

Engineering Education for the Near Future

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Outline of Talk

1. World Wide Competition Resulting from Enhanced Communications
2. Defining Engineering
3. Need for Leadership Skills
4. International Design Teams
5. Requiring Undergraduates to TA
6. Cross disciplinary Courses and Including Non Engineers
7. Current Placement of Graduates



World Wide Competition

1. Asia is Graduating Close to a Million Engineers a Year.
US 60,000
2. Optical Communications and Satellites Make
Communication Low Cost.
3. This Makes Engineers World Wide Available for
Many Projects Available at $\frac{1}{3}$ to $\frac{1}{10}$ of the Costs
in the US.



Defining Engineering Educational Objectives

1. Solving Social Problems Using Math and Science.
2. Being Able to Design Products that Customers will Buy,
3. How do Engineers Differ from Scientist, Technicians
4. Engineering as the Science of Avoiding Work.



Defining Engineering Requirements

1. A Need for Broader Skills
2. Seeing the Big Picture of Where the Industry or Society is Going Before Others
3. Example of the Electric Car
 - A. Technical Requirements,
 - B. Possible Changes in Batteries, or Combustion, Super Capacitors
 - C. Changes in Combustion Efficiency
 - D Changes in Living Style with \$10+ /gallon

Defining Engineering Requirements

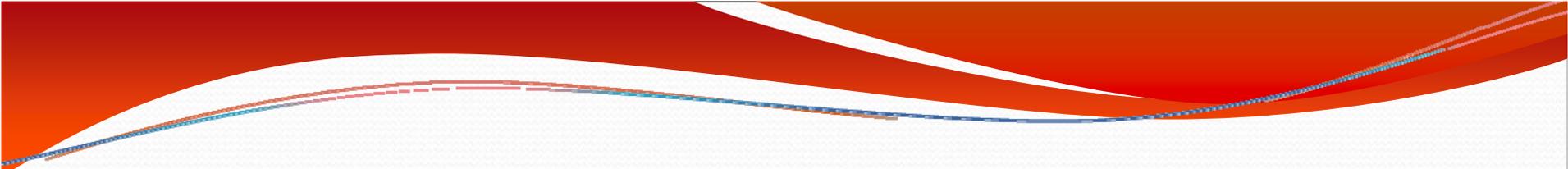
4. Writing and Speaking Skills,(Thinking Clearly and Expressing Ideas Efficiently and Effectively).

Possible approaches

- (1) Term papers, original and current papers
- (2) Courses on Speaking and Writing
- (3) Part of the Social Science and Humanities
- (3) Systematic requirements every term

5. Leadership Skills to be Competitive

6. Honesty +



Leadership Training

1. Technical
2. Management
3. Entrepreneurial
4. A Need to Address These Skills Systematically
5. Capstone Teams but How do We See that Each Student Tries Leading More than Once and Learns From His or Her Mistakes?



Leadership Training

1. Working on International Design Teams
2. Example of International Future Energy Challenge
3. Working or Going to School Outside the Country for a Term or a Year.





Leadership Training

Undergraduate Teaching or TA's as a Requirement for Graduation

- Improves Technical Depth of Understanding
- Improves Organizational and Speaking Skills
- Grading and Helping Make up Tests Changes Study Habits.
- Gives the Students Taking the Class Attention from Someone Who Has Recently Taken It.

Cross Disciplinary Courses

- Integrates Technical Information with History, Economics, Society
- Can Appeal to a Large Group of Students
Examples: Wireless, Energy + Environment, Water, Disaster Recovery, Security, etc.
- Add to understanding of Engineering by other student majors.
- Can provide Teaching Opportunities for Undergraduates.

Figure 1

The Future for Engineering Graduates

- Most graduates will not be “engineers” in 25 years

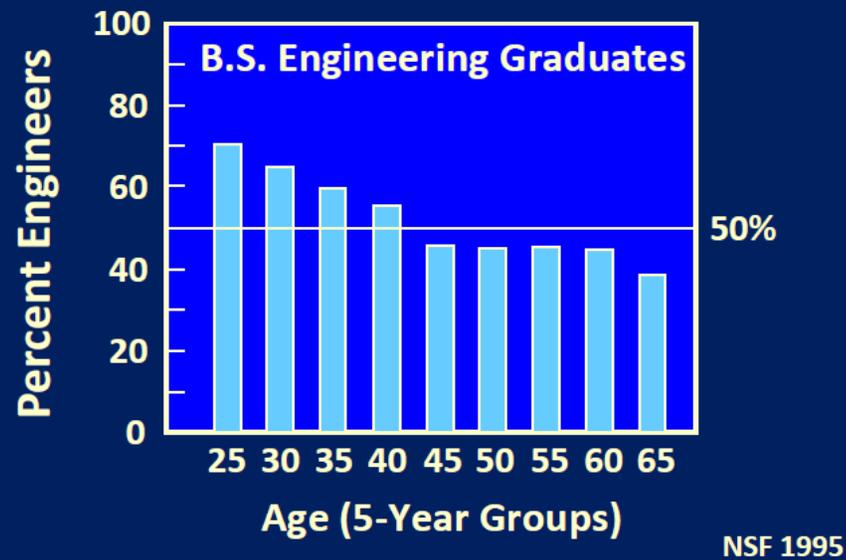
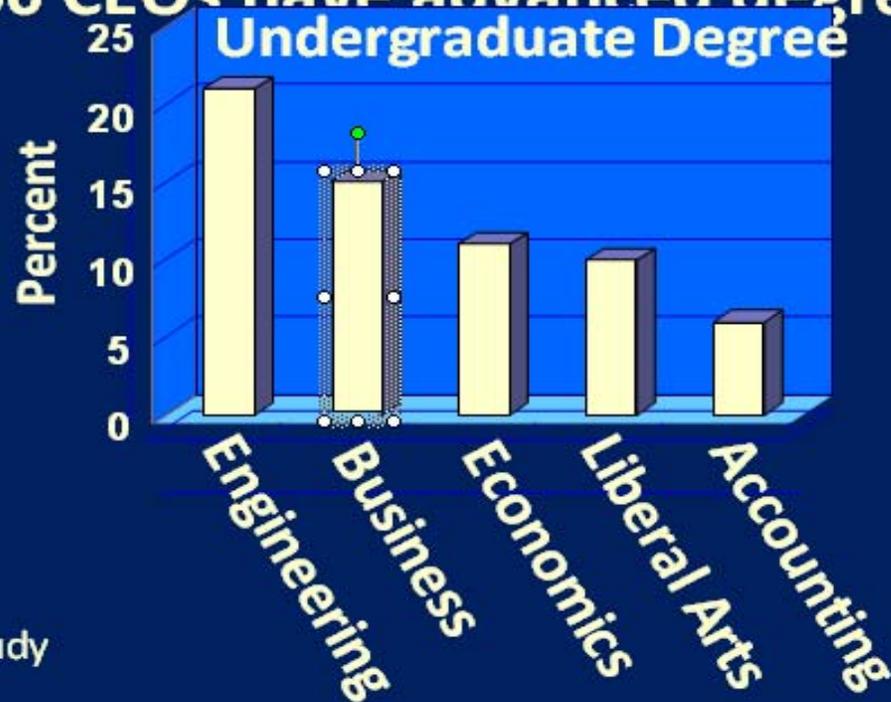


Figure 2

Fortune 500 CEOs

- Most common undergraduate degree: Engineering
- 78% of Fortune 500 CEOs have advanced degrees
 - MBA: 38%
 - Law: 11%
 - Other: 29%



SpencerStuart 2004 CEO Study