Engineering Resources for Educators, Students, Parents and Counselors

Engineering Our Future NJ Conference

Douglas Gorham, IEEE Director of Educational Outreach

11 May 2007
A Few Words about IEEE

- IEEE is the largest professional engineering association in the world
  - 367,000 members in 150 countries
  - A 501(c)3 organization in incorporated in New York

- Originally concentrating on power engineering and communications IEEE at present spans technical interests across the spectrum of technology
  - From nanotechnology to oceanic engineering

- In many respects IEEE has become “the steward of Engineering”
What does IEEE do?

- Publishes literature in engineering, technology and computing
- Organizes conferences
- Develops standards
- Gets engineers and technologists from different locales together
- Organizes professional activities among engineering students
- Educates the public about Engineering
Why is IEEE interested in pre-university education?

- Because it is in our stated and un-stated mission
- Because in many IEEE Sections there is marked decline in the interest of young people in technical careers
  - This is bad for the future of these communities and would have a negative impact on their standard of living
- Because we believe that we can impact the level of technological literacy of the pre-university community worldwide
What is the Problem?

- Flat or declining engineering enrollments in most developed nations
  - Coupled with disappointing performance of youth in Mathematics
  - E.g., “free fall” in Scandinavia

- Insufficient number of engineers and engineering educational programs in most developing countries
  - Asia is far behind Europe and the US in number of engineers per capita
Science degrees include life sciences, physical sciences, mathematics, statistics, computer sciences, engineering, manufacturing, and building.

Source: Organization of Economic Cooperation and Development
What is the Problem?

- Women & minority students conspicuously under-represented

- Public perception of engineers/engineering/technology is largely misinformed
  - Resulting in early decisions that block the path of children to Engineering
<table>
<thead>
<tr>
<th>It helps to be…</th>
<th>Are you ready to…</th>
</tr>
</thead>
<tbody>
<tr>
<td>fascinated by the relationship between law and society</td>
<td>engage in intense discussion of thorny legal problems?</td>
</tr>
</tbody>
</table>
From Collegeboard.com: Broadcast Journalism

<table>
<thead>
<tr>
<th>It helps to be…</th>
<th>Are you ready to…</th>
</tr>
</thead>
<tbody>
<tr>
<td>sharp of mind and quick of tongue</td>
<td>learn how to find and interview sources?</td>
</tr>
</tbody>
</table>
From Collegeboard.com: Civil Engineering

<table>
<thead>
<tr>
<th>It helps to be...</th>
<th>Are you ready to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>A problem-solver who’s creative, curious, logical, and a fan of math.</td>
<td>Spend hours and hours working on problem sets and design projects?</td>
</tr>
<tr>
<td>It helps to be…</td>
<td>Are you ready to…</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>A fan of science and math, a creative problem solver, and someone who likes to take things apart to find out how they work.</td>
<td>Rely on your math skills? Master difficult scientific concepts? Take on a heavy course load? Spend five years as an undergrad…</td>
</tr>
</tbody>
</table>
### Electrical Engineering

<table>
<thead>
<tr>
<th>It helps to be…</th>
<th>Are you ready to…</th>
</tr>
</thead>
<tbody>
<tr>
<td>A fan of science and math who’s curious about the way things work</td>
<td>Spend hours building detailed, complicated systems</td>
</tr>
<tr>
<td></td>
<td>Try, try, and try again when at first a project doesn’t succeed</td>
</tr>
</tbody>
</table>
Where the jobs are...

<table>
<thead>
<tr>
<th>Field</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical and electronics</td>
<td>292,000</td>
</tr>
<tr>
<td>Civil</td>
<td>228,000</td>
</tr>
<tr>
<td>Mechanical</td>
<td>215,000</td>
</tr>
<tr>
<td>Industrial</td>
<td>194,000</td>
</tr>
<tr>
<td>Aerospace</td>
<td>78,000</td>
</tr>
<tr>
<td>Computer hardware</td>
<td>74,000</td>
</tr>
<tr>
<td>Environmental</td>
<td>47,000</td>
</tr>
<tr>
<td>Chemical</td>
<td>33,000</td>
</tr>
<tr>
<td>Materials</td>
<td>24,000</td>
</tr>
<tr>
<td>Nuclear</td>
<td>16,000</td>
</tr>
<tr>
<td>Petroleum</td>
<td>14,000</td>
</tr>
</tbody>
</table>
1,478,000 US engineering jobs!
Engineering Job Outlook

Projected declines:
- Petroleum engineers
- Nuclear engineers

Projected increases:
- Environmental engineering
Traditional Attributes of Engineers

- Strong analytical skills
- Practical ingenuity
- Ethical standards
- Professionalism
- Resilience
Attributes of Engineers in 2020

- Strong analytical skills
- Practical ingenuity
- Ethical standards
- Professionalism
- Resilience
- Creativity
- Flexibility
- Communications
- Business and management
- Leadership
- Lifelong learners
On Line Portal

Tryengineering.org
Good existing model

- **Tryscience.org**
  - “Your gateway to experience the excitement of contemporary science and technology through on and offline interactivity with science and technology centers worldwide.”
  - Science is exciting, and it's for everyone!

- **Partnership between**
  - IBM
  - the New York Hall of Science
  - the Association of Science-Technology Centers
  - Science centers worldwide
What information is needed on line?

- We met with school counselors from NACAC and ASCA and Engineering Associations

- Need on line tools for identifying formal and informal engineering education opportunities

- Engineering associations that participated in our discussions
  - ACM, AIChE, AIAA, ASME, ASCE, IEE, JETS, SAE, SEE, Sloan Career Cornerstone Center
**TryEngineering.org**  
A portal for school counselors, teachers, parents and students

<table>
<thead>
<tr>
<th>School search in 15 countries: By location, program, environment</th>
<th>Day in the life of an engineer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on and virtual projects</td>
<td>Lesson plans for teachers</td>
</tr>
<tr>
<td>Ask an engineer: Brought to you by SAE, International</td>
<td>Ask an undergraduate student: Brought to you by JETS</td>
</tr>
<tr>
<td>Games</td>
<td>Summer camps, internship opportunities</td>
</tr>
</tbody>
</table>

Brought to you by SAE, International  
Brought to you by JETS  
Games  
Summer camps, internship opportunities  

IEEE
TryEngineering.org--Current Status

- TryEngineering.org has been on-line as of 5 June 2006
  - Please visit and provide us with feedback
- Some statistics (as of 1 May 2007)
  - 22,595 = average # of visitors per month
  - 25-47 minutes = average time a visitor spends on the site
  - 100,793 = average # of page hits per month
  - 4,403 = average number of university searches per month
  - 9675 = average number of lesson plan downloads per month
  - 1207 = questions submitted to Ask an Expert

IEEE
Welcome to TryEngineering.org

TryEngineering.org is a resource for students (ages 8-18), their parents, their teachers and their school counselors. This is a portal about engineering and engineering careers, and we hope it will help young people understand better what engineering means, and how an engineering career can be made part of their future. Click here to learn more.

Become an Engineer

Are you thinking of becoming an engineer? Do you want information on engineering degrees, or the numerous options available to those with an engineering degree? Our recommended pre-university course selection, descriptions of engineering and engineering technology majors, and information on summer programs should help you find out more about this fun and rewarding career. Surf TryEngineering and check out tons of great information about how you can Become An Engineer!

TryEngineering is brought to you by:
Sources

Contact Information

ASCE www.asce.org
  Jane Howell, Director, Communications
  jhowell@asce.org

ASME www.asme.org
  Marina Stenos, Manager, Center for Public Awareness
  stenosm@asme.org

IEEE www.ieee.org
  Douglas Gorham, Director of Educational Outreach
  d.g.gorham@ieee.org