



## **PLTW Ignites Imagination, Innovation Through Learning**

*by Michael Gallagher, Project Lead the Way (PLTW) high school teacher at Saratoga Springs High School, PLTW master teacher*

How do you get high-school students more engaged in their schoolwork? Simple: implement Project Lead The Way (PLTW), the leading provider of rigorous and innovative science, technology, engineering and math (STEM) educational programming for middle and high schools in the United States.

As a PLTW teacher at Saratoga Springs High School in upstate New York, I regularly watch students become so engrossed in PLTW projects that they lose track of time. The bell rings at the end of the day, and two, sometimes three hours later, I'm still trying to usher them out the door. In the nine years I've been teaching PLTW, I've never eaten lunch alone. I'm always accompanied by at least five PLTW students—the high-school version of a working lunch.

### **Engaging students**

PLTW is a well-established U.S. nonprofit educational organization that engages students in innovative and critical thinking at the middle and high-school levels. The goal is to create the next generation of STEM professionals, a critical task in a global economy that is increasingly dependent on a high-tech workforce.

PLTW officially got its start in upstate New York in 1997. Saratoga Springs City School District, my district, was one of the earliest to adopt PLTW's middle and high-school pre-engineering programs. It's the reason I became a technology teacher. My father wanted me to be an engineer—I wanted to be an educator. PLTW was the solution for me, and it's the solution for U.S. schools looking for ways to engage students, particularly those who shy away from STEM studies but enjoy hands-on, project-based learning.

Originally, the impetus for PLTW's engineering program was a shortage of engineering students at the university level. A shortage of qualified science and health professionals prompted the development of a second PLTW program—Biomedical Sciences (BMS)—in 2007. The program's emphasis on problem solving and critical thinking also provides students with skills to compete in today's global economy.

Today, 3,500 hands-on, project-based PLTW STEM programs are in place in schools in all 50 states and the District of Columbia, and more schools join every year. Through PLTW, students have the opportunity to apply the science and math they learn in traditional classrooms to real-world problems using state-of-the-art software identical to what professionals use in the workplace. PLTW also provides many students with a reason to come to school. I've attended multiple meetings concerning student discipline and been shocked by other teachers' perceptions of what I consider to be excellent students. My only conclusion is that PLTW brings out the best in students.



In 2007, PLTW expanded its STEM programming to include Biomedical Sciences. (Photo credit: Romana Vysatova)

### **Three tracks**

Each PLTW program—the Gateway To Technology middle-school program, the Pathway To Engineering high-school program and the BMS high-school program—contains several courses within: digital electronics, biotechnical engineering, energy and environment, aerospace engineering, civil engineering and architecture, flight and space, human body systems and medical interventions, to name a few.

All three programs are as much about engineering and biomedical sciences as they are about teaching students to be critical thinkers and problem solvers. At Saratoga Springs High School, we have a lot of students who go on to study engineering, as well as many who go on to study other subjects.

### **Hands-on learning**

Historically, the conventional approach to education in the United States—feeding students information they regurgitate on tests—has shortchanged many exceptionally bright students. Many students become disenfranchised and end up never making it to higher education. When asked, 97% of PLTW students said they intend to go on to college.

Students from all walks of life are attracted to PLTW in large part because of its activities-based, project-based and problem-based curriculum, which is developed and written by topnotch curriculum experts, most of whom started out as teachers. The curriculum is built around real-world applications aided by Autodesk and Fischertechnik software and educational kits that model real-world machines and structures down to the last detail, making math and science relevant.

There's very little sitting in a PLTW class. PLTW teachers demonstrate a skill, and then almost instantly students are on their feet, applying that skill—they're just waiting for that opportunity.



PLTW students will design an apparatus using state-of-the-art software and then build it in class. (Photo credit: Romana Vysatova)

### **Teacher training**

As a PLTW Master Teacher, I travel to colleges and universities—such as Duke University, San Diego University and Old Dominion University—to train middle and high school teachers in PLTW. More than 13,000 have been trained to teach PLTW courses. Core training is an intensive two-week session that takes place at PLTW-affiliated colleges and universities, and is supported by PLTW's online Virtual Academy (available at [www.pltw.org](http://www.pltw.org)). PLTW's affiliates are part of a larger nationwide PLTW Network comprised of PLTW staff, Master Teachers, affiliate directors and state leaders available to PLTW schools for support. The PLTW Network is just one of the components of PLTW that has made it the leading provider of STEM education.

PLTW also regularly revises curriculum to keep pace with the ever-changing world of technology, and teachers are expected to keep up with those changes with the support of PLTW refresher courses and its Virtual Academy. When I attended college and took a computer technology class, I went home during a break, read up on the technology the professor was using and discovered it was obsolete. PLTW keeps pace with the rapid changes in software in part because of partnerships with companies such as Autodesk and Fischertechnik. When new software is introduced, I need to learn it to continue teaching PLTW.

### **Mentors and internships**

PLTW schools also partner with businesses to bring workplace experience into the classroom via mentors who support the curriculum from a professional perspective. Such partnerships are part of the PLTW equation. Saratoga Springs' PLTW program partners with Espey Mfg. & Electronics Corp., which makes customized power generation systems including power generators for satellites. Espey engineers visit classrooms and provide support and feedback on student projects. The firm also hires PLTW students as interns, as does Mann



Wireless Ltd. Mann Wireless enhances communications to enable wireless communications inside buildings with more than 200 million square feet of floor space and in miles of underground tunnels—frequently in secure locations where wireless communications are mission-critical, such as power plants, prisons, hospitals and airports.

It's their depth of problem solving that makes PLTW students valuable in the workplace, said Andrea Mann, co-founder of Mann Wireless. "They're given projects, and they work the project and rework the project and rework the project until it gets better and better and better. They're not skimming the surface. This is really in-depth learning. They come out of high school with cutting-edge real-life skills."

*Michael Gallagher is a Project Lead the Way (PLTW) high-school teacher at Saratoga Springs High School, in Saratoga Springs, NY, and a PLTW Master Teacher. He received his master's degree in cross-disciplinary studies in engineering and education from Rochester Institute of Technology. For more information about PLTW programs, visit [www.pltw.org](http://www.pltw.org).*