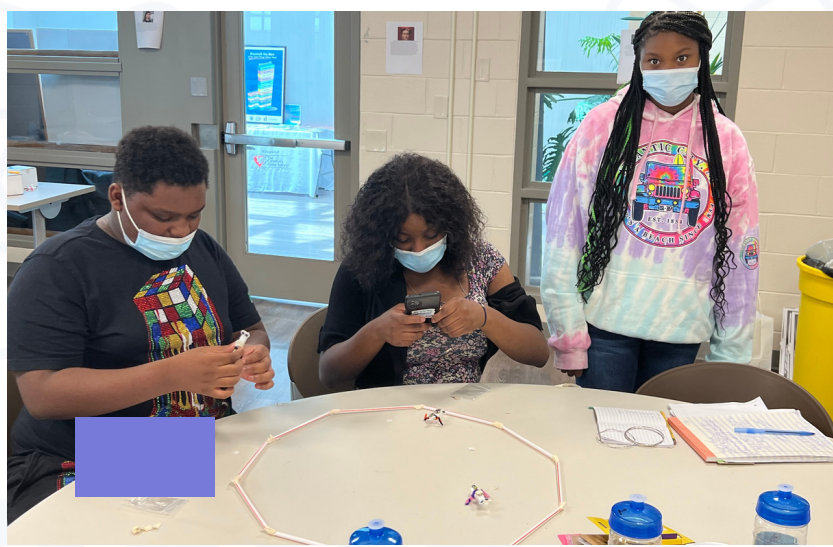


3

WEEK 3

ROBOTICS

The youth built solar-powered cars, brush bots, and wind-up toys of their own creation, and learned about motors, energy, and motion. They also visited Dr. Kim's Robotics Lab and learned what college students are doing with robots.



YOUTH FEEDBACK

“This week, I used different perspectives because today, we made different items/creatures using the motors from the wind-up toys, and not everyone had the same idea so we all used different perspectives.” - Aniyah

THE COLLEGE OF NEW JERSEY

“Thank you Dr. Kim and students. You guys helped me learn that I like robotics more than I thought from playing with Baxter the robot controlling tic tac toe.” - Timothy



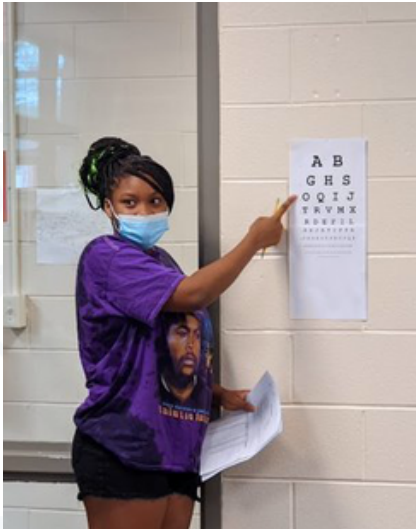
STEM Explores enjoyed the trip to TCNJ and learned so much about what a college campus has to offer!

4

WEEK 4

BIOMEDICAL SCIENCES

Explorers calculated their vision on the 20/20 scale, built a bionic arm, mimicked the structure of the lungs by using balloons, and learned what biologists do on a daily basis!



RUTGERS UNIVERSITY

"The thing I personally enjoyed the most at Rutgers Microbiology Lab was when we were trying to find out which water had protein. It was my favorite because later in the tour we saw that the tools we used were very important tools other engineers used too, so it made me feel as if I was an actual engineer." - Tionna



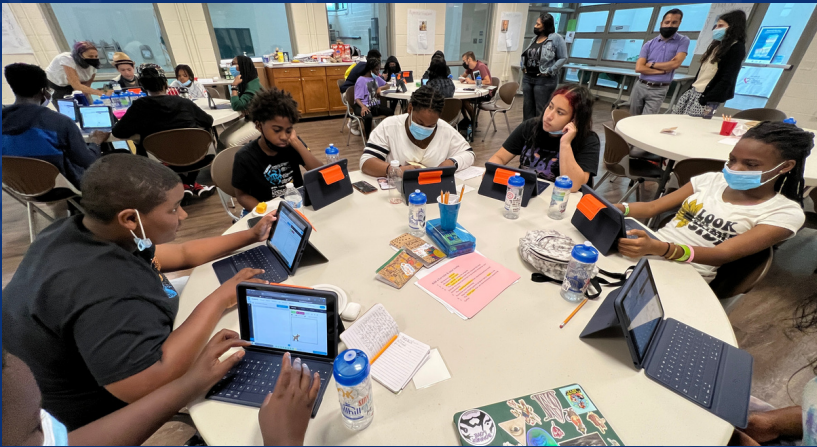
STEM Explorers standing in front of the collagen sculpture with Dr. Nanda who taught us a lot about proteins.

5

WEEK 5

COMPUTER SCIENCE

STEM Explorers wrote code, learned how machine learning differentiates two things from one another, created binary code jewelry, and created an algorithm of a drawing!



YOUTH FEEDBACK

"What I found really interesting was Karel coding because I got to code and make my own thing like a house out of balls by coding and I really might get into coding more." - Timothy

RUTGERS BIOCHEMISTRY LAB

"Thank you Dr. Bromberg. You and your students did an amazing job explaining and showing us the wonders of computer science." - Megan



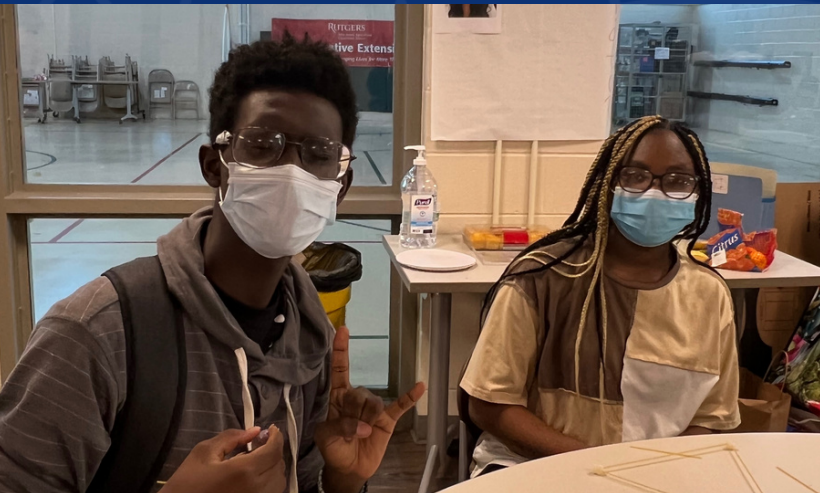
"One SEL skill I used this week was teamwork. When me and Tionna went through all the coding at Rutgers, we took turns." - Losene

6

WEEK 6

ENGINEERING

Engineering week featured a trip to the Rutgers water research labs and using Tinkercad to make 3D model buttons. Explorers also created structures made of spaghetti and gum drops to stand against an earthquake simulator.



YOUTH FEEDBACK

"I was very interested in making a house that survives an earthquake. I never knew how important studies were for us to have a safe living condition during such natural disasters." - Tionna

RUTGERS Engineering Lab

"Thank you for sharing your work and experiments with us. I enjoyed the feeling of being in your shoes and getting to experience things you guys do everyday to help New Jersey get clean water." - Hannah



"The thing I enjoyed most was the machine where they made waves with the water." - Dayonna



WEEKLY VIRTUAL FIELD TRIPS

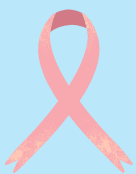


SANDIA NATIONAL LABORATORIES

This lab offers technology solutions to our nation's national security issues. Through the tour students learned of the many challenges being thoroughly research by scientists in many different careers.

The BMW Leipzig Plant is one of the most modern and sustainable car plants in the world. Robots are used to to manufacture cars with little human intervention and produce 960 vehicles a day. The youth were amazed.

BMW I3 FACTORY

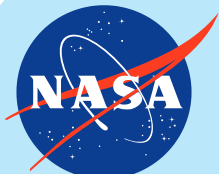


CENTRE FOR CANCER IMMUNOLOGY

In Spring 2018 the University of Southampton in the UK opened this Centre which is connected to leading institutions worldwide. This enables interdisciplinary teams to explore new areas and develop lifesaving drugs in the biomedical space. That's the power of teamwork.

This is the world's largest collection of historic computers, from the 1940s to mainframes of the 1960s and personal computing in the 1980s. With how far we've come in the computing age, our students were able to program on hand-held tablets!

THE NATIONAL MUSEUM OF COMPUTING



NASA JOHNSON SPACE CENTER

We explored a variety of unexpected roles and functions that lend to the development of complex projects, like the Starliner/CST-100. Students were exposed to the unusual paths that led to these unique engineering careers.

MINORITY INNOVATORS

Each week we highlighted African American and Latinx innovators who are doing pioneering work in the sciences. Here were some of their favorites.

EPHRAIM OYETUNJI



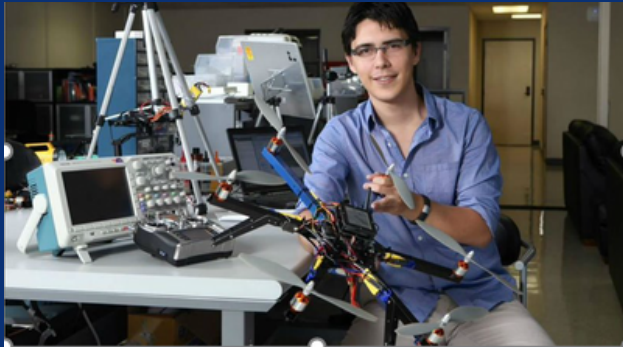
At age 17 Ephraim studied the effects of caffeine on fruit flies and found it helped improve motor function & reduced neurodegenerative effects. He plans to do research to help patients with Alzheimer's and Dementia.

STEPHANIE CASTILLO



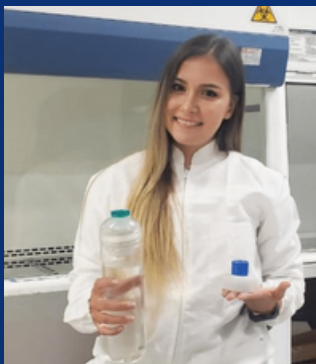
Stephanie is co-founder of Latina Girls Code, an organization that provides education and mentors to girls to spark their interest in technology.

JORDI MUNOZ



Jordi hacked the sensors on the controller of his Wii, wrote code, and gave birth to the first autopilot drone. He is co-founder of the largest US-owned company of commercial drones.

MARIA TAMAYO



At 24 years old Maria developed a device that eliminates bacteria, bringing safe drinking water to Columbians in rural and poorer communities.

AYANNA HOWARD



Ayanna is the Dean of engineering at Ohio State. She worked at NASA's Jet Propulsion Laboratory and is the nation's most senior AA female robotocist in higher education.

SCIENCE EXPO

The STEM Explorers created posters and shared what they learned this summer with 100 family members, teachers and funders. What a great showcase of science in action!



HARD WORK

Students spent quality time making sure their posters were filled with their favorite activities and lots of pictures! Some even brought samples of their experiments to display.

ALWAYS

The memories made throughout the program will always be remembered and cherished!



STEM
EXPLORERS
SCIENCE EXPO 2022



PAYS OFF!

In the end our students spent 6 weeks learning about everything STEM has to offer and will continue to learn more as they grow!

PROGRAM OUTCOMES

THE STEM EXPLORERS REPORTED HIGH SCORES IN SCIENCE KNOWLEDGE AND CAREERS IN STEM.

94%

OF THE YOUTH FELT THEY GAINED SCIENCE KNOWLEDGE FROM THE FIVE SCIENCE TOPICS COVERED DURING THE PROGRAM

94%

OF THE YOUTH AGREED THEY HAVE GAINED INVESTIGATIVE SCIENCE SKILLS FROM PARTICIPATING IN THE PROGRAM

89%

OF THE YOUTH AGREED THAT THE PROGRAM MADE THEM AWARE OF CAREERS IN STEM

82-88%

OF YOUTH REPORTED THIS LEVEL OF AWARENESS AND UNDERSTANDING OF STRENGTHS (82%), EMPATHY (85%), AND GROWTH MINDSET (88%)

93-100%

OF YOUTH REPORTED THIS LEVEL OF AWARENESS AND UNDERSTANDING OF TEAMWORK (93%), DISAGREEING RESPECTFULLY (93%), AND APPRECIATING DIFFERENT PERSPECTIVES (100%)

THE STEM EXPLORERS LEARNED VALUABLE SOCIAL EMOTIONAL LEARNING SKILLS.

"The thing I found the most interesting was that there was so much science under the tip of our noses. (Science of our surrounding nature) I found it the most interesting because it has shown me that I was underestimating our nature." - [Tionna, Trip to the Watershed Institute](#)

We asked youth...

WHAT WAS THEIR FAVORITE PART ABOUT THE FIELD TRIPS IN THE PROGRAM

"I enjoyed calculating what the machine learning robot was going to say such as Jaguar or a Leopard. I also enjoyed the fish tracking and to see what their mating box looked like." - [London, Trip to Rutgers Biochemistry Lab](#)

"The listening and observing nature activities were the most interesting, and the reason is because I find enjoying nature like listening to the grass or staring at trees fun and relaxing." - [David, Nature trip to Moody Park](#)

"I enjoyed making proteins, I enjoyed looking at cells, & I also enjoyed the students showing us their projects." - [Kaydence, Trip to Rutgers Biomedical Engineering Lab](#)

"I enjoyed doing the protein activity where we had to put water and some other substance into a tiny tube to see which one changes color, and the one that changes colors is the one with protein in it." - [Dayonna, Trip to Rutgers Biotechnology Lab](#)

"Me personally, I enjoyed all of it but I enjoyed how we got to use the computers to analyze the pictures of the animals. I also enjoyed how we got to have a picnic and look at the lake and have team bonding." - [Jacob, Trip to Rutgers Biochemistry Lab](#)



THANK YOU!

TO OUR PARTNERS AND FUNDERS

