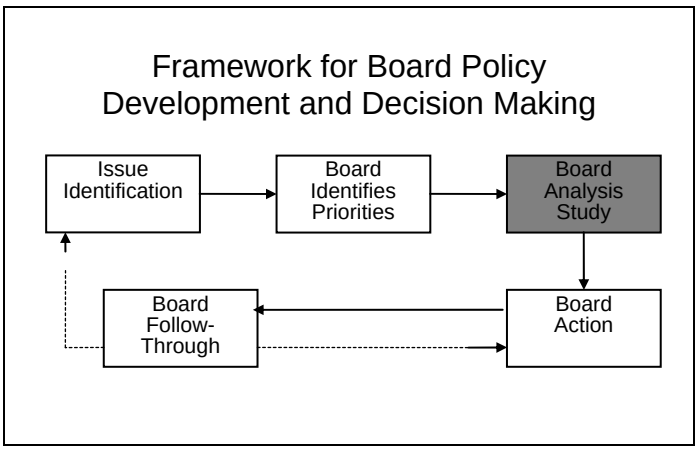
Iowa State Board of Education

Executive Summary

February 6, 2008



Agenda Item: **Project Lead the Way**

Iowa Goals: **(2) All K-12 students will achieve at a high level.**

(3) Individuals will pursue postsecondary education in order to drive success.

Equity Impact Statement: **All students must be given educational opportunities that prepare them for success in the workforce.**

Presenter: **Ken Maguire, Educational Consultant**
Program Development and Information Systems

Attachments: **1**

Recommendation: **It is recommended that the State Board of Education hear and discuss this information.**

Background: **The Project Lead The Way® (PLTW) state system is designed to foster the implementation of the PLTW pre-engineering educational program. This statewide system fosters the integration of academics into Career and Technical Education and creates a seamless transition for students to move from the secondary level to higher education. PLTW fosters the integration of academics and technical education through curriculum that addresses national math and science standards along with national industry skill standards.**

Iowa Project Lead the Way

The Project Lead The Way® (PLTW) state system is designed to foster the implementation and growth of the PLTW pre-engineering educational program. This statewide system fosters the integration of academics into Career and Technical Education and creates a seamless transition for students to move from the secondary level to higher education. Project Lead The Way® (PLTW) is a 501 © (3) not-for-profit corporation that promotes pre-engineering education for middle and high school students. Project Lead the Way (PLTW) fosters the integration of academics and technical education through curriculum that addresses national math and science standards along with national industry skill standards. PLTW incorporates strong partnerships between the public schools, higher education institutions and the private sector to increase the quantity and quality of Iowa's advanced manufacturing and biotechnology workforce.

The broad scope of the PLTW program prepares students for engineering and related careers at Iowa's community colleges and 4-year institutions. The program consists of the following courses:

- Introduction to Engineering and Design
- Principles of Engineering
- Digital Electronics
- Computer Integrated manufacturing
- Civil Engineering and Architecture
- Biotechnology Engineering
- Aerospace Engineering
- Engineering Development and design

Activities and Accomplishments:

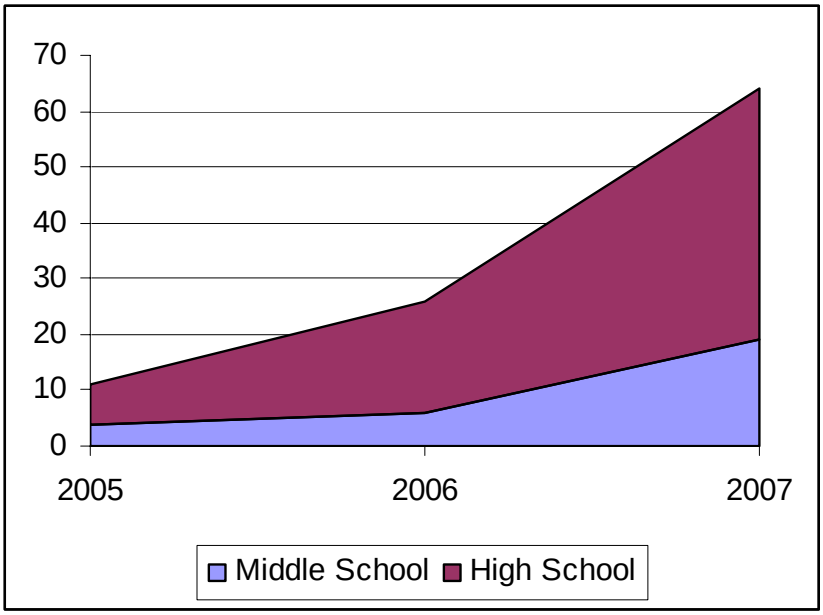
- **Public and private funding has been brought together through a partnership initiative proposed by the Community College presidents.** This initiative includes $1 million dollars from the Department of Economic Development, funding that was allocated to the community college system for equipment and software initiatives related to Iowa's Targeted Industries, $1.2 million dollars from the Kern Family Foundation, a foundation concerned about the future workforce and views PLTW as an effective program to better prepare students in the areas within STEM education, and $900,000 dollars from the community colleges. These commitments together will provide 3.1 million dollars to assist Iowa Community Colleges develop PLTW sites within their region of the state.
- Both U of I and ISU have trained professors and offered two-week training institutes in the summer of 2007 for the following courses: Gateway to Technology, Introduction to Engineering, Principles of Engineering, Digital Electronics and Biotechnical Engineering. Sixty-four teachers were trained in the summer of 2007. Thirty-seven teachers received training by Iowa State University or the University of Iowa and twenty-seven received training from affiliate universities outside of Iowa.
- Provided professional development for PLTW teachers including the required two-week summer training institute, fall and spring meeting for PLTW teachers and a student symposium.
- Both the U of I and ISU provide the opportunity for students to receive credit for PLTW courses. Credit is offered in for all eight PLTW pre-engineering courses. Information on this credit can be found at www.pltwiowa.org
- Counselors play a key role in answering students and parents' questions about the PLTW program and in successfully enrolling students in appropriate PLTW courses. They also counseling students as they consider engineering, engineering technology, and related career fields of study. Over two hundred participants attended a PLTW counselor's conference over the past three years. .
- The private sector has committed approx. $3 million dollars to assist educational institutions implement PLTW.

Results:

- Iowa's PLTW Enrollment trends
  - PLTW enrollment in 2005-06 was compiled for the six public high school sites. The total enrollment was **233, (83% were male, and 17% were female.)**
  - PLTW enrollment in 2006-07 was compiled for thirteen public high schools sites. The total enrollment was **1,044, (84.9 % were males and 15.1% were females.)**

- The number of PLTW program sites that have been established has increased by 53 from 2005-2007.

PLTW program sites

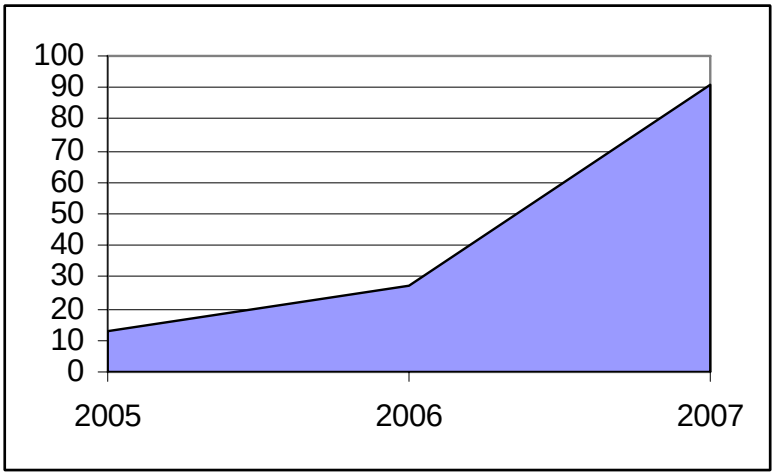


Number of PLTW sites in Iowa

	Fiscal Year		
	2005	**2006**	**2007**
Middle School	**4**	**6**	**18**
High School	**7**	**20**	**43**

- Every teacher must successfully complete a two-week intense training institute conducted by an affiliate University-College of Engineering. Iowa PLTW teacher training by year:

PLTW teachers trained



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	2005	2006	2007
Teachers	13	27	91

- College Credit
  - In 2005-06, 49 students applied for university credit for the Introduction to Engineering course and 39 received credit. Eleven (11) students applied for university credit for the Principles of Engineering course and 11 received credit.

The PLTW state system is made up of partnerships between, the Department of Education, Department of Economic Development, Iowa's Community Colleges, Regent Universities - Colleges of Engineering and teacher education, school districts, Project Lead the Way and business and industry. Each partner provides essential elements within the system.

School districts are partners for the following:

- Commitment to the implementation and sustainability of the program.
- Identify quality teachers to teach in a rigorous technical program that directly incorporate national math and science standards and be willing and able to attend summer training.
- Encourage students to enroll in a parallel math and science courses.
- Commitment to become a nationally certified PLTW school.

Affiliate universities and community colleges are partners for the following:

- Maintain PLTW trained professors and staff.
- Provide a two-week training institute for each course within the PLTW program.
- Coordinate the credit and articulation options for individual PLTW courses.
- Provide leadership to implement the PLTW certification process in Iowa.
- Provide technical assistance at a statewide and regional level.
- Provide ongoing training for PLTW teachers and counselors.
- Provide advocacy for Science, Technology, Engineering and Math (STEM).

State agencies are partners for the following:

- Provide financial support for PLTW
- Provide leadership for the PLTW state system and the state PLTW Leadership team.
- Provide leadership to implement the PLTW certification process in Iowa.
- Serve as liaison to national PLTW and provide technical assistance within Iowa.
- Conduct annual training conferences for counselors.
- Provide statewide advocacy for Science, Technology, Engineering and Math (STEM).

Private sector is a partner for the following:

- Provide financial support for PLTW implementation.
- Provide local leadership as members of the local partnership teams.
- Serve as technical experts within PLTW capstone projects.
- Provide advocacy for Science, Technology, Engineering and Math (STEM).

National PLTW is a partner for the following:

- Provide a pre-engineering and biotechnical engineering curriculum that integrates academics and better prepares students for success in higher education.
- Design and maintain a national certification system that will ensure the instruction being delivered by highly qualified teachers and consistently is maintained across the country.
- Provide a high quality teacher training and professional development program.
- Provide web-based professional development for PLTW teachers.
- Provide national advocacy for Science, Technology, Engineering and Math (STEM).

Supporting research

The Department of Education has reviewed research that indicates PLTW does impact the academic attainment of students and below is a bulleted summary of key findings of the Southern Regional Education Board (SREB) research (Bottoms and Anthony, 2005). The full report may be accessed on the SREB website.

Address: www.sreb.org/programs/hstw/publications/briefs/ProjectLeadTheWay.asp

- When PLTW students are compared to similar students from comparable career/technical fields, PLTW students have significantly higher achievement in mathematics on a National Assessment on Educational Process (NAEP)-referenced assessment.
- When PLTW students are compared to similar students across all career/technical fields, PLTW students have significantly higher achievement in reading, mathematics, and science on a NAEP-reference assessment.
- When PLTW students are compared to similar students in comparable fields of study and to similar students drawn from all career/technical fields, PLTW students' complete significantly more high-level mathematics and science courses.
- Significantly more PLTW students were enrolled in classes that engage them in reading and writing across the curriculum; and in using real-world problems, technology and group work to advance mathematics and science achievement.
- Significantly more PLTW students experience career/technical classes that required students to use academic knowledge and skills to complete project assignments.
- Research conducted by PLTW indicates that most states have a minority population of 20% to 50%, and schools that have adopted PLTW generally have higher minority population than the state.