

# BOON BEST PRACTICES CONFERENCE

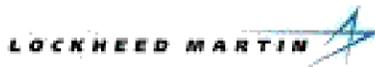
Summary Report on Recruiting and Retaining  
Engineering and Computer Science Students

Third Annual Technology and Workforce Development Workshop

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# TETC Best Practices Meeting 2008

## Technology Workforce Development Grant Program

### Conference Summary

The Texas Engineering and Technical Consortium (TETC) held its third annual Best Practices Conference at Southern Methodist University on February 28-29. The school's Engineering Dean, Dr. Geoffrey C. Orsak, gave a passionate key-note address challenging Texas engineering faculty and educators to take risks and fundamentally change the way engineering is presented and taught.

Dean Orsak pointed out that 50 percent of post-World War II United States economic growth was due to technology and emphasized that the importance of engineering needed to be recognized. Recently successful countries such as Malaysia and Korea began their success with a narrow and single-minded focus on engineering education. But in the US, only one out of 100 ninth graders attains an engineering undergraduate degree.

He quoted Tom Engibous, chair of TI, saying that we "can't even comprehend the competition that is coming" and a 2006 National Academies study found that the next generation may be the first to be economically worse off than its parents' generation.

Dean Orsak made it clear that the solution to the engineering education crisis must come from the educators in the field. In this country, he said, the role of public policy is to give incentives to do the right thing, but it will not provide the answers.

**Arturo Sanchez**, Director of Workforce Development at TI and new chair of TETC (outgoing chair Ray Almgren of National Instruments was present), opened the Best Practices Conference by saying that TETC recognizes that it is making a difference in Texas enrollment and graduation numbers.

#### **Roundtable Discussions – Participants Input**

1. Consistent with Dean Orsak's message TETC needs to continue to encourage engineering/computer science college educators to implement change.
2. The program needs continuing funding. Funding allows projects otherwise not done and the exploration of ideas. Involve local industry to sustain the initiatives.
3. TETC should make resources/programs available to educators with which to increase interest in STEM careers: make a connection between engineering and quality of life.
4. High school outreach needs to increase awareness and involvement of parents, help prepare counselors and career centers, and make use of college student groups and college student outreach programs.
5. One of Best Practices Conference's greatest values is the opportunity to network and share information; participation should be mandatory for grant recipients.

## Best Practices

The summaries for each of the presented Best Practices projects below show again that increasing graduation numbers overall depends on attention given to each student by individual educators and advisors. It also shows increasingly, however, that engineering and computer science students thrive on opportunities to lead and participate. These students respond to opportunities to mentor or peer teach, to get involved with secondary school students or industry leaders, to build campus communities, or to take up educational experiences outside the classroom. When engineering education provides opportunities during the time of study, it motivates by convincing students that their engineering education will also open doors after graduation.

### Sustaining successful outreach, recruitment, and retention programs

A joint recruitment and peer mentoring program between **University of Houston Clear Lake** and **San Jacinto College** was expanded through a STAR program (Success through Academic Recognition) with heavy faculty involvement that seeks to identify and inspire individual students. Tight collaboration between the institutions forms the backbone to the program's success.

**Texas Tech University** operates an interlocking program of outreach from elementary to high school through robotics. The institution recognizes the value of sustained and repeated involvement to build up students' interest in technology. While secondary education as a profession is not attractive economically to newly graduated engineers, the program found an ideal, synergistic relationship between teachers and undergraduate students that requires both directing a class of pupils and handling the robotics and computer technology.

**Prairie View A&M University** used the Infinity curriculum and laboratory hardware to jump-start its new degree program in computer engineering. Student enrollment increased from 15 students in the first year (2003) to 81 in fall 2007. Retention of freshmen students taking the Infinity Project course is above 80 percent and the engineering school now is adopting the Infinity curriculum in its other disciplines.

### Advancing successful articulation and transfer agreements with community colleges

**Texas State University-San Marcos** (TX State) and **Austin Community College** (ACC) have an agreement that allows 74 transferable hours between the college and completion of the computer science degree at the Round Rock Higher Education Center (RRHEC). The program specifically targets working professionals and uses a web-based tutoring system with tutoring stations at ACC, TX State, RRHEC, and, in the future, the Austin and Round Rock Independent School Districts. It also offers a web-based mentoring system whose mentors are volunteer industry professionals.

**Richland College** and **Collin College** worked out specific articulation agreements with **The University of Texas at Dallas'** (UTD) Erik Jonsson School of Engineering that allows community college students to earn an Associate in Sciences degree that replicates the first two years at UTD. The agreement bridges the gap of what a student can potentially transfer from the field of study curriculum and what is applicable in actuality. The agreement requires twice-

yearly meetings to assure alignment of every aspect, from text book selection to syllabi or lab facilities.

One-half of **The University of Texas at Arlington's** (UTA) undergraduate students are transfer students. UTA has had a working informal agreement with **Tarrant County College** for more than seven years. Maintenance requires yearly reviews and meetings. The agreement includes dual enrollment opportunities and transfer of hours back to the community college level. This allows students to take advantage of college advising and to manage their GPA, and allows the community college to reach its performance goals for completed associate degrees.

#### Recruiting and retaining women in engineering and computer science programs

Overall retention in electrical engineering for minority, first generation, and female students is very low at **The University of Texas at San Antonio** (UTSA). The institution is redesigning curricula from the high school to its senior design course levels. This includes a "Just in Time Math" course based on the Wright State Model of introducing engineering mathematics. It includes structured problem solving and conceptual learning in its engineering design courses and visual pedagogy for its statistics course. The latter course is a gate-keeper course for students that lack the language skills to work through word problems dominating the subject.

**The University of Texas at Austin** targets female high school students from across the State with its First Bytes Outreach Programs. The programs include summer camps for students and workshops for teachers and counselors. Enrollment in these programs is highly selective but the university achieves a 50 percent enrollment of female camp participants in its science and technology degree programs.

The **University of Houston** recognized that today's students, the "Millenials," use the world-wide web, including "wiki" pages, "blogs," and social networking sites such as "Facebook" and "MySpace" to communicate and build relationships. These tools blur the boundaries between leisure and learning, socializing, and professional interaction. They also give the faculty an opportunity to support its student community by incorporating these tools into special recruitment and retention programs such as WELCOME (Women in Engineering Learning Community for Maximizing Excellence), PROMES (Program for the Mastery of Engineering Studies), and G.R.A.D.E. (Girls Reaching and Demonstrating Excellence) camps.

The **Southern Methodist University** (SMU) School of Engineering has achieved a 32 percent overall participation of female students, while the national average has dropped to 17.5 percent. SMU finds that its female students are drawn to the subject because they recognize that a degree in engineering or computer science will be a foundational degree. The institution gives support by emphasizing a holistic educational approach including participation in professional organizations, opportunities for work experience, opportunities to pursue multiple interests, and experiences outside the classroom.

The Texas Engineering and Technical Consortium (TETC) posted presentation slides and the meeting proceedings at

<[http://www.tetcnews.us/Best\\_Practices.html](http://www.tetcnews.us/Best_Practices.html)>

Related TETC websites are:

<<http://www.tetc.us/>>  
<<http://www.allacrosstexas.us/>>

The Texas Higher Education Coordinating Board (THECB) posted Best Practices materials at its website under

<[http://www.thecb.state.tx.us/AAR/Research/Techworkforce/  
TETC\\_best\\_practices\\_08.cfm](http://www.thecb.state.tx.us/AAR/Research/Techworkforce/TETC_best_practices_08.cfm)>

Related THECB websites are:

<<http://www.thecb.state.tx.us/AAR/Research/Techworkforce/>>  
<<http://www.thecb.state.tx.us/AAR/Research/EngRecruitment/>>