



Colorado Schools Enhance Project Lead the Way Program with Dimension 3D Printers

DIMENSION HELPS STUDENTS AND TEACHERS LEAD THE WAY

“In the past we’d talk with the students about how to make a prototype using a mill. The learning curve was fairly steep and time-consuming. With the Dimension 3D Printer, it’s just that much quicker and easier to generate a model. The technology allows the students to focus on design and engineering concepts.”

– Ken Cox, Teacher, Sand Creek High School

CASE STUDY



Colorado, with the highest average elevation of any state in the country, is best known for its mountain landscapes, world-class ski resorts, abundance of forest land and rivers for hunting and fishing. Colorado also has made a name for itself as a leader in education, boasting some of the highest average test scores for middle and high school students in the nation. Colorado’s success can, in part, be attributed to its participation in such innovative initiatives as Project Lead the Way (PLTW), the nation’s leading pre-engineering middle school and high school program.

PLTW is a national program that prepares students to be successful in engineering and engineering technology programs by exposing them to various facets of engineering and design disciplines. The program was founded in 1997 with the belief that introducing students to engineering at an early stage in their learning development would increase the number of students graduating post-secondary institutions with engineering degrees, as well as help stem the shortage of quality engineers entering the field.

Integrating Technology Tools into the Curriculum

PLTW courses taught in Colorado school systems provide students the tools to begin understanding the foundational concepts of engineering and design. Students, typically in their freshman or sophomore years, begin with the introductory courses, such as “Introduction to Engineering Design,” and progress to the culminating senior-level capstone course, “Engineering Design and Development.” Before PLTW, teachers spent much of their time teaching trade skills such as tooling, and other traditional metal and wood shop activities.

“Those types of skills were very useful at one point in time, but in today’s workplace, the emphasis is more on utilizing computer-related skills to get the job done,” Lehman said. “We began to shift from spending time in the shop to using technology tools that allowed us to focus more on teaching design and function.”

With participating schools in 45 states, Colorado owns the distinction as the first state west of the Mississippi River to implement the program. Today, Colorado boasts 33 middle and high schools utilizing portions of the PLTW curriculum, according to Bill Lehman, state director of PLTW in Colorado Springs, CO.

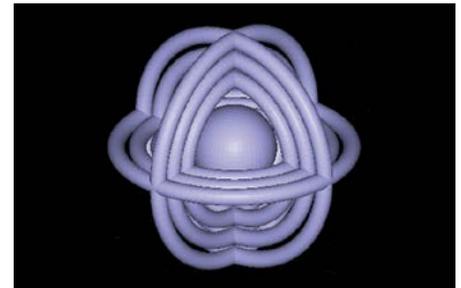
One of those tools was rapid prototyping. In his PLTW classes in Colorado Springs, Lehman used a local rapid prototyping service bureau to build models developed by students. The first course Lehman utilized the service provider for was the freshman-level “Principles of Engineering.”

“The models were generally crude and didn’t exactly convey the design intentions of the students,” Lehman said. “I knew there was a better way to generate models for the students, but prices for in-house rapid prototyping machines were more than our school district could afford.”

The Dimension 3D Printing Solution

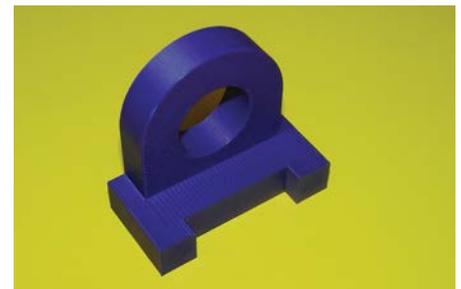
After researching other technology options, Lehman gathered together fellow Colorado Springs PLTW teachers to see a demonstration of the Dimension® BST 768 3D Printer. The Dimension BST 768 is a networked, desktop modeling system that builds functional 3D models with durable ABS plastic from the bottom up, one layer at a time.

Lehman and his colleagues were very impressed. “After seeing the demonstration, I knew the Dimension 3D Printer would be an excellent, in-house tool to bring the students’ design concepts to life,” Lehman said. “The price of the 3D printer had come down to a very reasonable level as well, compared to expensive high-end rapid prototyping systems. We could hardly afford not to do it.”



“The Dimension 3D Printers have not only let kids touch, feel and interconnect the models to their design concepts, but they’ve also helped students interconnect with what’s happening outside of these school walls. We’re very pleased with how well the printers have become a seamless part of our teaching process.”

— Bill Lehman
State Director of PLTW
Colorado Springs, CO



“The students hadn’t seen anything like it. My administration was equally impressed. To demonstrate what the printer could do, we printed pencil holder boxes for the counselors with ‘PLTW’ inscribed on the side as a reminder to promote the program to students.”

— Vanessa Stratton
PLTW Teacher
Mitchell High School



Sparking Student Interest in Engineering

Dimension 3D Printers are powered by Catalyst™ software, which runs on computers using Windows NT, 2000 or XP. Students create their designs in a computer-aided design (CAD) program, such as Auto Desk Inventor, and the Catalyst software imports the STL file and automatically slices and orients the model, creates any necessary support structures and plots a precise deposition path for the 3D printer to follow. It's as easy as sending a text document to a traditional desktop printer. Bryce McLean, PLTW teacher at Coronado High School, found the printer integrated very smoothly into his curriculum.

McLean has utilized the printer to great benefit in his "Aerospace Engineering" course, using it as an incentive to push students to create the best designs possible. "In the class, students design an airfoil and place it in a wind tunnel to test various aerodynamic characteristics. I turn the project into a contest and print a 3D model of what is considered to be the most efficient design in the class. The students really get into it," McLean said. "The printer allows us to more consistently match the student's design specifications and generate a model that is to their exact standards. I actually show the kids a video, describing old machine shop techniques to give them an appreciation for how far the technology has come."

Preparing Tomorrow's Engineers with Real-World Technology

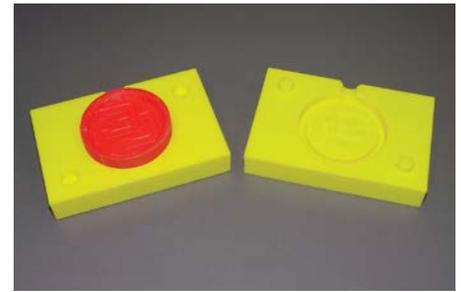
Overall, the Dimension 3D Printers have not only benefited the students in the PLTW program, but also the educators in the Colorado Springs school district.

"Instructors like the printers because they're not the focus of the course. Just another useful tool they can use to convey the educational content of the course," Lehman said. "The printers are so easy to use. Training was very straight forward."

Teachers in the PLTW program often bring in speakers from local businesses to provide information on their engineering experiences as well as a real-world perspective on what skills are necessary to succeed in the field. All the visitors are impressed that the schools are using 3D printing technology, according to Lehman.

For more info contact:

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"With the Dimension 3D Printer, we can give kids the ability to get a tangible item in their hands, which accelerates the learning process much more than just looking at a design on a computer screen or a piece of paper."

— Bryce McLean
PLTW Teacher
Coronado High School

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