


Oregon Pre-Engineering & Applied Sciences Strategic Planning Summit

**Engineering Education for ALL Americans
A National Priority**




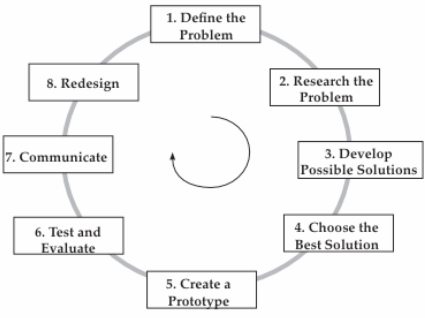

Cary Sneider
Vice President for Educator Programs
Museum of Science, Boston

OPAS Summit 2005
Portland, OR

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Engineering is a Way of Thinking



1. Define the Problem
2. Research the Problem
3. Develop Possible Solutions
4. Choose the Best Solution
5. Create a Prototype
6. Test and Evaluate
7. Communicate
8. Redesign

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Processes Similar—Goals Different


Science	Engineering
<ul style="list-style-type: none">• Identify a question• Research the question• Generate ideas• Formulate a hypothesis• Conduct an experiment• Communicate results• Identify a new question	<ul style="list-style-type: none">• Define a problem• Research the problem• Generate solutions• Create a prototype• Test the prototype• Communicate product• Redesign

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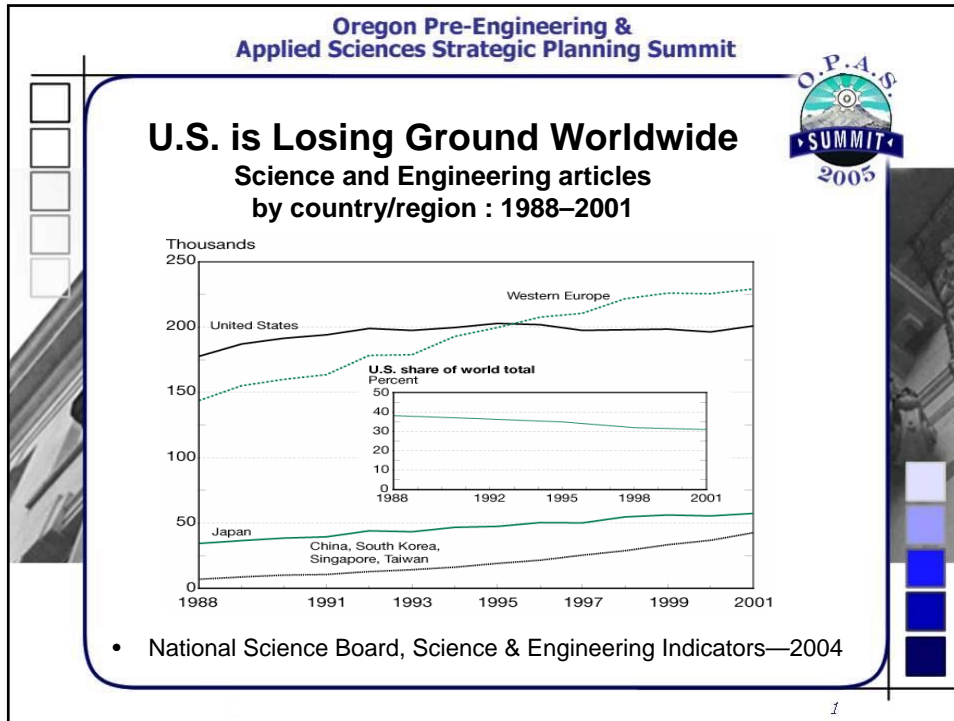



The “Pipeline” Rationale

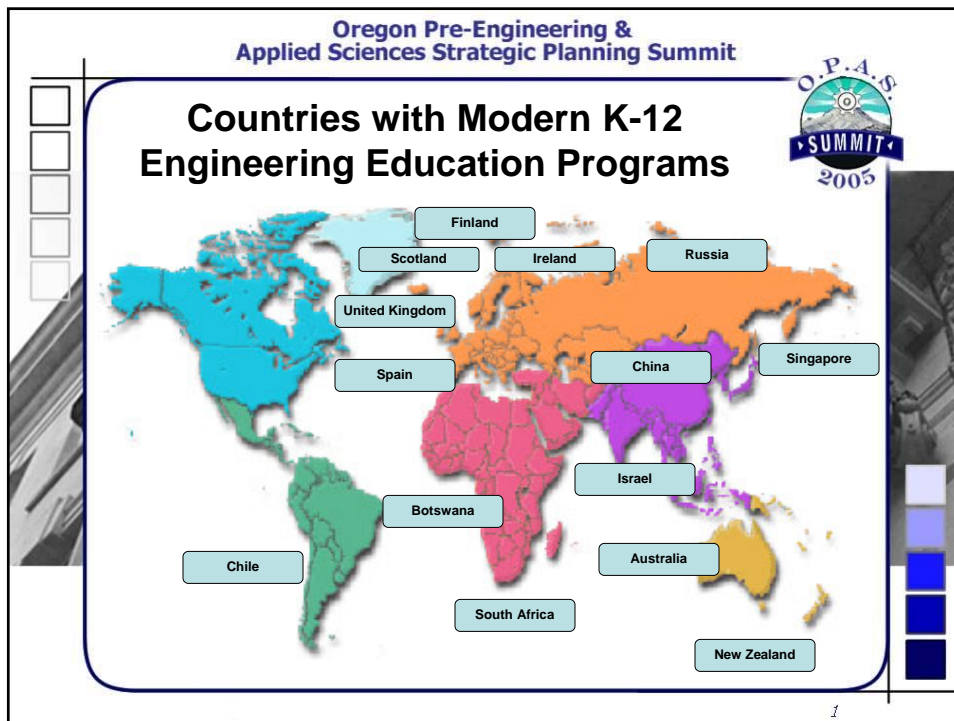
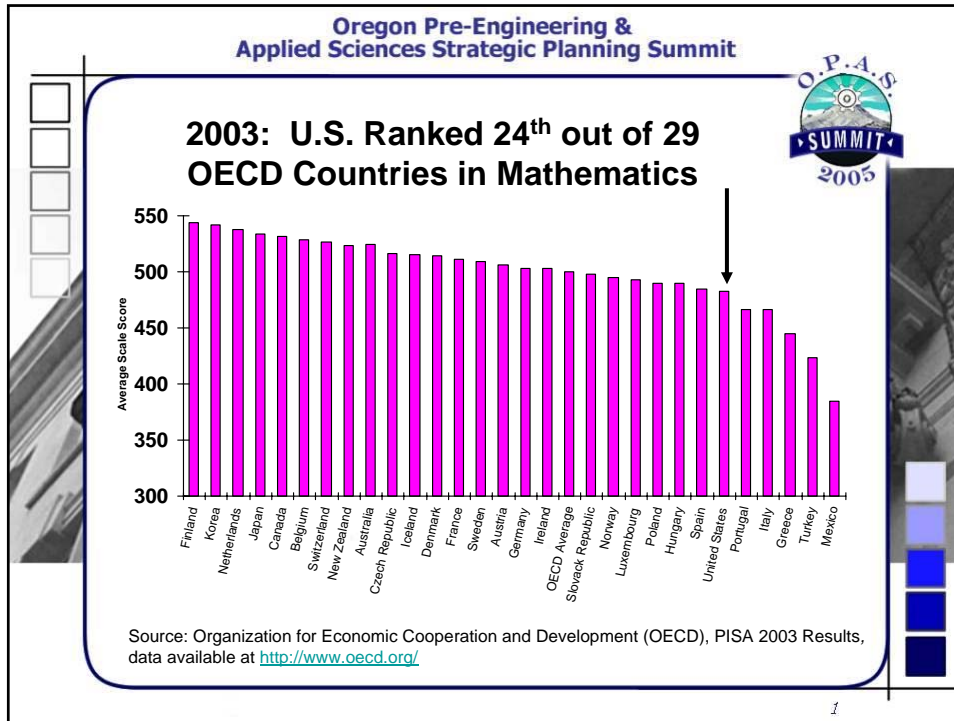


- China graduates six times more engineers than we do.
- It's harder to import talent from abroad.
- Engineering drives our economy.
- Engineering is essential for sustainable development.
- Few students learn what engineers do, so they're not likely to choose it as a career.

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- ### The “Education for All” Rationale
- Understanding engineering is essential for all citizens, workers, and consumers in a modern democracy.
 - Public support of engineering is necessary if the U.S. is to continue to play a significant role in the world economy.
 - Technology and engineering are viable careers only if students take the appropriate courses in high school.
 - Engineering education for all is an important aspect of equity for girls and minority students.
 - The capability to formulate and solve problems is a valuable life skill.
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What's In a name?

Robert C. Wicklein- University of Georgia

1. **Engineering** is more easily understood and valued than technology.
2. **Engineering** elevates the field to a higher academic level.
3. **Engineering** provides a solid framework to design curriculum.
4. **Engineering** is ideal for integrating mathematics and science.
5. **Engineering** provides a focused career pathway for students.



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The Massachusetts Model Standards for All

K-5 Engineering Design, Tools, Materials & Machines.

6-8 Engineering Design, Tools, Materials, and Machines, Communications, Manufacturing, Construction, Transportation, Bioengineering

9-12 Engineering Design, Construction, Energy and Power: Thermal, Fluid and Electrical Systems, Manufacturing, Communications.




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Massachusetts Model Assessment for All



- **In grades K-8:** Assess all students in science and technology/ Engineering
- **In grades 9-10** Offer end of course assessment for Tech/ Engineering as alternative to biology, physics, or chemistry

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Massachusetts Model




Mission of the Museum of Science, Boston:
Leverage the Museum's unique position as a science center, its expertise in working with students, educators and the public, and its spirit of fun education to promote technological literacy nationwide among people of all ages.

1. Create Educational Products
2. Conduct Research
3. Assist Others through Advocacy and Outreach

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NCTL
Educator Resource Center
www.mos.org/ERC

- Online Searchable Database
- Instructional materials in technology & engineering evaluated by teachers
- Mapped to national and state standards

ERC Search

Advanced Search

Enter search text:

Extend text search to standards connections [Learn More](#)



Grade range: to

Category:

Format:


Edu. standards: to

Results 1 - 10 of 235 (sorted by relevance to search criteria)

Title	Author	Description
 Electric Car Science		Quest to General Competency in the Electric Car Competition by Jerry Maloney (PGC - Portland General Electric). This is a guide to help students design, build and test an electric vehicle for Portland General Electric's Electric Car Competition. The guide provides the scientific concepts and math needed what makes a go-kart function. The article is located.
<input type="button" value="Where to find this resource: Educator Resource Center"/> Grades: 9 - 12		
 Alternative Energy Data Sheets		Engineering Technology, Lessons and Projects Collection by Chicago High School Technology Department (Chicago High School Technology Department) These worksheets, created by the Technology Department of the Chicago High Schools, are designed for students involved in the creation of an alternative energy vehicle.
<input type="button" value="Where to find this resource: Educator Resource Center"/> Grades: 9 - 12		


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NCTL: Elementary Curricula
Engineering Is Elementary


- Integrates engineering, reading, and science
- Provides engaging stories about engineers and hands-on activities
- Children from different ethnic and national backgrounds are role models
- Integrated with core elementary science concepts & curricula



"Marvelous Machines"
Connections to FOSS
and STC Curricula

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NCTL: High School Curricula Engineering the Future

- Full-year high school course *for all students.* (Not just students on pre-engineering or vocational tracks.)
- Introduction to fields of engineering, physics and math
- Minimal investment in facilities and materials.



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NCTL: Programs for School District Leadership



- Gateway program provides leadership training to school district teams.
- Share ideas, best practices in person and online.
- Produce case study reports of how the model is working in Massachusetts.

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Critical Factors

Student Success

- Engagement
- Achievement
- Continuous Support



Engagement, Achievement & Support for learners of ALL AGES.

From "Engagement, Capacity, and Continuity: A Trilogy for Student Success," by Jolly, Campbell, and Perlman, 2004.

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Oregon's Treasure Chest

Schools, Businesses & Science Centers



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