

# STEM and The Workforce Pipeline

Nicholas J. Altiero, PhD  
Professor and Dean  
School of Science and Engineering  
Tulane University

Presentation at the Meritorious Service Awards Luncheon  
American Petroleum Institute – Delta Chapter  
March 17, 2009



# Outline of Presentation

- Just a little bragging about Tulane University.
- Comments on the state of STEM education and the engineering and technology workforce pipeline.
- A call to (more and better coordinated) action.



# Tulane University

- One of only 62 members of the prestigious Association of American Universities (AAU) in the United States and Canada.
- Has received more than 40,000 undergraduate applications for a targeted 2009 freshman class of 1,400.
- Attracts more than \$150M in research funding from government agencies, foundations, and industry annually.
- Offers strong post-baccalaureate degree programs in Science and Engineering, Medicine, Public Health & Tropical Medicine, Law, Business, Liberal Arts, Social Work, and Architecture.
- Has placed a strong emphasis on community involvement. The only major national university with a community service requirement.



# School of Science and Engineering

- Second only to the School of Liberal Arts in undergraduate enrollment with more than 1,300 students enrolled in 14 undergraduate degree programs.
- The largest school at Tulane in doctoral enrollment with over 300 students enrolled in 9 doctoral programs.
- Nearly \$25M in annual research funding, third behind only the School of Medicine and the School of Public Health and Tropical Medicine.
- In keeping with the University commitment to community involvement, has established two community outreach initiatives:
  - K-12 STEM Education
  - Technology Transfer and Business Development.



# STEM Education

- **Science**
- **Technology**
- **Engineering**
- **Mathematics**



# Science

- Science is a fundamental component of a well-rounded education. An understanding of science should be expected of every citizen of the 21<sup>st</sup> century.
- It is not sufficient to teach science as a compilation of facts. It is critical that students understand what it is to “do” science, i.e. the “scientific method.”
- Too many teachers who are assigned to teach science courses are not educated in the subject matter.
- A science course should be taught by a teacher who not only has been educated in that specific scientific discipline but who also takes joy in doing science and can convey this joy to the students.



# Mathematics

- Mathematics is also a fundamental component of a well-rounded education. Some level of mathematical literacy must be expected of everyone.
- Mathematics is essential to doing science. One cannot do science without mathematics.
- As with science, too many teachers are being assigned to teach mathematics courses in which they have little understanding of the subject matter and in which they take no joy.
- A lack of enthusiasm for, or even fear of, a subject is transferred to the students who can then be turned off by the subject.

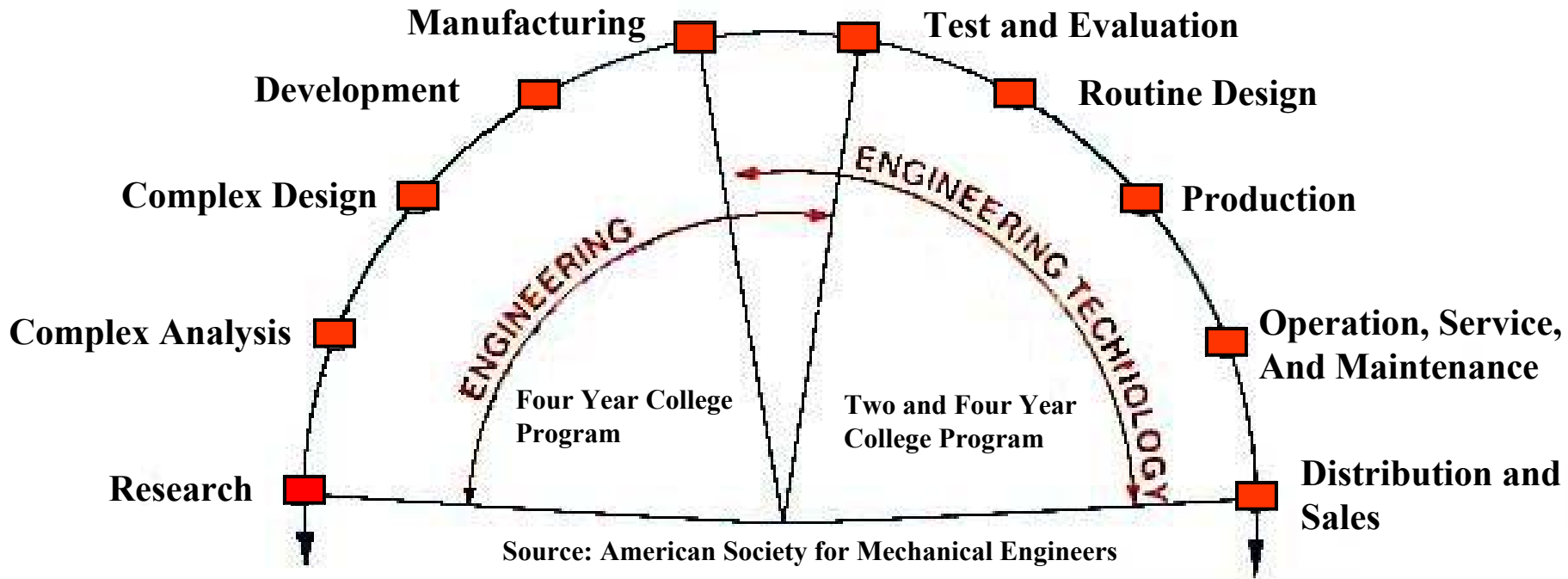


# Engineering vs. Technology

- There is a very big difference between “engineering” and “technology” but the distinction is not well-understood by many who are involved in K-12 education.
- Among those blurring the distinction are:
  - the US Department of Education
  - many organizations and companies working to introduce engineering and technology into the K-12 curriculum.
- In higher education, “Engineering” and “Engineering Technology” programs are both accredited by ABET but they are subject to very different criteria and they open the door to very different career options, e.g. “electrical engineer” vs. “electronics technician.”
- “Engineering” requires a significantly higher level of mathematics than does “Engineering Technology.”



# Engineering and Engineering Technology -Career Paths-



# Questions

- Is it possible to teach technology in K-12? If so, at what level and what, if anything, should it replace in the curriculum?
- Is it possible to teach engineering in K-12? If so, at what level and what, if anything, should it replace in the curriculum?
- Are we unintentionally confusing K-12 students about what constitutes a career in science vs. engineering vs. technology?
- Are there ways, other than curricular, to inspire K-12 students to pursue careers in engineering and to properly prepare them to do so?



# A call to (more and better coordinated) action

- **Inspiring students to pursue STEM careers.**
  - Local activities: GNOSEF, FIRST, DOE Science Bowl, etc.
  - National example (engineering): ASEE/AAES/NAE initiative.
- **Preparing students to be successful in STEM careers.**
  - Education and certification of subject-specific teachers.
  - Local activities: GNO STEM Initiative, etc.
  - College/High School partnerships and programs (NSF, TSSP, etc.).
- **Expanding “SM” education to “STEM” education in K-12?**
  - “Project Lead the Way;” etc.
  - Proposed ASEE involvement.



Questions?

