

Montgomery middle-schoolers ‘invent the future’ in unique STEM program

In a course exclusive to the Maryland county school system, students invent objects they think would improve life on the planet



By [Nicole Asbury](#)

May 26, 2023 at 6:00 a.m. EDT

Bethel Dawit and Selihom Gizaw were focused as they ran the shoelaces through their cardboard sneakers. They were finalizing a prototype for their invention: a pair of shoes with trackers to help find people when they go missing.

The two Parkland Middle School students had seen posters of missing people on their Instagram feeds, and they thought they could help solve the problem by placing trackers in shoe soles. They knew their peers were into buying shoes after seeing the popularity of Air Jordans and Crocs, they said, and they wanted to create something that would gain the same traction.

“I didn’t think we would do something good,” Selihom, 12, said.

Selihom and Bethel are a part of a cohort of roughly 2,000 middle-schoolers in Montgomery County who are brainstorming inventions that answer the question, “What will you make to improve life on the planet?” The challenge is part of an educational program called “[Invent the Future](#)” — a partnership between a Bethesda-based nonprofit called the KID Museum and Montgomery County Public Schools.

Over the course of a semester, the middle school students engage in hands-on learning about engineering design, 3D modeling and coding, and then apply those technical skills to create their own invention. The program’s goals are to teach students how to innovate, problem-solve and collaborate to fix serious human problems. The middle-schoolers work together in small groups to research an issue, write a pitch and create prototypes of their proposed solution.

Over the years, students have created prototypes that target issues like food waste, pollution, bullying and domestic violence. Previous student projects have included a pencil that could be used to record bullying and alert parents, and a new type of bridge that could help alleviate traffic around the D.C. metro area.

“It’s a place that students really continue to see themselves and engage in this collaborative, dynamic way of learning,” said Cara Lesser, founder and executive director of the KID Museum.

A version of the educational program piloted in 2014 as “Invention Studio” at Parkland Middle School, but it expanded in 2017 into a school system-wide STEM competition. The school district directly funded the highest-needs schools in the county to participate in the challenge either through an after-school club or as a class, Lesser said. The bid in 2017 was competitive; since then, the school system has awarded a contract with the KID Museum through a single-source contract.

But roughly two years ago, the program expanded again to a full elective course that middle school students can enroll in, similarly called “Invent the Future.” The elective course is exclusive to the Montgomery school system, though there are plans to expand it to other schools.

The organizers behind the program developed the course to remove some of the barriers to STEM education and after-school programs. The program prioritizes the highest-needs schools, and when a school opts in, the school district and the KID Museum work together to recruit students who may not identify as “a STEM kid,” Lesser explained.

“There is a real racial equity gap across socioeconomic divides in terms of students participating in rigorous advanced coursework,” Lesser said. “This program is really intentionally looking to combat that and ensure that students aren’t closing off options.”

A survey conducted through the program shows the effect it has on students: About 75 percent of them report being interested in pursuing a STEM career, and 73 percent show an increase in critical thinking. Eighty-nine percent of teachers said their students demonstrated increased perseverance.

The elective course is divided into two units, said Alyna Raynovich, who teaches the “Invent the Future” class at Parkland. During the first unit, students receive in-depth teaching about the engineering design process step by step. They end the first unit with a mini project, where the teacher of the course assigns a problem and the students have to create a solution. During the second unit, the students launch into the project for the “Invent the Future” competition where they decide the problem they want to solve and their subsequent solution.

In between, the students make four visits to the KID Museum. The first three visits are workshops that focus on building technical skills such as coding, but the fourth and final visit is dedicated to students continuing working on their project. The program finishes up this year on June 3, when students showcase their ideas at the Universities at Shady Grove. They can also choose to have their projects judged by professionals and get feedback on their work.

During Parkland’s fourth visit in May, many of the students were working on applying the finishing touches to their projects. About 30 students pulled out hot glue guns and cardboard to keep building. The room was filled with chatter that switched between English and Spanish as the small groups refined their pitches. Their projects included a machine that provides food and water to stray animals in Latin American countries, a robot that provides comfort to people dealing with family issues or family violence, and a robot that identifies gang activity by looking for key colors to alert the police.

And all of the prototypes were made by sixth-graders.

Talia French and Stephanie Morales Mendoza, both 12, were building a machine that could compost meat by using heat. It also had a ventilation system so that it wouldn't smell as the meat is composted, and it could be powered by batteries or solar panels, they explained. They chose this project because they've seen restaurant staff and other people throw away food when it could be used to help the soil and other plants, they said.

Both Talia and Stephanie said they had been interested in building things before, but they were too shy to share their ideas with other people.

"This is like a really grand step for me to work with a partner, to speak in front of the class," Stephanie said.

In another part of the studio, Clinton Nguyen, Efren Maldonado and Dominic Murphy — all 12 — were finishing writing their pitch on a camera that could be attached to school walls to detect bullying. The camera would send an alert to an administrator's phone that a student needed help.

They explained that they chose the project because they have occasionally witnessed bullying at school, and they knew the impact it has on middle-schoolers' lives. "It causes a lot of trauma and depression," Clinton said.

"And also nobody is doing anything about it," Dominic added.

"Sometimes they are, but it's not that good," Clinton continued.

Often times, the groups pick projects that reflect issues that they have witnessed or are ongoing in their lives, said Raynovich, the classroom teacher. Parkland also has a lot of students who are children of immigrants and who often tell stories of the issues they witnessed while visiting their parents' hometowns.

"They definitely do a good job at picking problems that are relatable to them," Raynovich said.

Selihom and Bethel said they expected the class to be boring when they initially enrolled, but it's been the opposite. They both realized how "hard it is to be an engineer," Bethel said. They said that if they finished their project in the future, they would sell the shoes for \$50.

