

# Inspiring Students to Become Idea Builders Through Embedded STEAM Lessons



## Union City School District provides multiple entry points to STEAM for inner-city students

The progress Union City School District (UCSD) in Union City, New Jersey has made as a Title 1 district with 98 percent minority enrollment is no secret. Nationally known for an above-average graduation rate, UCSD leaders credit much of the district's success to a mission for technology equity.

Marcos Navas' role as a K-12 technology facilitator for the Union City Board of Education is to continue pushing the envelope. He contributes to the district's success in educating a future-ready student body. Navas identifies and implements new opportunities for students to practice a design-thinking approach to learning.

STEAM instruction at UCSD often begins – but certainly doesn't end – in one of the district's newly constructed makerspaces. Navas began testing new possibilities for hands-on learning around the same time he began bringing his own Dremel 3D Idea Builder printer to the classrooms he frequents.



Navas and the district's other technology facilitators were instrumental in developing makerspaces in high school, middle school and elementary school buildings.

"I threw myself into the world of 3D printing quickly, but it's been very exciting," Navas said. "Sometimes [3D printing] leads students to think outside of the box and ask, 'why not?' which is much needed in education."

The Union City Board of Education has since created a breakout course that integrates computer-aided design (CAD) and 3D Printing, and he's helped lead a district-wide summer STEAM camp and "maker faire." Navas, who designed and coordinated the program, believes opportunities like these allow students to embrace failure as an opportunity to ask, "why?"

"3D printing has become the students' go-to for solving almost any problem", Navas said. "And if it doesn't work, it's O.K."



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## Nurturing Imagination, Building Confidence

Navas' approach for infusing STEAM curriculum from elementary school to high school evolves from the top down: Navas considers the application of the lesson he's designing, and then builds the steps to work toward that end goal.

As a technology facilitator, Navas provides avenues for students to tinker and explore learning more independently. He facilitates these opportunities in a number of ways. One method is by training teachers to use technology in their daily lessons.

For example, Navas helped high school algebra students print 3D representations of equations so they could visualize and conceptualize problems in the physical space.

"3D printing is motivational tool for students," Navas said. "When they can actually bring something they've worked on to life and hold it, it gives them a reason to keep learning."

Navas also designed an elective course for the district's freshman academy. The topic, Ancient Wonders of the World, enables students to explore history through recreating and imagining the physical world through CAD and 3D printing.

"STEM is not a separate subject or time set aside for students to play with kits and tools," Navas said. "It's embedded into all curricula, so students can explore practical solutions for real-world problems."

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During the summer, students in third through sixth grade can enroll in Union City's free Summer STEAM Camp, organized by Navas and his colleagues. In the camp's third summer, students built a hydroponic system with 3D-printed parts using the Dremel Idea Builder. The system filtrates water that can be reused for future watering cycles.

“We introduced students to hydroponic systems to explore sustainability in an urban environment,” Navas said.

According to Navas, the endless applications of 3D printing motivate students to take lead in their own projects. To facilitate the transfusion of ideas among students, teachers and parents, students attending the Summer STEAM Camp participate in the end-of-course maker faire.

“As an educator, it’s a powerful moment to watch students proudly showcase what they’ve made and accomplished,” Navas said. “I’ve seen students become rigorous problem-solvers and take learning past the limits.”

#### **Future ‘Idea Builders’**

Navas believes 3D printing has encouraged students of all ages and backgrounds to reimagine possibilities for learning.

“There’s nothing quite like the first time a student sees a 3D printer in action,” he said. “It’s an ‘eye-popping’ moment for students, especially those who haven’t had exposure to new technologies like 3D printing.”

**“We are putting the fun back into the classroom”, Navas said**

Because UCSD is home to a large population of bilingual students, many of who emigrated from Spanish-speaking countries, Navas believes 3D printing helps capture different ideas and perspectives.

"Students from other countries think differently because their society is different," Navas said. "They're coming up with new ideas that we as educators wouldn't see in the traditional classroom."

Students with learning differences are no exception. Navas has seen these students gravitate toward the "world of imagination" in CAD.

"3D printing has motivated students who are challenged in the general education setting to make suggestions, and even lead class," Navas said. "We've even seen a decrease in discipline problems because students truly want to learn with this technology."

For Navas, there's just one true common denominator for inspiring students with STEM.

"We're putting the fun back into the classroom, and building ideas together."

**"3D printing has motivated students who are challenged in their general education setting to make suggestions and even lead class"**



## About Dremel

Founded in 1934, Dremel is the industry standard in leadership and excellence for versatile tools systems. The Dremel 3D Idea Builder expands the brand's reach from the workshop to the classroom to provide educators and students with cutting-edge technology for STEM education. Built upon the brand's dedication to empowering makers through creativity, precision and project enjoyment, the Dremel 3D Idea Builder nurtures student confidence by giving them a tool to design and build their own models to understand lessons. With available curriculum to draw connections between 3D printing and instruction, Dremel is providing educators with the support they need to transform classrooms. Learn more about classroom applications and curriculum-based learning at [3dprinter.dremel.com](http://3dprinter.dremel.com).

