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What is Engineering and Why Encourage Students to Consider this Field?

Project Lead the Way (PLTW) Facilitates Career Exploration for Students

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Project Lead the Way offers students an opportunity to explore fields which offer exciting career options that rarely get discussed in traditional K-12 curriculum. Our objective is to introduce you to some of these fields and discuss how the PLTW curriculum increases awareness and generates interest among students about these interesting career opportunities.



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Project Lead the Way Mission

Create dynamic partnerships with our nation's schools to prepare an increasing and more diverse group of students to be successful in engineering and engineering technology programs.

Source: PLTW Website

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When is the last time you saw an engineer on TV? CSI shows have led to Forensics Science Majors popping up at many US colleges. And shows about lawyers and doctors are a dime a dozen. How about in the movies? The movie Apollo 13 came out in 1995 – but for those of you who saw it (and most of the students in middle and high school have not) all of the engineers at NASA were white men. How about in the newspaper? In Boston, engineers were all over the front pages because a 26 ton ceiling panel fell on a car, killing Milena Del Valle. Last month, there was an engineering “problem” on the most recent Space Shuttle and of course no one can forget the Challenger disaster. So one critical issue is that we have a public relations problem and lack multiple channels of information about engineering.

An organization that offers students an opportunity to explore fields which rarely get discussed in traditional middle and high school classrooms is Project Lead the Way. Project Lead the Way has developed a four year sequence of courses which, when combined with college prep mathematics and science courses in h.s. introduces students to engineering and engineering technology prior to engineering college.

PLTW curriculum is available in over 1700 schools in the US (49 states) and many of the people you may be speaking with are PLTW sites. They are a great resource for you to refer students, parents, teachers and counselors. Their url is listed in the materials you will receive.

One of the challenges of Project lead the Way is to engage more females in engineering and engineering technology which we will be discussing today.



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Greatest Engineering Achievements of the 20th Century

- | | |
|--|---|
| <ul style="list-style-type: none">▪ Electrification▪ Automobile▪ Airplane▪ Water Supply and Distribution▪ Electronics▪ Radio and Television▪ Agricultural Mechanization▪ Computers▪ Telephone▪ Air Conditioning and Refrigeration | <ul style="list-style-type: none">▪ Highways▪ Spacecraft▪ Internet▪ Imaging▪ Household Appliances▪ Health Technologies▪ Petroleum and Petrochemical Technologies▪ Laser and Fiber Optics▪ Nuclear Technologies▪ High Performance Materials |
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<http://www.greatachievements.org/>

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How many of the 20th century's greatest engineering achievements will you use today? A car? Computer? Telephone? This list, developed by the National Academy of Engineering identifies their concept of the top 20 engineering achievements, most of which we all take for granted and depend upon every day of our lives. These engineering achievements have shaped a century and changed the world. Take water supply and distribution for instance.....CLEAN WATER is the single most important discovery in improving life expectancy among human beings (not medical breakthroughs) as most people think. Engineering is responsible for this discovery.

If Americans were more aware of these contributions, would students would be more interested in participating in the field?



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Why Should We Encourage Students to Study Engineering?

- **In 2003, there were 1,300,000 engineering and engineering technology jobs available in the U.S. without trained people to fill them.**
- **Between 1980-2000 the number of nonacademic science and engineering jobs increased by 159%.**
- **The total number of retirees among science and engineering degree workers will increase dramatically over the next 20 years because the 40-44 age group is nearly 4 times as large as the 60-64 age group.**

Source: PLTW Website (NSF 2004 Study)

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In order for the US to remain competitive and to deal with the challenges that face us globally, we must educate students from all demographic backgrounds and encourage more to consider engineering. The numbers are NOT in our favor.



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Why Do We Care if Women and Minorities Become Engineers?

- **As a consequence of a lack of diversity [in engineering] we pay an opportunity cost, a cost in designs not thought of, in solutions not produced.**

Source: Dr. Bill Wulf, Past President, National Academy of Engineering

- **If we do not engage women and minorities in the engineering enterprise, we are ignoring more than 50% of America's intellectual talent.**

- **By the year 2050, 85% of the entrants into the workforce will be people of color and women.**

Source: Bostonworks.com

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Yes, Engineering Is A Woman's Job

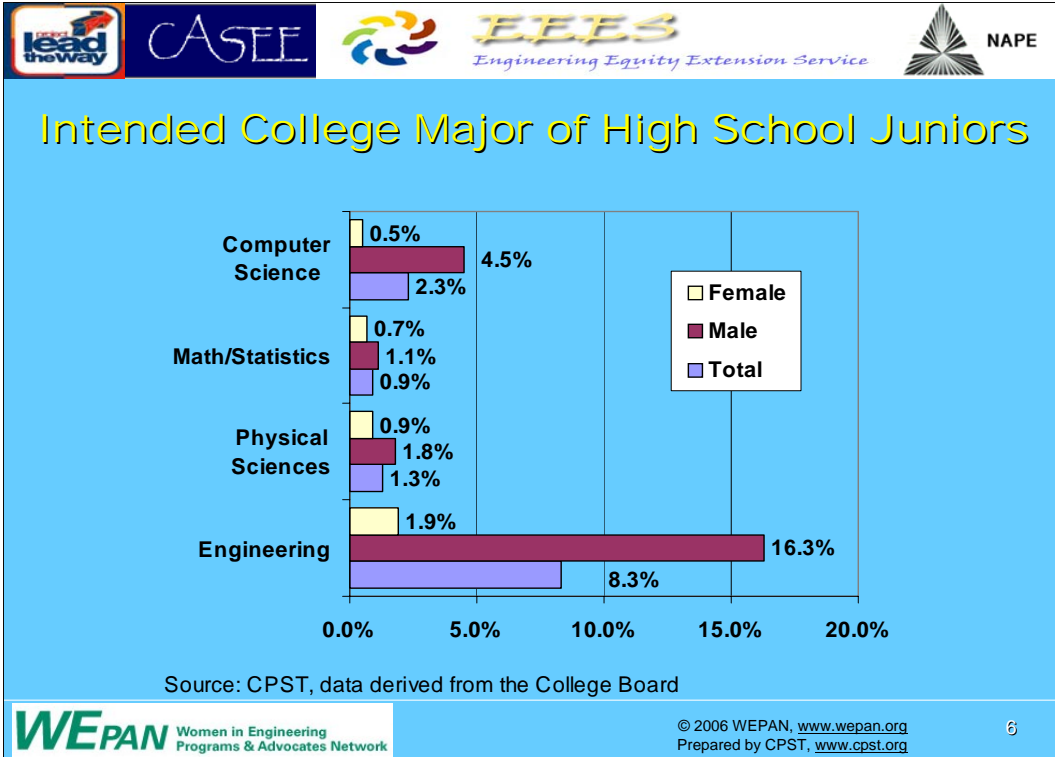
Jill S. Tietjen | ED Online ID #10117 | April 14, 2005 Electronic Design Magazine

This article written by Jill Tietjen, a woman engineer provides some insight as to what William Wulf had in mind when he made this statement. Women see things differently than men. Women would not have designed the early versions of VCRs that no one could program. Women would not design a PDA specifically or primarily to fit in a man's breast pocket. Plus, women would not design car airbags that are likely to seriously injure or kill people when it deploys. But 30 women were involved in the design of the Ford Windstar. This very popular van won the five-star governmental award (the highest) for frontal crash tests. In addition, it included such features as square cup holders designed for juice boxes and a reverse sensing system that beeped to warn backing-up drivers of objects in the way. It also had sliding doors on both sides that could be opened by clicks on the key fob.³ Women think differently.

---Environmental concerns were also addressed: The 1999 Windstar was the first and only gasoline-powered minivan to meet nationwide low emission vehicle requirements and for "green" states, ultra-low emissions requirements.

•Women represent nearly 52% of our population and arguably 52% of the brainpower in this nation. We can't afford to ignore this population.

•There will not be enough white males to fill the positions in the science and engineering workforce in the future.

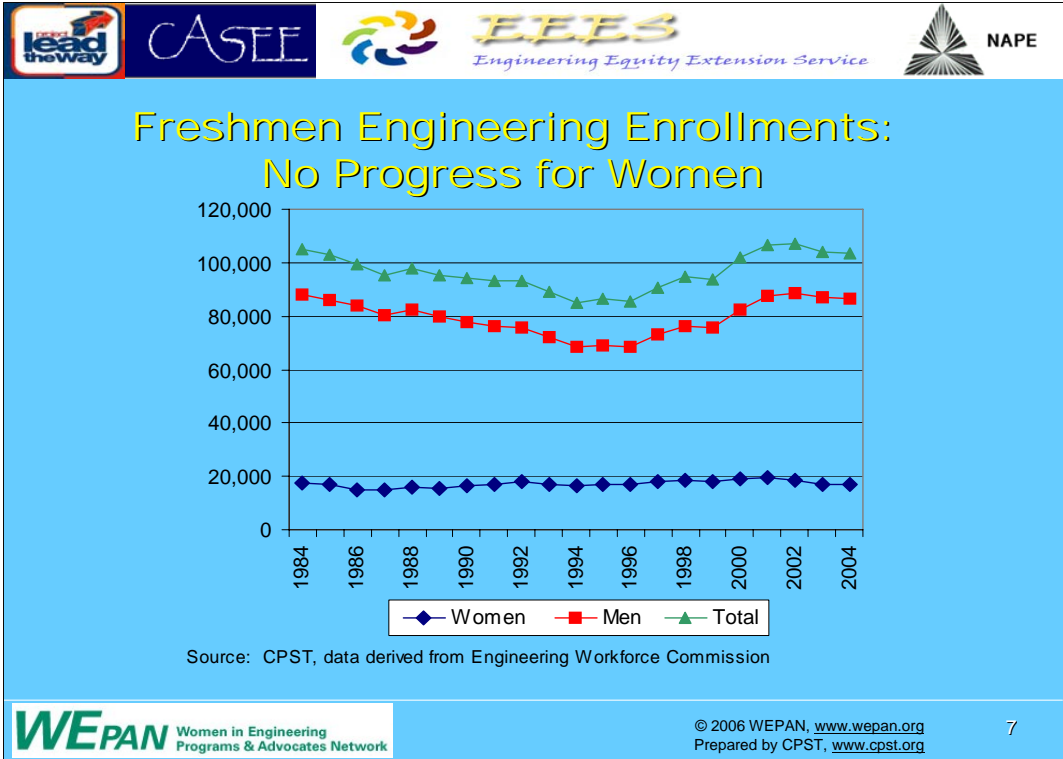


This next group of slides provides some background on the status of women and minorities in engr. and engr technology. You may want to pick and choose a few of the ones you find most compelling to make your case....

Among the 1.4 million high school juniors taking the PSAT in 2004-05, 8.3% indicated that they planned to major in engineering. Males were far more likely to indicate that they planned to major in the field than women – 16.3% vs. 1.9%.

A total of 603,000 male and 753,000 female high school juniors took the PSAT in 2004-05.

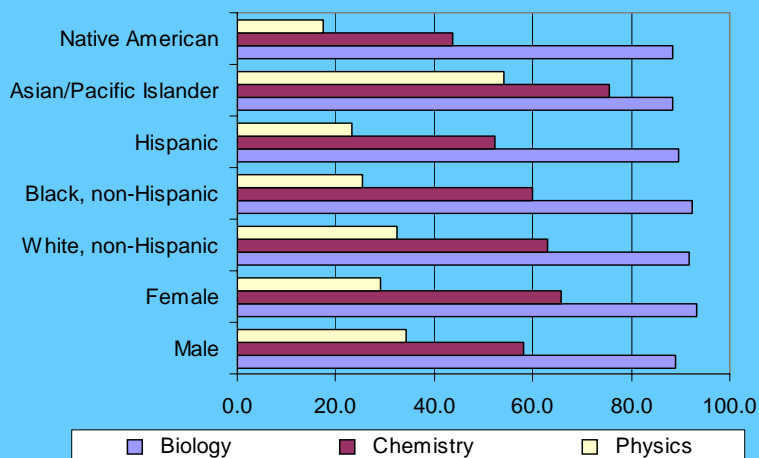
Source: Commission on Professionals in Science and Technology. Data derived from The College Board, 2004-2005 College-Bound High School Juniors.



Freshmen enrollment in engineering is at nearly the same level today as it was 20 years ago. From 1984 to 2004, the number of freshmen women actually dropped 2.6% from 17,356 to 16,896. For men, the number dropped 1.6%, from 87,893 to 86,465. Therefore, **women are actually a slightly smaller proportion of the freshmen engineering class today than they were two decades ago – representing 17.5% in 2004, down from a high of 20.1% in 1984.**

Source: Commission on Professionals in Science and Technology. Data derived from Engineering Workforce Commission, Engineering & Technology Enrollments, Fall 1984 through Fall 2004.

What Science Courses Are U.S. High School Students Taking?



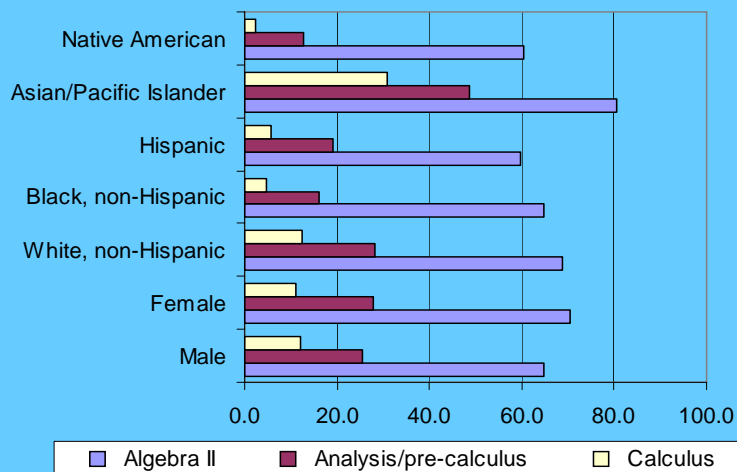
Source: CPST, data derived from National Center for Education Statistics

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What is interesting is that young women are taking the math and science courses they need to be academically prepared to major in engr.

Females were more likely to have taken chemistry than males (65.7% vs. 58.0%) as well as biology (93.3% vs. 89.0%), but males were more likely to have taken physics (34.2% vs. 29.0%).

What Mathematics Courses Are U.S. High School Students Taking?



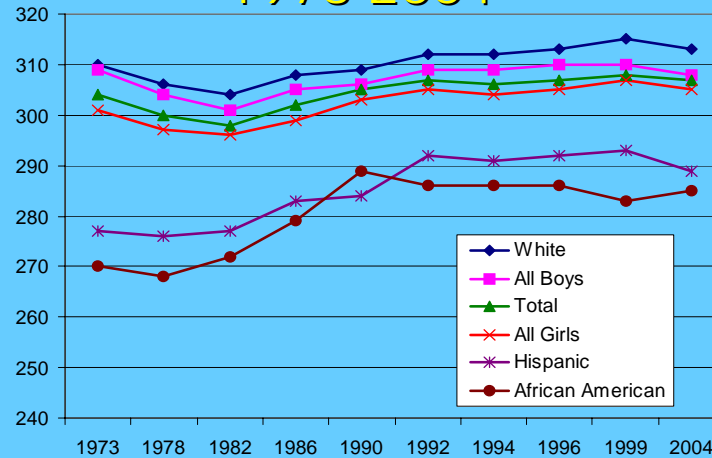
Source: CPST, data derived from National Center for Education Statistics

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In math, males and females are taking the same courses with slight differences.

Males were slightly more likely to have taken Calculus than females (12.2% vs. 11.1%), females were more likely to have taken Analysis/Pre-Calculus (27.9% vs. 25.4%) and Algebra II (70.5% vs. 64.8) than males.

Trends in NAEP Math Scores by Sex and Race/Ethnicity, Age 17, 1973-2004



Source: CPST, data derived from National Center for Education Statistics

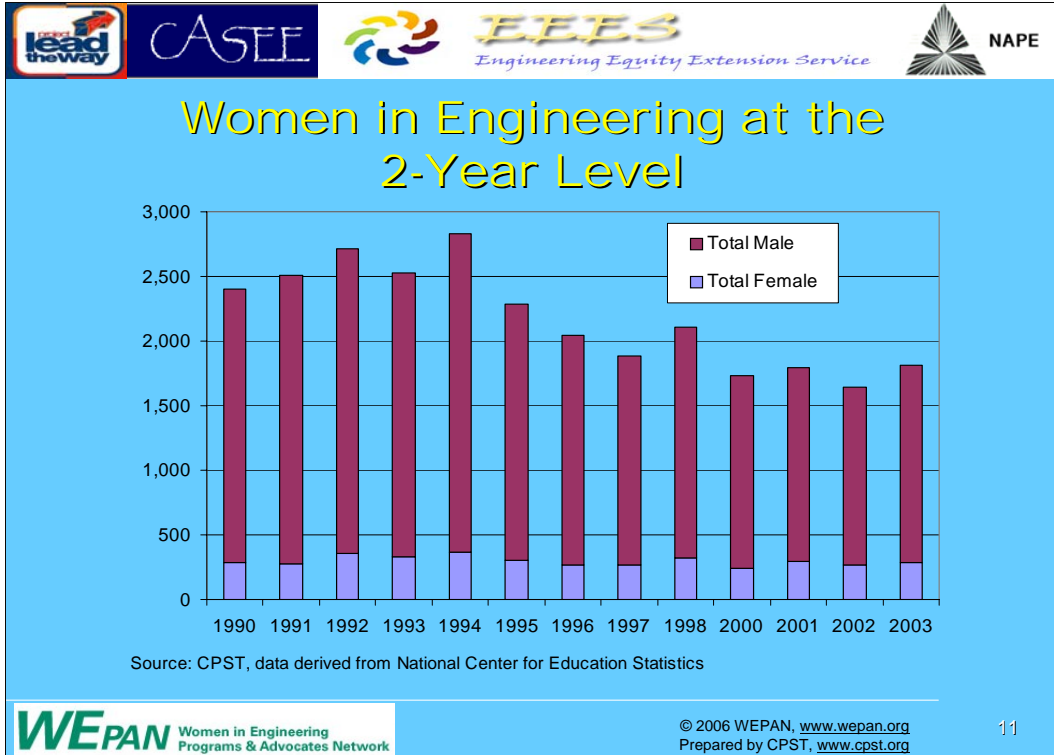
10

When you look at the National Assessment of Educational Progress (NAEP) test, scores have not changed significantly over the past three decades. In 1973 the average score for all students was 304, and in 2004 it was 307.

And in terms of gender, there are only 3 points separating boys and girls in 2004 (305 and 308).

So the bottom line is that girls are academically prepared for engineering, they are just NOT INTERESTED.

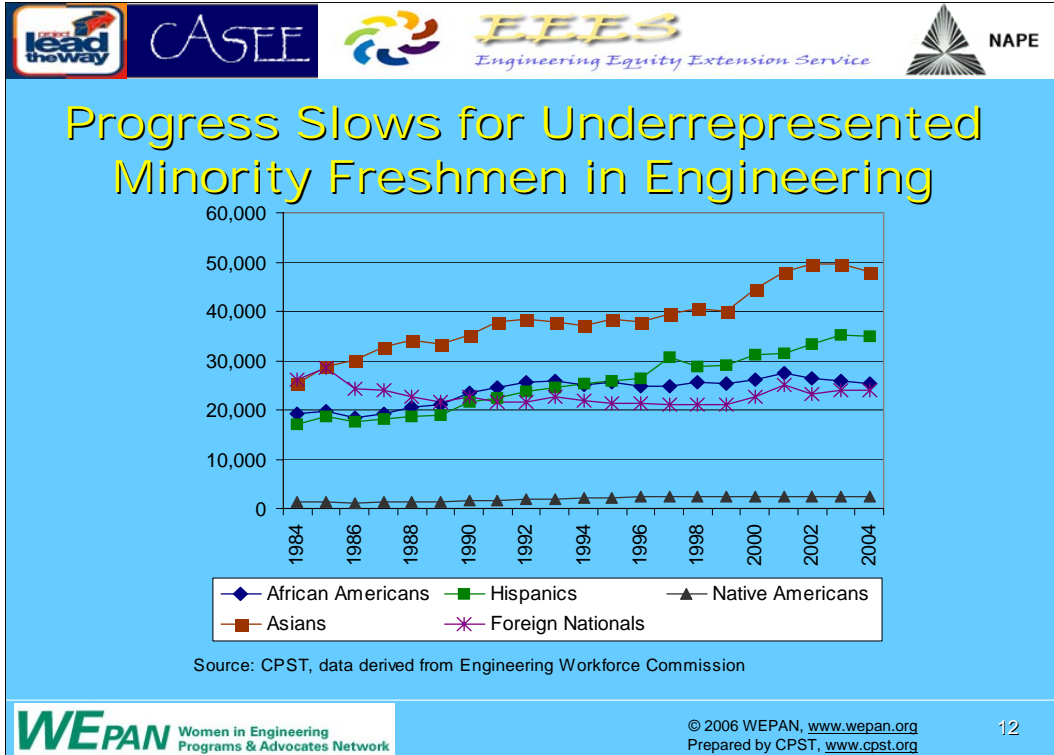
It is important to note that although Hispanics and African Americans made substantial progress in the 1980s, scores have leveled off since 1992. So more work needs to be done to improve the academic preparedness of students from these demographic groups. Uncertified math and science teachers teaching math and science particularly in urban areas and lower socioeconomic areas is one area that needs attention.



About one in every six associate's degrees in engineering are earned by women, however the total number of engineering associate's degrees was only 1,816 in 2003. While the number of degrees awarded is small, it appears that many students take at least some courses at community colleges en route to a higher degree.

In fact a 2004 report from the National Science Foundation found that almost half of the more than 740,000 science and engineering graduates with bachelor's degrees in 1999 and 2000 attended a community college at some point.

Source: Commission on Professionals in Science and Technology. Data derived from National Center for Education Statistics, *Digest of Education Statistics, 2004*, NCES 2006005, October 2005 and previous editions; and National Science Foundation, *The Role of Community Colleges in the Education of Recent Science and Engineering Graduates*, NSF 04-315, <http://www.nsf.gov/statistics/infbrief/nsf04315/>.



While total freshmen enrollment in engineering has declined 1.8% from 105,249 in 1984 to 103,361 in 2004, both the absolute number and the proportion of all underrepresented minority groups has increased.

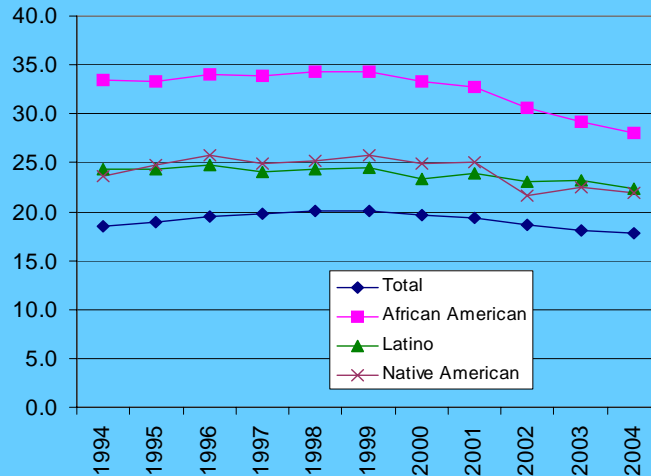
Hispanics experienced the greatest growth with a 72% gain, from 4,814 to 8,268, followed by a 70% increase for Native Americans, from 410 to 696, and an 18% gain for African Americans, 6,245 to 7,374.

Despite these gains over the past two decades, progress has stalled for African Americans and Asian/Pacific Islanders in the last few years, with their numbers and proportions both declining.

In Fall 2004, Hispanics were 8.0% of the freshmen engineering class, African Americans were 7.1% and Native Americans were 0.7%.

Source: Commission on Professionals in Science and Technology. Data derived from Engineering Workforce Commission, Engineering and Technology Enrollments, Fall 1984 through Fall 2004.

The Decline of Women in Engineering Evident for all Races/Ethnicities

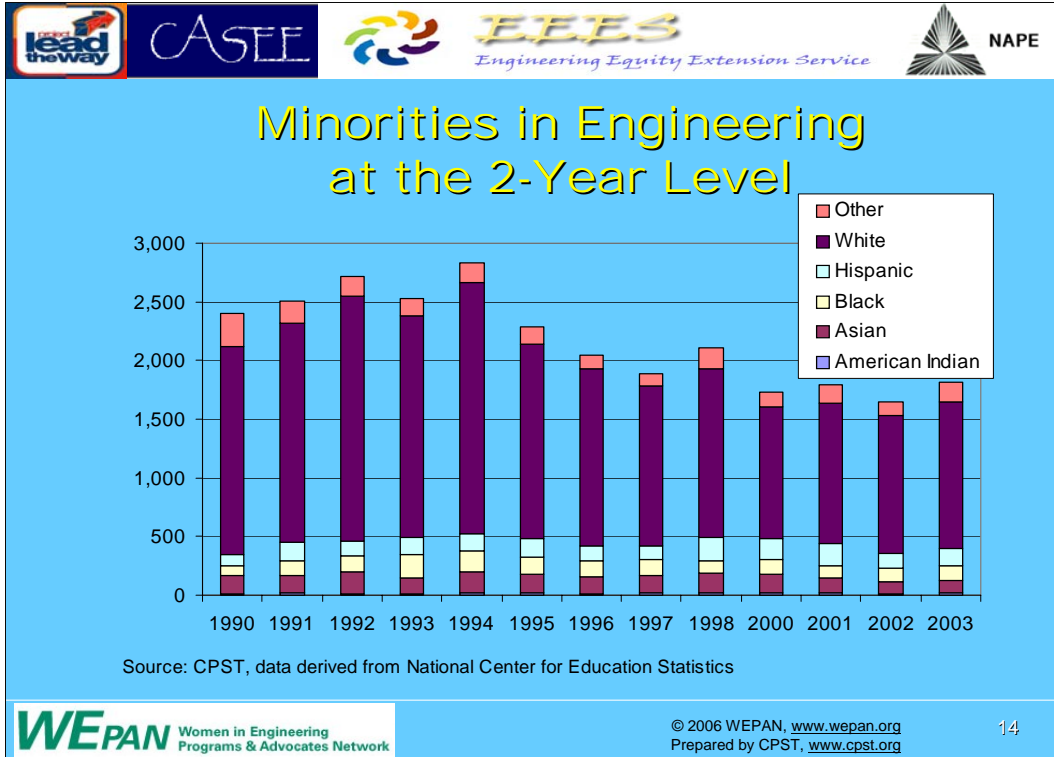


Source: CPST, data derived from Engineering Workforce Commission

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WOMEN MINORITIES

Among full-time undergraduate engineering enrollments, the proportion of women has declined for all groups, but particularly for African Americans. Over the last decade, African American women, as a proportion of all African Americans, declined from a high of 34.0% of full-time undergraduate engineering enrollments in 1996 to a low of 28.0% in 2004. Accompanying this proportional decline was a drop in absolute numbers, from 8,001 in 2001 to a low of 6,371 in 2004.

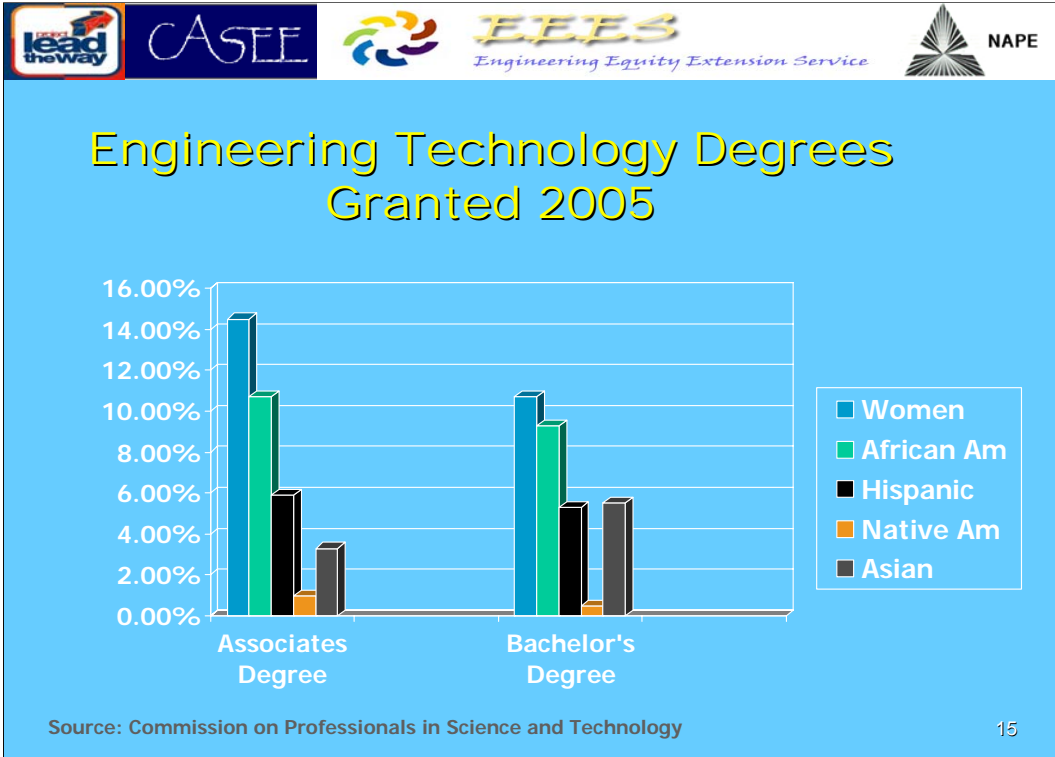


In 2003, whites earned 68.8% of the 1,816 associate’s degrees awarded in engineering. This compares to 8.3% for Hispanics, 6.4% for Blacks, 1.0% for Native Americans , 6.2% for Asians and 9.2% or ‘other’ (includes those of other races/ethnicities and temporary residents).

According to the same 2004 National Science Foundation report on recent science and engineering graduates, community college attendance varies across racial/ethnic groups, with Hispanic science and engineering graduates more likely to have attended a community college than any other minority group (51%) but no less than 40% for the other groups.

About 51% of Hispanic science and engineering graduates reported attending a community college before receiving their bachelor’s or master’s degrees, compared with 45% of Native Americans, 44% of Blacks, 43% of Whites, and 40% of Asian/Pacific Islanders.

Source: Commission on Professionals in Science and Technology. Data derived from National Center for Education Statistics, *Digest of Education Statistics, 2004*, NCES 2006005, October 2005 and previous editions; and National Science Foundation, *The Role of Community Colleges in the Education of Recent Science and Engineering Graduates*, NSF 04-315, <http://www.nsf.gov/statistics/infbrief/nsf04315/>.



In Engineering Technology, students can obtain a 2-year Associates degree or a 4-year Baccalaureate degree in several Engineering Technology fields.

What is the difference between engineering and engineering technology? Here is a comparison of each field at the bachelor's level. (source: <http://www.et.uncc.edu/comparison.html>)

Both use skills in math, science and engineering, though the level of skill varies.

Engineering Graduate

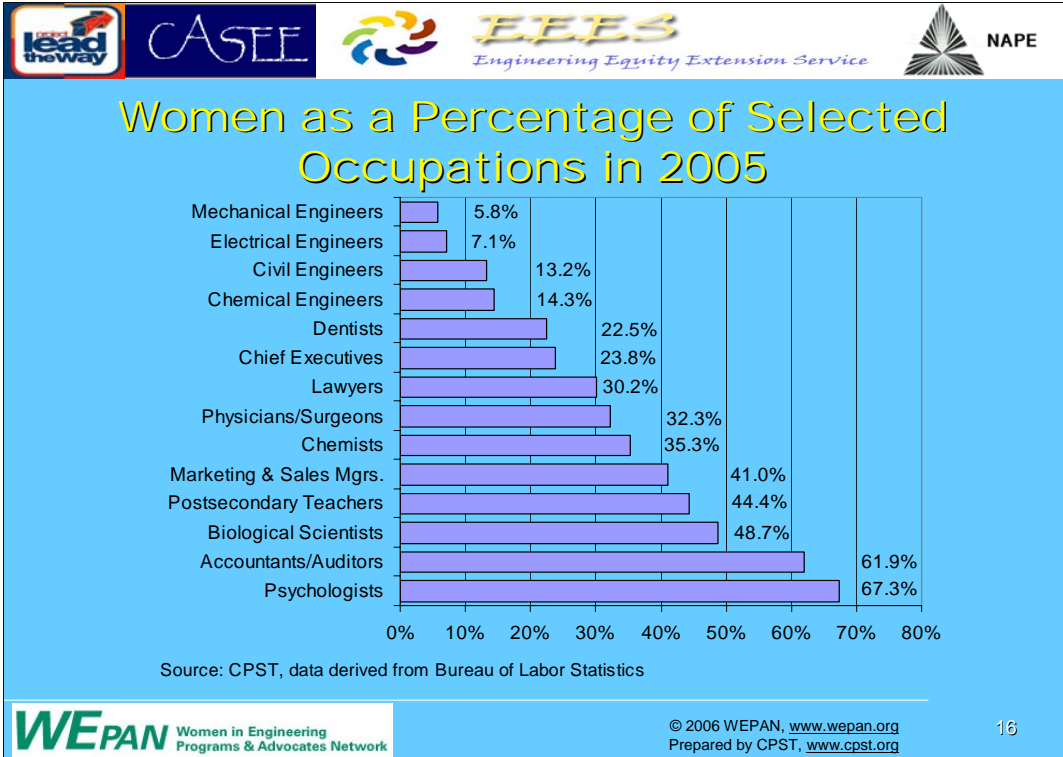
An innovator - one who is able to interweave a knowledge of advanced mathematics, the natural and engineering sciences, and engineering principles and practices with considerations of economic, social, environmental, and ethical issues to create new systems and products. **The engineering graduate can develop new procedures to advance the state of the art.**

Engineering Technology Graduate

A doer or implementer - one who is able to apply a basic knowledge of mathematics, the natural and engineering sciences, current engineering practices, and an understanding of economic principles to the solution of design problems and to the operation or testing of engineering and manufacturing systems. **The engineering technology graduate can apply established procedures which utilize the current state of the art.**

Associate Degree in (Engr. Tech) - graduates are referred to as engineering technicians.

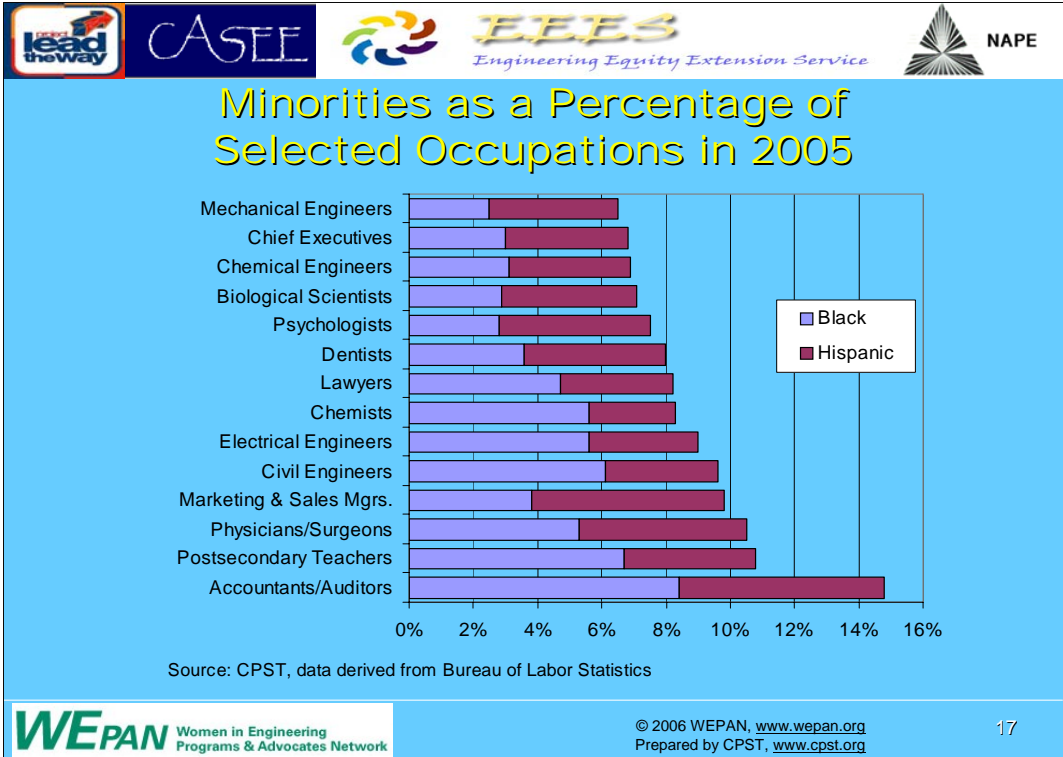
Bachelors Degree in (Engr. Tech) - graduates are referred to as engineering technologists, however it should be noted that the **actual job title given to graduates depends solely upon the employer**, and is usually based upon the graduate's degree, experience, and the specific job position assigned by the employer.



Women make up just a small percentage of working engineers. For example, they are just 6% of mechanical engineers and 7% of all electrical engineers. In contrast, they account for 24% of chief executive officers, 30% of lawyers and 32% of physicians and surgeons.

What this suggests is that woman are certainly capable of doing highly intellectual professional work that does include math and science....they are just not interested in doing engineering.

Source: Commission on Professionals in Science and Technology. Data derived from Bureau of Labor Statistics, Current Population Survey, Annual Averages, 2005.



Let's look at minorities in the workplace.

Minorities also make up just a small percentage of working engineers, but they are actually better represented in some engineering occupations than in some professional occupations. For example, Blacks/African Americans and Hispanics combined are make up 9% of all electrical engineers, but they account for just 8% of lawyers. Among the occupations shown in this slide, they comprise the largest percentage of accountants and auditors (15%).

Source: Commission on Professionals in Science and Technology. Data derived from Bureau of Labor Statistics, Current Population Survey, Annual Averages, 2005.

Career Challenges for the 21st Century

- Energy
- Environment
- Healthcare
- Information Systems
- Security
- Communications
- Transportation



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The U.S. and the world are facing enormous challenges. Here are some of the fields in which engineers will have an enormous impact which is why it is imperative that we engage people from diverse backgrounds...We need all the technical talent available to focus on these issues. Specific examples....

Energy: Alternative energy sources need to be developed such as solar and wind and current sources such as oil need to be conserved.

Environment: Designing ways to protect the environment as we use our natural resources is critical. Strategies to address global warming need to be developed and implemented.

Healthcare: Finding new ways to conduct surgery, developing state of the art prosthetic devices for people who have lost the use of limbs, designing equipment to help people maintain a good quality of life as we continue to live longer, is a significant challenge.

Information Systems: Providing, storing and protecting the huge amounts of information we have access to through the Internet and other sources need to be managed.

Security: Post 9/11 national security is a critical need in our airports, malls, buildings, stadiums and borders to name a few. New systems and approaches need to be developed, tested and implemented.

Communications: We are all so reliant on our various communications systems which are constantly changing and improving the way we operate in the world.

Transportation: Better transportation systems need to be developed to protect the environment and make roads and cities more accessible to everyone – particularly as the tunnels, bridges, roads, airports etc. and other pieces of our country's infrastructure age.



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Engineering?

- **66% Americans feel they are “not very” or “not at all” well informed about engineering and engineers.**
- **53% of American men are “very” or “somewhat” interested in engineering compared to 28% of American women.**

Source: Harris Poll Commission by AAES: American Association of Engineering Societies in 2003

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Among college graduates, 53% are not very well or not at all informed about engineering and engineers.

The fact is --- although engineering innovations surround us, and engineering is the second largest profession in the US (education is #1), ENGINEERING remains an enigma to most people. Yet we have very little understanding of the field. What are some of the reasons why this is the case?

- Not well integrated into K-12 education (with the exception of PLTW schools)
- Non-existent in major media such as movies, tv, mainstream publications
- Not part of the everyday life of Americans as are doctors, nurses, teachers etc.

What Do Engineers Do?

Engineers are men and women who work in teams and use their skills in math and science to assess and solve problems, and create products and processes that improve the quality of people's lives around the world.



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This is a broad and basic definition that appeals to a diverse group of people. It speaks to both genders, addresses skills in math and science without sounding genius-like, talks about creativity and making a difference in people's lives.

One question that typically comes up is "What is the difference between a scientist and an engineer? Again, in broad terms this is how one faculty member I know responds:

Scientists analyze:... to understand and explain the world around us.

Engineers synthesize:... to design products and processes within economic, environmental and other constraints that benefit society.



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In What Areas Do Engineers and Engineering Technicians Work?

- **Production/Manufacturing: iPods, prosthetic devices**
- **Product and Project Design: “green buildings”, hybrid cars**
- **Operation Service & Maintenance: oil refineries, waterways**
- **Technical Sales and Marketing**
- **Consulting**
- **Teaching (Pre-College and College)**
- **Research: alternative energy sources, security**
- **Technical Writing and Journalism**
- **Policy Analysis and Development**
- **Patent Law**

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Engineering is a very diverse profession that allows tremendous flexibility. Engineers work in all sectors including industry, government and academia, for profit and non-profit organizations. They also put their skills to work in different areas including (the bullets identified in this slide). Some are more traditional, others non-traditional...but all engineering.



Engineering Disciplines

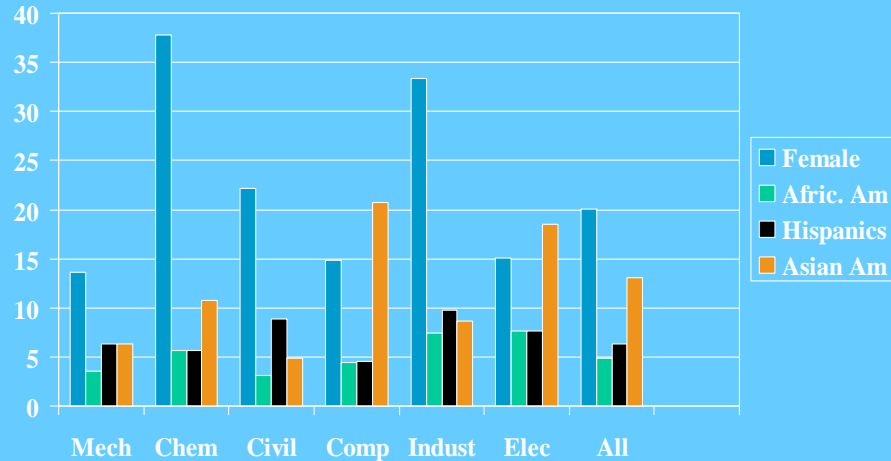
- | | |
|--|---|
| <ul style="list-style-type: none">▪ Aeronautical▪ Agricultural▪ Automotive▪ Biomedical▪ Chemical▪ Civil▪ Computer▪ Electrical▪ Environmental | <ul style="list-style-type: none">▪ Industrial▪ Marine▪ Materials▪ Mechanical▪ Mining▪ Nuclear▪ Ocean▪ Petroleum▪ Polymer |
|--|---|

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These are most of the specific areas of study in engineering. The largest and most traditional fields of study are chemical engineering, civil engineering, electrical engineering and mechanical engineering. The fields with the highest representation of women studying at the undergraduate level are biomedical, chemical, environmental and industrial engineering.

Civil engr. tends to be the most recognizable discipline – bridges, tunnels, roads, people wearing hardhats.

Bachelor's Degrees Granted by Engineering Discipline 2004



Source: CPST, data derived from Engineering and Technology Enrollments: Engineering Workforce Commission NOTE: Native Americans less than 1% in all categories.

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It is interesting to note that the two largest disciplines, mechanical and electrical engineering have close to the lowest representation of women studying at the undergrad level. (13.6% and 15.1% respectively). Chemical engineering, which many students perceive as the most difficult discipline has one of the highest percentages of women 37.8%, biomedical, although a small # of students has nearly 50% women.

Why is this the case? There has not been much research on this topic, but the common thread that runs through the disciplines with the highest percentage of women are words like: caring, nurturing, making a difference in people's lives.

Obviously environmental engineering and biomedical engineering by their very terminology connote caring and helping and making a difference in people's lives.

Chemical engineering focuses on food, pharmaceuticals, and some people contend that since students do take chemistry in high school, there is an element of familiarity or comfort in that students perceive they have more of an understanding of chemical engineering than other engr. disciplines which is probably not true – but perception counts a great deal.

There are several organizations that publish concise descriptions of many of these disciplines that can be accessed online: ASEE.org, WEPAN.org, SWE.org.



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Salaries of Engineers and Engineering Technicians

- **Median annual salary of engineers employed in industry and government with a bachelor's degree ranges from \$70,000 to \$94,000 depending on discipline.**
- **Median annual salary of engineering technicians with an associates degree is \$47,000.**

Source: Commission on Professionals in Science and Technology

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What I have presented here is the median salary range (comes up most frequently). These numbers represent an average salary across all experience levels. Therefore, an engineer with very few years of experience will earn less than the median while those with many years of experience earn considerably more. Salaries vary by engineering field and by sector (industry, academia, government).

Overall, the average salary of engineers with a bachelor's degree is higher than any other field with comparable education.

What Impacts Student Interest in Engineering?

- Engineering courses are practically non-existent in K-12 education. PLTW has assumed an important role in this regard.
- Stereotypes about engineering persist.
- A lack of information and awareness about contributions engineers make to society is prevalent.



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We have noted this before, but these are the major factors that deter all students who are academically prepared for engineering, from pursuing engineering.

- Lack of familiarity with what engineers do and the impact engineering has on society.
- Stereotypes that feed into a negative image of engineers and engineering.



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What Impacts Adolescent Girls' Interest in Math and Science?

- **Negative messages about their potential and prospects**
- **Decline in self-esteem which leads to a downward trend in math and science scores**
- **Role of media and popular culture in shaping the identities of adolescent girls**
- **No *one* solution to retaining young girls interest in math and science**

WEPAN Women in Engineering Programs & Advocates Network

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Prepared by CPST, www.cpst.org

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Research shows (*Reviving Ophelia: Saving the Selves of Adolescent Girls*) there is no single factor that explains the difference between girls' and boys' performance, but the decline in math and science interest begins in the middle school years.

Peer pressure and the need to fit in often precludes a transparent interest in pursuing math and science based study which still has a somewhat “nerdy image”.

The most recognizable role models for girls have nothing to do with math and science.



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High School Girls and Engineering Key Issues and Findings

- Engineering is portrayed as very challenging and stresses the importance of superior math and science skills. Messages do not include benefits and rewards of being an engineer.
- Professional interests for girls hinge on relevance - the job is rewarding and the profession is for someone “like me.”
- Career motivators for high school girls: enjoy their job, have a good work environment, make a difference, earn a good salary, and have flexibility.
- High school girls react positively to personal and informational stories. How does engineering align with their career motivators?

Source: Extraordinary Women Engineers Final Report, 2005

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A 2005 study conducted by the WGBH Educational Foundation for the American Society for Civil Engineers asked girls about their perception of engineering and what would help attract them to engineering. Here are some of the key findings.

Two themes emerge:

- Young women need information to assess if they would succeed in engineering – do people like me become engineers? Am I smart enough? Would I like it?
- I want to make a difference in the world....how is that relevant to a career in engineering?

Anything you can do to help students address these issues will help guide their decision. We will discuss some of these strategies on the next slide.



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How You Can Help: Key Messages to Convey


Familiarize yourself with various aspects of engineering so you can:

- **Talk about how people's lives have been affected by engineers.**
- **Converse about engineering as more than drafting and cars ... it can be about social issues and having a positive impact globally.**
- **Talk about hands-on fun, that it's not sitting in a cubicle all day, but it can be about traveling the world, making a difference, and seeing your creations come to life.**
- **Inform students that engineers not only make good money, but also contribute to the well-being of the human race.**

Source: *Extraordinary Women Engineers Final Report, 2005*

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Based on the WGBH “Extraordinary Women Engineers” research, high school girls suggest ways to discuss and portray engineering to increase their interest in the field. So when you talk about engineering or invite a speaker to talk about engineering, make sure these topics are covered.



Your Challenge: Convert Students' Perceptions

FROM THIS...	TO THIS...
<ul style="list-style-type: none"> ▪ Nerd ▪ Math and science geek ▪ Must be brilliant ▪ White male ▪ Primarily works with machines ▪ Communicates poorly ▪ Boring ▪ Rigid 	<ul style="list-style-type: none"> ▪ Creative ▪ Enjoys and does well in math and science ▪ Likes to solve problems ▪ Works in teams ▪ Improves the quality of people's lives ▪ Curious

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The list on the left was generated by nearly 2000 middle and high school students that I have worked with over the years when I asked the question “What stereotypes do you think of when you hear the word ENGINEER”. Basically it is a word association exercise.

The objective of most programs that intend to increase awareness about engineering is to change the audiences’ perception of engineers from the list on the left to the list on the right.



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What Else Can You Do to Encourage Students to Consider Engineering?

- **Dispel the stereotypes that persist about engineering.**
- **Provide information to students and parents about engineering.**
- **Encourage students to enroll in a PLTW course to explore the field.**
- **Suggest that students investigate programs at colleges designed to introduce students to engineering.**

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•Dispelling stereotypes continues to be a battle. (Refer to the previous slide). Often what I like to do with student groups is to start an information session with a blank slide that has a heading “Stereotypes of Engineers”. I ask them what a stereotype is and then I have students respond....so we create the list together. Usually I begin by suggesting the term NERD which breaks the ice.

Then after they participate in the engineering awareness program, I conclude the information session with another blank slide with the question: Characteristics of People Who Do Well in Engineering. Inevitably the items on the previous slide appear and if they don't I fill them in after the class interaction ceases. (Go to next slide)

OTHER THINGS TO DO....

- Give students a hand out or direct them to a website which profiles women and students in engineering in exciting areas. There are many good ones: Engineering Go For It produced by ASEE.org and Making the Connection Newsletters produced by WEPAN.org. and Engineer Girl produced by NAE.edu
- Recommend a summer program or conference sponsored by a local college. These programs typically have panel discussions featuring well-prepared students and engineers. They are usually arranged by the women in engineering or minority in engineering department at the college.
- Field trip to a local company that employs engineers can be interesting. You do need to do some prep work so the organization knows what you want and who to expect. I have taken students to manufacturing companies like Colgate Palmolive, Kraft Foods, NY Port Authority, Radio City Music Hall, Disney etc.



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What Else Can You Do to Encourage Students to Consider Engineering?...cont.

- **Broaden your perspective about the profile of students (male and female) who might be interested in or benefit from studying engineering.**
- **Remind students that taking math and science courses is important since so many careers in the 21st century require this knowledge.**
- **Organize a career program and include students who participated in PLTW and are now involved in the engineering profession.**

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And finally, a few more things to consider as you identify ways to attract students to engineering.

- As an example of the first bullet....maybe you know a student who is interested in marketing or writing or law but is also good in math and science. Studying engineering may give them a leg up on many interesting careers such as marketing or selling bio-tech products, being a science writer or editor or being a patent lawyer. Having an engineering degree typically gives you a leg up when applying to medical school or an MBA program and if you decide not to go to a professional school right away, you have many viable career options.

Inviting college students or professionals to speak to high school students works very well if you select the right people and prepare them for the talk.

- Have a young woman who is an upperclass engineering student at a local college come to school and talk about how she decided to major in engineering. If she participated in a Project Lead the Way Class she could discuss her experience. What does she like most about studying engineering? What does she think she might like to do when she graduates? As a caution, make sure the student you choose is not a “superstar”. You don’t want the high school students to feel less confident and generally “scared” after the speaker leaves.

- Have a woman who is a practicing engineer in an area that students can relate to speak to the class. Have her bring something visual that her company produces.



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Resources to Help Students and their Parents to Explore Engineering

- Project Lead the Way: www.pltw.org
- ASEE Engineering K-12 Center: www.engineeringk12.org
- Engineer Girl!: www.engineergirl.org
- Sloan Career Cornerstone Center: www.careercornerstone.org
- Engineers Week: www.eweek.org
- Society of Women Engineers: www.swe.org
- Try Engineering: www.tryengineering.org
- National Alliance for Partnerships in Equity
www.napeequity.org
- National Academies CASEE and EES Virtual Support Network
ees.nae.edu
- WEPAN: Making the Connection <http://www.wepan.org>

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Here are some of the websites I mentioned that are good resources for your audiences and for you if you are looking for handouts and materials. Others will be listed on the EES site.



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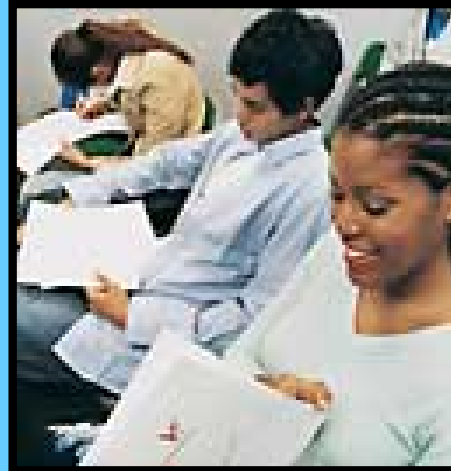


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