

# E<sup>3</sup> Spotlight: Galvanizing the STEM Pipeline

Increasing the pipeline by 430% in just 5 years

## The Challenge

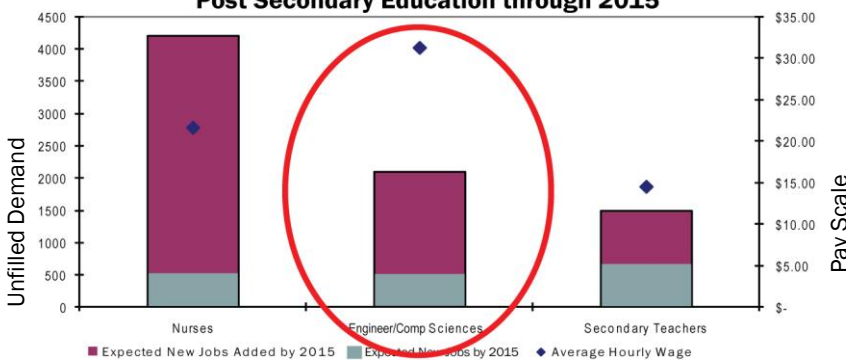
In Central Texas, several of our fastest growing, highest paying occupations are in industries that require concentrations and post-secondary credentials in Science, Technology, Engineering and Mathematics (STEM). However, a 2007 gap analysis of our STEM student “supply” versus workforce “demand” indicated that our region’s education systems were falling far short of current and projected labor market needs.



## Compelling Data

An E<sup>3</sup> Alliance analysis of Central Texas high school graduates obtaining Bachelor’s degrees estimated that less than one-fourth majored in STEM fields and only 12% in engineering and computer science. Industry has been forced to import talent at a cost of about \$100,000 per experienced engineer.

**Highest Demand Jobs Requiring Post Secondary Education through 2015**



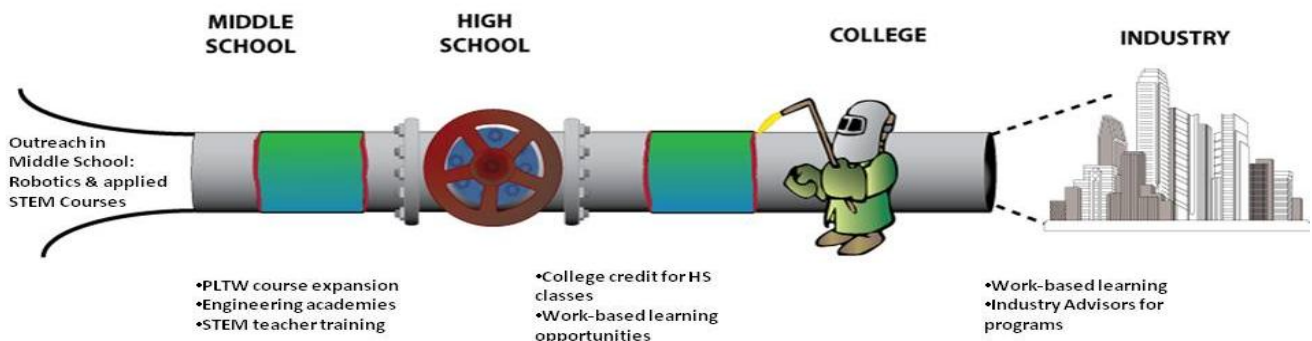
## Common Agenda

E<sup>3</sup> Alliance facilitated the launch in 2008 of the STEM Pipeline Collaborative, consisting of 12 school districts, four higher education institutions and 10 community organizations and industry partners. E<sup>3</sup> Alliance conducted an asset inventory of secondary STEM efforts and determined that both after-school robotics programs and the national engineering curriculum Project Lead the Way (PLTW) had established footprints in Central Texas. Based

on this inventory, participating stakeholders agreed to expand and diversify the STEM pipeline to: (1) attract and engage middle school students in STEM through robotics competitions; (2) expand PLTW course offerings; (3) provide teacher professional development to increase the capacity of secondary STEM teachers and improve teacher effectiveness; and (4) offer articulated college credit for PLTW courses – the first engineering college credit in state history – to motivate students and simplify their transition into STEM postsecondary majors.

After base-lining efforts, E<sup>3</sup> Alliance sought and obtained a National Science Foundation grant to develop the infrastructure resources to expand PLTW, FIRST Robotics and a qualified STEM teacher force.

## THE STEM PIPELINE COLLABORATIVE

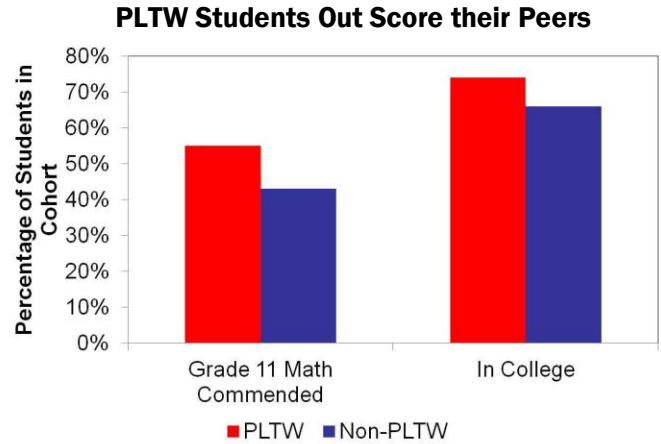


## Changed practices

E<sup>3</sup> Alliance conducted a literature review of PLTW student outcomes and found that, despite an established customer base, PLTW’s evaluations relied largely on student and teacher surveys and representative sampling to determine student performance outcomes and trends. As a result, E<sup>3</sup> Alliance undertook the first longitudinal study of PLTW students to assess outcomes and found positive trends in the quality, capacity and diversity of the pipeline in Central Texas.

We learned that our efforts:

1. *More than quadrupled* the pipeline of students participating in PLTW courses, **from 1493 students in 2007-08 to 6373 in 2011-12.**
2. Central Texas students participated in these classes at *more than three times* the rate of the rest of the state, and participation grew at twice the state’s rate.
3. In a longitudinal evaluation, PLTW students outperformed their comparable non-PLTW peers on the 11<sup>th</sup> grade standardized math test, and enrolled in college in greater numbers.

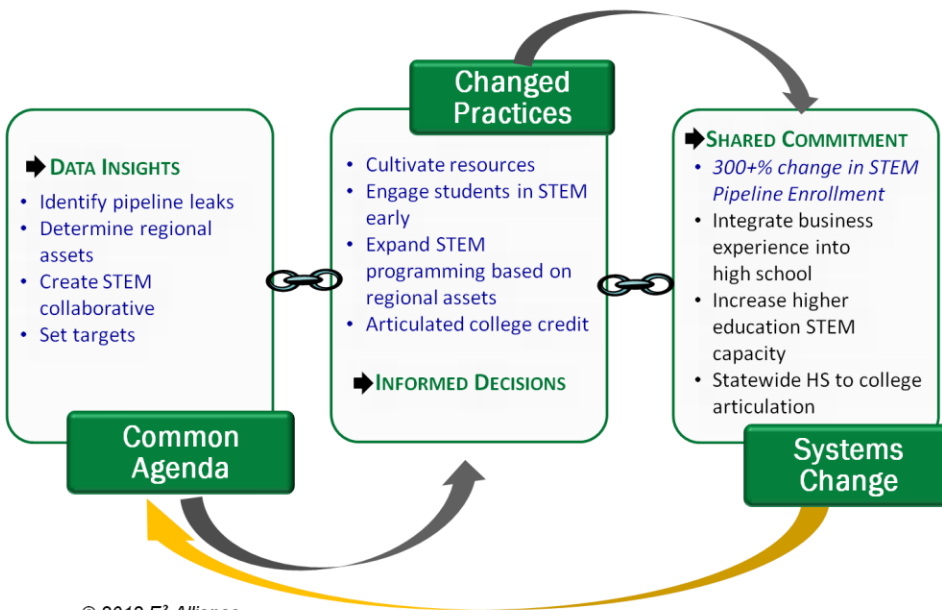


Perhaps our most compelling result was that there was greater diversification of the pipeline in populations not traditionally represented in STEM careers. *Hispanic students increased at almost 1.5X the overall rate, female students at almost 2X, and low income students at twice the overall student growth rate.*

## Systems Change

The STEM Pipeline Collaborative has initiated true systems change to help scale and sustain these strategies: (1) Industry commitment has grown with financial contributions and support for work-based learning expansion from the Austin Human Resources Management Association; (2) district partners have committed to expanding PLTW to 46 schools and adding new offerings, including biomedical; (3) Concordia University is planning a new engineering program to increase postsecondary STEM capacity; and (4) E3 Alliance is working with PLTW, U.T. Austin, and Skillpoint Alliance to bring greater opportunities to meet districts where they are as they continue to prioritize improving the capacity and quality of STEM education.

### A MODEL FOR SYSTEMS CHANGE



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*“We are proud that we have been able to increase our engineering enrollment over 3 times in the last four years. Our great partnership with E3 Alliance and school districts was a major contributor to this growth.” ~ Dr. Harold Stern, Professor, Texas State University Ingram School of Engineering*