



Educator Case Study

INSPIRED BY INVENTEAM EXPERIENCE, TEACHER BUILDS PATHWAY OF INVENTION AT TUSTIN UNIFIED SCHOOL DISTRICT

Eight years ago, Eduardo “Ed” Hernandez applied for a grant to start a 3-D modeling class at Tustin High School in Tustin, Calif. The school, which Hernandez calls “a good snapshot of the state of California” with almost half of the students being Hispanic or Latino and with a large free and reduced lunch program. The 3-D modeling class, he believed, would be the perfect gateway to the world of invention. “A lot of students today don’t know how things work. We’ve become a nation of users instead of makers and doers,” says Hernandez, who has a tinkering workshop at home.

“ I wanted to foster curiosity in students to want to figure out how something works. ” – Ed Hernandez

Hernandez, educated as an electrical engineer, exited the corporate world 14 years ago because he didn’t find his job fulfilling. He pursued a master’s degree in education and began teaching. “I didn’t know if I was going to be any good at it, but I knew problem-solving was my favorite thing” and says he wanted to share that passion with students.

That’s what brought Hernandez to the Lemelson-MIT InvenTeams initiative. Tustin High engineering students had been doing problem-solving with its 3-D modeling for a few years, even creating a prosthetic hand for a middle school student in the district. Hernandez felt it was time to level up. “I was lucky in that the Tustin Unified School District historically has been very forward thinking in its approach to technology and STEM education,” even allowing Hernandez to start the T-Tech Academy within the high school. MIT, as the pinnacle of STEM education, would open even more doors for the district and his students. “My students were familiar with project-based learning, so I wanted them to have the opportunity to go out there and compete at a higher level,” he says.



Hernandez was selected as a Lemelson-MIT Excite Award winner in 2015 and 2016, after missing out in 2014, and traveled to MIT twice for the Lemelson-MIT Program's annual EurekaFest to see prototypes developed by high school and college students solving real-world problems through invention. He was so inspired by the EurekaFest experience that in the summer of 2016, he and his students applied for a \$10,000 Lemelson-MIT InvenTeam grant. At the start of that school year in September, the Tustin High School InvenTeam learned their idea for a device to remove gum from sidewalks and other concrete surfaces had qualified them as a grant winner. They presented their invention at EurekaFest in June 2017.

With his high school students well on their way to excellence in STEM after participating in InvenTeams and his T-Tech academy where he teaches engineering, Hernandez focused turned to the district's middle school students.

“ I’m excited to get into the younger grades because I’ve realized that by the time students get to high school, they have already chosen a path, especially young women. As a country, we are struggling to get more women into science, technology, engineering and math. If we don’t catch the youth in middle school, we now know it’s kind of late. ” – Ed Hernandez

Enter the Lemelson-MIT JV InvenTeam curriculum, which was created for students in grades 6-10 to hone their hands-on skills and enrich their STEM education through invention-based design activities. Tustin Unified School District had four middle schools participating in the initiative during the 2017-2018 school year and Hernandez, recently drafted as a Lemelson-MIT Master Teacher, acted as advisor. The sixth, seventh, and eighth graders used the curricula to make electronic textiles and shoe soles while leaning the process of inventing.

Hernandez took the JV InvenTeam experience one step further and had the middle school students present their inventions alongside the



12th graders in the year-end Senior Showcase held at the high school's shop. "It worked out great. My [high school] students got to see some cool middle school ingenuity and the younger students got to see what they have to look forward to in high school," he says.

This school year, Hernandez plans to incorporate the shoe sole invention activity into his 11th grade Principles of Engineering class, where students will design a computer model of the shoe sole, 3-D print it, and make molds from that design.

Hernandez continues to be inspired by the spirit of invention at his school and among students he encounters through the Lemelson-MIT InvenTeam and JV InvenTeam programs. "I am incredibly honored to continue to be part of invention education and to mentor teachers who bring invention to their classes."

Seven of his nine InvenTeam students who graduated have gone on to pursue STEM careers in college. "They might not have chosen a STEM path were it not for what they did here with the InvenTeam," he says.

As he dives into another year of teaching, he continues to be impressed with how students approach problems and invent real-world solutions. "Students will surprise you. They have a higher level of ability than we often give them credit for. I've learned to take their input [when it comes to invention] and value it," he says.

LEMELSON-MIT
InvenTeams
lemelson.mit.edu