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Jim Lynch / Apple Valley High School

3D printing hub at Apple Valley High School

#### CASE STUDY

# Developing Futures in STEM

## 3D PRINTING BOOSTS A MINNESOTA DISTRICT'S K-12 LEARNING

Ten years ago Minnesota Independent School District 196 (District 196) was faced with poor academic performance and declining enrollment at Cedar Park Elementary School in Apple Valley. In an effort to improve performance, leaders of District 196 converted Cedar Park into a magnet school focused on engagement and skills in STEM.

After the transition, opportunities for students grew along with the number of parents eager for their children to attend an award-winning STEM school. The district decided to convert neighboring Valley Middle School and Apple Valley High School to create a K-12 path for STEM opportunities available to all students in the district.

## Building a Foundation

The ultimate goal for the district's three magnet schools was to develop students' proficiency by teaching STEM in every subject and class, preparing students for every career.

"A comprehensive STEM education includes a strong emphasis on hands-on, experiential and inquiry-based student experiences and activities. STEM knowledge activities are used not just in specific subjects, but throughout the entire school day," said Paul Olson, lead teacher for District 196 K-12 STEM. "3D printing has played a major role in our transformation from the very beginning."

The district's hands-on approach starts early, with students learning computer design to 3D print their own creations in the first years of their education. Students gain hands-on knowledge using the MakerBot Digitizer to scan their sculpted designs and print 3D models for various subjects including geography and human anatomy.

"Even in kindergarten and first grade, as they learn how to write, they 3D print letters and other new shapes and take them home to share with their family," said Ryan Erickson, coordinator of Cedar Park's Makerspace.

## Comprehensive Solutions

3D printing is key to STEM learning at all three magnet schools. Staff soon saw the need for a cohesive technology offering across facilities.

"We took stock of our 3D printer inventory and found we had seven different makes, which created problems for students and teachers in learning all the different interfaces," Erickson said. "We had some printers sitting idle because no one knew how to operate them."

Teachers discovered Fortus, PolyJet and MakerBot solutions met all of their requirements. Now Cedar Park Elementary has six, Valley Middle School has two and Apple Valley High School has ten 3D printers from Stratasys.

"The Stratasys platform is easy to learn, so our printers are busy throughout the day and long into the evening," said Jim Lynch, E3 STEM program manager at Apple Valley High School. "Now we are teaching STEM not in a silo but on a pathway that runs all the way from kindergarten to 12th grade. When our students go from elementary to middle to high school, they continue to work with the same products and interfaces."

## Top of the Class

"We've had kids that were barely hanging in there in school and 3D printing is what really lit them up and got them to the point where they were on the path to a high-paying career," Lynch said.



Two Apple Valley High School students watch the part they designed print.



Makerspace at Cedar Park Elementary School



Cedar Park Elementary School students designed adaptations for a prosthetic hand.

A decade after becoming STEM magnet schools, all three are highly sought-after. Cedar Park has also won five consecutive School of Excellence awards from the National Magnet Schools of America, and was honored by the Minnesota Department of Education as a Celebration School for their efforts to increase student achievement.



Cedar Park Elementary School students sculpt, scan and 3D print human anatomy models.

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