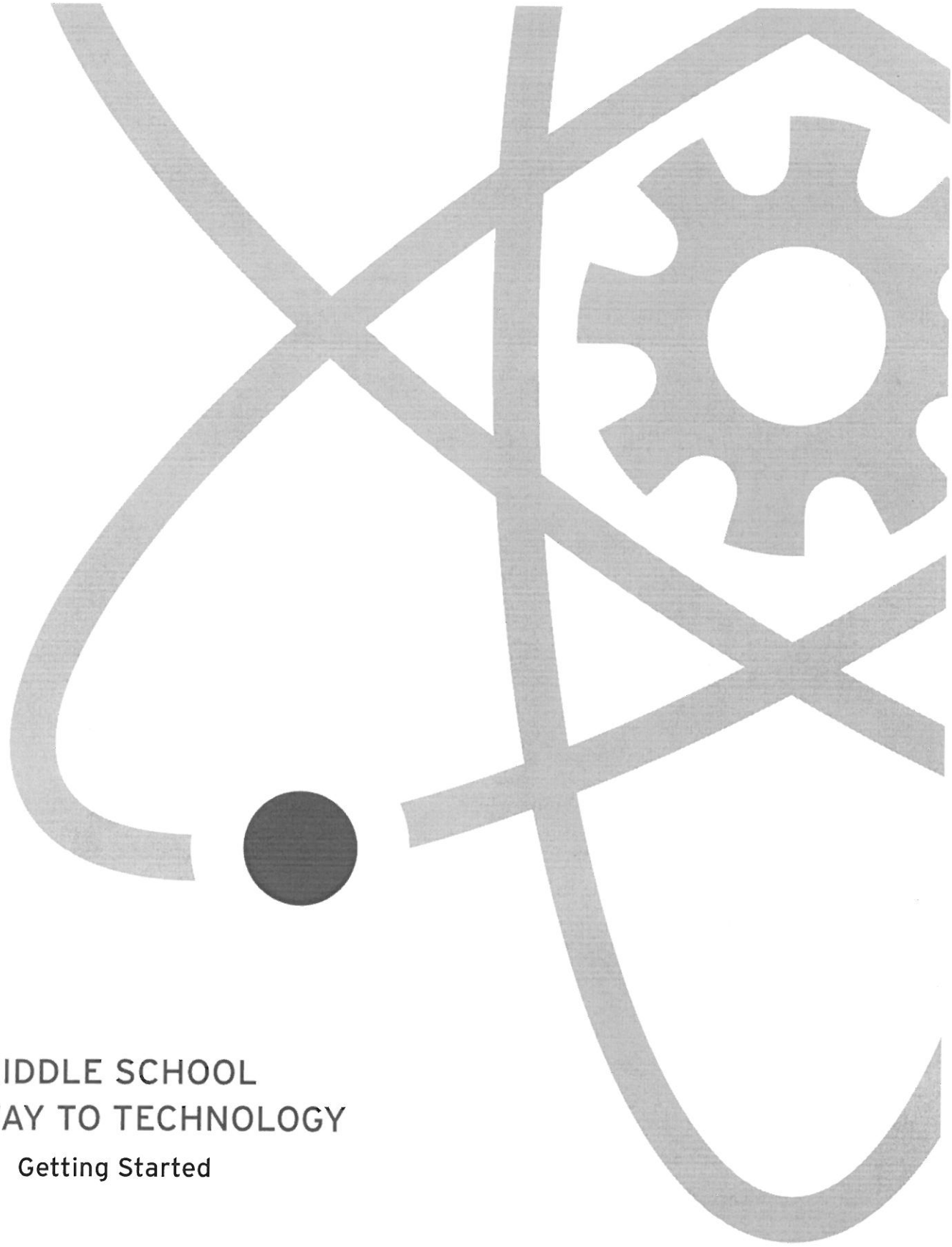

MIDDLE SCHOOL GATEWAY TO TECHNOLOGY

Getting Started

PROJECT LEAD THE WAY
PLTW

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OVERVIEW

SUMMARY & MISSION

PLTW is a national nonprofit organization that partners with middle schools and high schools to implement a curriculum, developed by it and imparted by teachers whom it has trained, that emphasizes hands-on experiences in Science, Technology, Engineering, and Mathematics (STEM) and biomedical sciences in an effort to prepare students for academic and professional success in these disciplines. PLTW aims to encourage an increasingly more diverse group of students to consider careers as scientists, technology experts, engineers, mathematicians, healthcare providers, and researchers in an effort to enable the United States to compete favorably in the global economy.

HISTORY & SCOPE

PLTW began in 1998 in 12 high schools in upstate New York as a program designed to address the shortage of engineering students at the college level. It has grown to a network of more than 3,300 middle and high schools in 50 states and the District of Columbia. In 2007, PLTW added a Biomedical Sciences program, also project-based, to stem an impending shortage of healthcare professionals and researchers.

CURRICULUM

PTLW's approach — using activities-, project-, and problem-based learning (or APPB learning) — centers on hands-on projects that have real-world applications. The curriculum makes mathematics and science relevant and strives to help students understand how the skills they are learning in the classroom may be applied in everyday life.

THREE TRACKS

PLTW Gateway To Technology (GTT) is a middle school program offered in six independent, nine-week units and designed to help students explore math, science, and technology. This activity-oriented program challenges and engages the natural curiosity of middle school students and is taught in conjunction with a rigorous academic curriculum.

PLTW Pathway To Engineering (PTE) is a four-year high school sequence taught in conjunction with traditional math and science courses. PTE's eight courses, including Digital Electronics and Civil Engineering and Architecture, provide students with in-depth, hands-on knowledge of engineering and technology-based careers.

PLTW Biomedical Sciences Program (BMS) introduces high school students to the human body, cell biology, genetics, disease, and other biomedical topics in a sequence of four courses. The program prepares students for postsecondary education and training necessary for success in a wide variety of positions: physician, nurse, pharmaceutical researcher, technician, etc.

PLTW NETWORK

Teachers and guidance counselors at schools that offer PLTW courses may access a nationwide support network comprised of PLTW staff, master teachers, affiliate directors and state leaders who are Department of Education employees. PLTW has 36 affiliated colleges and universities that provide teacher training. They also offer college credits for some of the courses. Business partners offer grants and internships.

TALKING POINTS

A CHANGING ECONOMY

Postsecondary education and training have become an essential requirement for a steadily increasing percentage of jobs. Two-thirds of America's economic growth in the 1990's resulted from the introduction of new technologies and 60% of the new jobs of the 21st century require postsecondary education, which is held by only one-third of America's workforce.

A SHORTAGE OF ENGINEERS

As the uses of science and technology expand in today's job market, our nation will need a constant supply of engineers graduating from college in order to remain competitive in the world's marketplace. Today, with more than half of the country's engineers and scientists nearing retirement, and with more than half of the students in college engineering programs dropping out before graduation, U.S. technical industries are in need of engineers and technical workers—not just a handful—but more than one million.

HIGH SCHOOL REFORM

Nationally, of 100 ninth graders, only 68 will graduate from high school on time, 38 will directly enter college, 26 are still enrolled in their sophomore year of college, and only 18 graduate from college. The rates for minority students are even lower. Only one-third of America's workforce has a postsecondary education, yet 60% of new jobs in the 21st century require it.

MATHEMATICS, SCIENCE, & PROBLEM SOLVING

According to the latest results from the Program for International Student Assessment, America's 15-year-olds performed below the international average in mathematics, literacy and problem solving, placing 27th out of 39 countries.

PLTW'S MISSION

PLTW's mission is to ensure that the United States succeeds in the increasingly high-tech and high-skill global economy by partnering with middle schools and high schools to prepare students to become the most innovative and productive in the world.

STUDENT ENGAGEMENT

PLTW is able to accomplish this mission because it has broken the code on student engagement through hands-on, project-based curriculum in STEM fields. To date, more than 500,000 students in the United States have taken at least one PLTW course.

RESULTS

PLTW alumni are studying engineering and technology at colleges and universities at rates approximately five to ten times the average of all U.S. students. They also have higher retention rates in college engineering, science, and related programs than other students in these areas.

TEACHERS

Teachers play a critical role in PLTW's success with students. Since 1997, PLTW has trained approximately 13,000 teachers to teach its courses. PLTW supports teachers with an ongoing professional development model based upon its curriculum. Its Virtual Academy, a robust online resource to which teachers may turn for guidance, is also available to non-PLTW teachers.

COLLEGES & UNIVERSITIES

PLTW has relationships with more than 100 colleges and universities. Of these, 36 offer credit to students for completion of select PLTW courses.

ECONOMIC STIMULUS

Among the biggest hurdles for new schools is the ability to secure capital for classroom technology. Some states have plans to include PLTW as a "centerpiece" in ARRA Race to the Top applications.

Gateway To Technology (GTT) is an activities-, project-, and problem-based (APPB) learning program designed to challenge and engage the natural curiosity of middle school students. The instructional units excite and motivate students to use their imaginations and teach them to be creative and innovative, while gaining the skills they need to develop, produce, and use products and services.

The GTT curriculum appeals to a full range of students in grades 6 through 8 and relates technology to students' daily lives. It also promotes communication and collaboration by emphasizing a team approach throughout the instructional units. This approach utilizes the strengths of each team member to accomplish the goals of the project, while offering students learning challenges at all ability levels.

The GTT program helps students develop and hone skills in middle school that enable them to enter the high school program with foundational knowledge and skills for success in engineering. Although not intended as an introduction to PLTW's Pathway To Engineering program, many schools report improved interest in PLTW's Pathway To Engineering high school program because of GTT.

The program consists of six independent nine-week units; each unit includes a two-day activity related to engineering careers: Design and Modeling, and Automation and Robotics are required units for all students. Each school district has the flexibility to decide which of the other four units best meets their needs.

UNIT 1: DESIGN & MODELING

This unit uses solid modeling software (a sophisticated mathematical technique for representing solid objects) to introduce students to the design process. Utilizing this design approach, students understand how design influences their lives. Students also learn sketching techniques and use descriptive geometry as a component of design, measurement, and computer modeling. Students brainstorm, research, develop ideas, create models, test and evaluate design ideas, and communicate solutions.

UNIT 2: AUTOMATION & ROBOTICS

Students trace the history, development, and influence of automation and robotics. They learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students acquire knowledge and skills in problem solving, teamwork, collaboration, and innovation.

UNIT 3: ENERGY & THE ENVIRONMENT

(Currently in development; network implementation planned for fall 2010)
Students investigate the importance of energy in our lives and the impact that using energy has on the environment. They design and model alternative energy sources and participate in energy fairs to demonstrate energy concepts and innovative ideas. Students evaluate ways to reduce energy consumption through energy efficiency and waste management techniques.

UNIT 4: FLIGHT & SPACE

In this unit students study the history of aerospace through hands-on activities, research, and a presentation in the form of an infomercial. Students explore the science behind aeronautics and use their knowledge to design, build, and test a model glider. Simulation software is used to expose students to traveling and living in space.

UNIT 5: SCIENCE OF TECHNOLOGY	This unit traces how science has affected technology throughout history. Students learn about applied physics, chemical engineering, and nanotechnology through exploratory activities and projects.
UNIT 6: MAGIC OF ELECTRONICS	Through hands-on projects, students explore the science of electricity, the behavior and parts of atoms, circuit design, and sensing devices. Students acquire knowledge and skills in basic circuitry design and explore the impact of electricity on our lives.

ADMINISTRATOR & COUNSELOR INFORMATION

WHO SHOULD TAKE PLTW COURSES?

The GTT program can be offered to all middle school students and can serve as an introduction into the high school PLTW Pathway To Engineering program.

WHAT ARE SOME SUCCESSFUL METHODS FOR RECRUITMENT?

- Provide teachers and counselors with PLTW promotional materials to distribute to their students.
- Encourage PLTW teachers to attend and present at parent/student orientations and other district/community meetings.
- Set up window displays showing a diverse population of students involved in various types of engineering.
- Provide students the opportunity to explore engineering career fields by utilizing the resources available on the PLTW website.
- Invite parents and students to learn more about the PLTW program through the various promotional materials provided on the PLTW website.
- Involve members of the community by inviting key stakeholders to bring their expertise and guidance to the students and, in the process, enhance their support of the program.
- Use press releases to local newspapers and other media outlets in order to generate community awareness of the PLTW programs.

WHAT IS THE GATEWAY TO TECHNOLOGY NATIONAL RECOGNITION PROGRAM?

The PLTW Gateway To Technology National Recognition program recognizes schools that have successfully implemented the Gateway To Technology program. The process parallels the PLTW High School Certification program but introduces some additional elements. The Gateway To Technology National Recognition process offers the following:

- Local review and involvement of the community
- Self-assessment and reporting procedures
- PLTW National Recognition

WHAT IS A PARTNERSHIP TEAM?

A Partnership Team is an advisory board comprised of teachers, representatives from colleges, business and industry, and other community members. This group supports the PLTW program, addresses issues arising from the implementation of the program, mentors student teams, and speaks to students about engineering and technology.

WHO SHOULD TEACH PLTW COURSES?

The school district shall recommend teachers for participation in the PLTW professional development program. Selected teachers should have a strong math background especially in algebra, geometry, trigonometry, and statistics. Engineering, math, and science teachers are prime candidates to teach PLTW courses.

WHAT IS A SCHOOL DISTRICT DELEGATE?

Each district office designates its own PLTW School District Delegate to be the liaison between PLTW and the entire district, including all schools implementing a PLTW program. In many districts, the Career and Technical Education (CTE) coordinator also serves as the delegate. The School District Delegate is responsible for the following:

- Verifying the accuracy and completeness of district information in the PLTW database and ensuring that all schools within the district teaching PLTW courses are registered.

- Acting as a liaison between PLTW and the district superintendent's office with the processing of the School District Agreement and the school board of education approval process.
- Assisting new teachers in registering with PLTW and enrolling in a Core Training.
- Periodically managing district and school data in the PLTW database to confirm for accuracy.

WHAT IS CORE TRAINING?

Until 2009, training took place exclusively during the summer months and was referred to by PLTW as Summer Training Institute (STI). As 2009 comes to a close, Core Training will take the place of STI as the name of PLTW's professional development division, with STIs continuing to take place during the summer months. Year-round training will allow PLTW to accommodate more teachers and schools. As with STIs, Core Training is offered through our Affiliate Universities. Core Training includes intense training of the PLTW teaching model and course content. Only upon successful completion of Core Training may a teacher instruct that PLTW course. In order to register for a Core Training course, teachers must earn a score of at least 75% on a pre-assessment for that course.

UNIVERSITY AFFILIATES

Arkansas Tech University
Duke University
Eastern Michigan University
Georgia Southern University
Indiana University Purdue University Indianapolis
Iowa State University
Milwaukee School of Engineering
Missouri University of Science & Technology
NHTI, Concord's Community College
New Mexico State University
Northwestern State University of Louisiana
Oklahoma State University
Old Dominion University
Oregon Institute of Technology
Penn State University
Purdue University
Rochester Institute of Technology
Rowan University
San Diego State University
Seattle University
Sinclair Community College
Stevenson University
University of Colorado at Colorado Springs
University of Illinois
University of Iowa
University of Kentucky
University of Maryland at Baltimore County
University of Minnesota
University of New Haven
University of Nebraska – Lincoln
University of South Carolina
University of Tennessee at Chattanooga
University of Texas at Tyler
West Virginia University
Wichita State University
Worcester Polytechnic Institute

PLTW PARTNERS

BUSINESS PARTNERS

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Cengage Learning
Edgecam
Fischertechnik
Intelitek
National Instruments
Stratasys/Dimension

SPONSORS

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Amgen
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Chevron
Intel
Lockheed Martin
Northrop Grumman
Qualcomm
Rockwell Automation
Rolls-Royce
Sprint
Time Warner Cable

EDUCATION INITIATIVES

Academy of Engineering Collaboration (AOE)
American Society for Engineering Education (ASEE)
Engineering Equity Extension Service (EEES)
Gateway Academy
NASA Goddard Space Flight Center
NASA Dryden Flight Research Center
National Council for Agricultural Education (NCAE)
Society of Manufacturing Engineers Education Foundation (SME-EF)
Southern Regional Education Board (SREB)
U.S. Army

FOUNDATIONS

Ewing Marion Kauffman Foundation
John S. and James L. Knight Foundation
Kern Family Foundation

INDUSTRY ASSOCIATIONS

Aerospace Industries Association/
National Defense Industrial Association

Project Lead The Way, Inc.
Clifton Park, NY

http://www.pltw.org

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