

How middle school girls are learning engineering

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Jenesis Brooks of Southfield is interested in engineering and she's had the chance to try some of it firsthand.

Last year she used mechanical toys known as K'Nex to build a roller coaster.

"We've also built drones and we've flown a little mini drone," she said. "We've created a lie detector. We've done many experiments with how things move and basically different forms of elements."

Jenesis is a seventh grader at Berkshire Middle School in Beverly Hills. She's one of more than 100 young women involved in the [Girls in Engineering Academy](#), a project of the Engineering Society of Detroit.

The program targets girls, beginning in middle school, who are interested in careers in science, technology, engineering or math — collectively known as STEM — which have long been dominated by men.

The girls attend a four-week summer session on a college campus, either Oakland University or Eastern Michigan University, where they stay in dorms, attend classes and work on group projects.

They also attend courses two Saturdays each month during the school year. Those classes were typically held at Wayne State, though with COVID-19, they've been conducted remotely.



Jenesis Brooks, 12, one of the students in the Girls Engineering Academy program poses for a photo at her home in Southfield, Mich. on Feb. 12, 2021. *Junfu Han, Detroit Free Press*

In addition to hands-on projects, the program also stresses computer coding.

"These 12-year-old girls are learning about all the algorithms of coding," said program director Gerald Thompkins. "They're learning computer languages like HTML, Arduino, and C++. They're learning web design. We've got a lot of engineers who don't know how to code, so here we have 12-year-old girls learning how to code and to put programs together using their laptops."

Another language in which the girls must excel is English.

"We do want engineers to be able to articulate their ideas, both in writing and verbally," said Thompkins, a former associate dean of the College of Engineering at Wayne State. "Engineers get a bad rap about being poor communicators. We want these girls to be able to write well. We want them to be able to get in front of a group and make a presentation."

Thompkins said the Engineering Society of Detroit launched the program in 2017.

"Once we started looking at the data, the data was extremely alarming," he said. "We saw that there was a huge disparity between males and females going into engineering."

Thompkins said data compiled by the American Society for Engineering Education shows that of the 112,036 engineering degrees awarded by American colleges and universities in 2019, men outnumbered women by more than three to one.

"Seventy-seven point five percent of those bachelor's of science degrees were awarded to men, 22.5% were awarded to women," he said. "If you look at those numbers by ethnicity, it becomes really disturbing."

Thompkins said that in 2019, just 159 of those degrees went to Native American women. African American women earned 1,439. Latino women earned 3,494 degrees and Asian women earned about 5,100.

The other 16,420 women to earn those degrees were white, he said.

The girls pay \$200 a year to register for the academy. Thompkins said he wants families to have "skin in the game" when they enroll, without putting it out of reach of low-income families.

The fees don't cover the roughly \$150,000 a year it costs to run the academy, which relies on sponsors like Ford Motor Co., Fiat Chrysler Automobiles (now Stellantis) and Denso as well as colleges like Wayne State, Eastern Michigan, Oakland and Lawrence Technological University.

In addition to sponsoring the academy, Ford recently donated 40 new laptops to help students upgrade their technology and stay connected.

“Many students simply do not have access to the tools and support they need to further their education in math and science, especially as the pandemic persists,” said Randy Strawsine, STEM lead for Ford. “We’re proud to donate these laptops to the Girls in Engineering Academy and strengthen our commitment to STEM education, especially for underserved students throughout Detroit.”

Academic benefits

Jenesis said she's benefited from the academy.

She acknowledges she's still a little shy, but she's seen improvements in math, science and language.

"I definitely learned a lot. It's helped me stay on top of my classes and basically know more than most of the other students," she said. "There are times where they're introducing new topics to other students and I already know what the topic is about and how to do it."



Jenesis Brooks, 12, one of the students in the Girls Engineering Academy program poses for a photo at her home in Southfield, Mich. on Feb. 12, 2021. *Junfu Han, Detroit Free Press*

Her father, Jomar Brooks, said he's noticed the improvement in his daughter's academic work.

"When she signed up, she was actually lacking in math at that particular time," he said. "It actually improved her math skills and now she's in honors math."

Her mother, Zakiyah Brooks, said she saw an advertisement for the program and was sold immediately.

"I thought, man, what a fantastic opportunity to give my girl a boost and really start to tap into some of those STEM type areas since it's certainly the wave of the future," she said. "She currently maintains a 3.7 GPA, with her advanced math class so she's doing extremely well and I credit a great deal of it to the GEA program."

Jenesis hasn't settled on a career path yet, but she likes both engineering and animation so she's considering video game design.

The academy is entering its fifth year and the first group of students to enroll are now in high school.

"There's a lot of things that I've learned that have gotten me into more advanced classes so far in ninth grade," said Joie Blakey of Detroit, a Mercy High School freshman who was a member of the first class.

Verbal skills

Joie's mother, Carla Blakey, said her daughter was always good at English, but she appreciates the emphasis on writing and speaking.

"I was very glad that they had that," Blakey said. "She wasn't as excited because they actually have to do presentations. She doesn't really like doing presentations, but it forced her to do them and now she does them very well."

Joie said she was always interested in building things. Even before she joined the academy, she constructed a vending machine out of cardboard from a design she's seen online. When she learned about the academy, she was immediately sold.

"I was in fifth grade so I thought it was just like the best thing," she said. "I was really into making things at home by myself and we did a lot of building and designing. I wanted to draw, so I thought it was really fun and the teachers and everything and the people are really nice."

Role Models

Thompkins said the teachers teach by example as well as by project.

"I'm the only male associated with the program because of my experience and background in engineering education," he said. "All of our other instructors, our teaching assistants, are female engineers or engineering majors or math majors. Some are biology majors. It depends on, you know, what we're looking for."

That's by design, Thompkins said.

"We want these girls to see other females that are close in age as role models," he said.

Valentina Vargas, 19, of Clarkston is one of the instructors. She's a sophomore at Michigan State studying mechanical engineering.

Vargas enrolled in a special STEM program at her high school, which helped her prepare for college. She also draws on her experience competing in robotics, but that stuff came in high school versus the middle school start these girls are getting.

"I definitely would have loved a program like this," she said.

Vargas said the girls have impressed her with questions about her own work.

"They start asking some complex questions," she said. "What type of motor controller do you use? What kind of programming languages do you use?"

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