Educating for Flexibility and Creativity in the Global Economy

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Introduction

• 20+ Years in Engineering
• 13 Years in University Relations
• 7 Years Focused on Issues of Systemic Change
Adaptability (in Context)

• Our World has Changed (and is Changing)
  – Flat and Spikey
  – Post-911 Evolution
  – Educational Performance

• Impact of Public-Private Partnerships
  – Sabato’s Triangle
  – Learn to Partner (or Languish)

• World Order in Flux
  – Invention, Innovation, and Competitiveness

• Critical That Education Serve Society
  – Relevance vs. Academic Freedom
  – Strategic & Proactive, Integrated with National Agendas
And the Results…

• Real World Consequences

<table>
<thead>
<tr>
<th>Region/Location</th>
<th>Number of Engineering Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>300,000</td>
</tr>
<tr>
<td>India</td>
<td>200,000</td>
</tr>
<tr>
<td>Japan</td>
<td>104,478</td>
</tr>
<tr>
<td>Russia</td>
<td>82,409</td>
</tr>
<tr>
<td>United States</td>
<td>59,536</td>
</tr>
<tr>
<td>South Korea</td>
<td>56,508</td>
</tr>
<tr>
<td>Taiwan</td>
<td>26,587</td>
</tr>
<tr>
<td>Mexico</td>
<td>24,184</td>
</tr>
<tr>
<td>Germany</td>
<td>23,196</td>
</tr>
<tr>
<td>Brazil</td>
<td>18,072</td>
</tr>
<tr>
<td>Romania</td>
<td>6,632</td>
</tr>
</tbody>
</table>

Source: NRC Science and Engineering Indicators - 2004

Engineers in South Korea

Wall Street Journal, July 11, 2005

Fading Fortunes
Gross domestic product, as percentage of world total

Singapore Science Park
Growth of Companies
• 1990’s Revolution in Engineering Accreditation
– ABET EC 2000 – Outcomes Based Assessment
– Criteria 3 for Accrediting Engineering Programs - Program Outcomes and Assessment
  Engineering programs must demonstrate that their graduates have:
  a) an ability to apply knowledge of mathematics, science, and engineering
  b) an ability to design and conduct experiments, as well as to analyze and interpret data
  c) an ability to design a system, component, or process to meet desired needs
  d) an ability to function on multi-disciplinary teams
  e) an ability to identify, formulate, and solve engineering problems
  f) an understanding of professional and ethical responsibility
  g) an ability to communicate effectively
  h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
  i) a recognition of the need for, and an ability to engage in life-long learning
  j) a knowledge of contemporary issues
  k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

• National Academies Adds to Momentum
  – The Engineer of 2020
  – Rising Above the Gathering Storm
The Problem is…

- Rate of Change is Accelerating
  - Industry, large and small, face global competition
  - Technology provides access, so opportunity is everywhere
  - Change is dynamic, relentless, and global scale

- U.S. Higher Education Continues to Struggle
  - State funding reduced, tuition already high
  - Collaborations are key to new initiatives and growth
  - Challenge: Creating a culture of partnership, strategy

- Student’s Face a New Kind of Professional Life
  - 30-40 careers
  - Most of which are not imaginable now
  - What skills will they need? What attitudes will sustain them?
  - What do they need to learn today, to prepare for that tomorrow?

- …And Need an Education that
  - Facilitates mobility in smooth, predictable ways
  - Integrates curriculum in coherent, connected ways
  - Ties learning to real world situations and opportunities
  - * Enables flexible consideration of ideas from an informed, open perspective *
New Languages To Learn…

• Students – *Prepare for the Unexpected*
  – Globally Competent
  – Flexible, Adaptable, Open
  – Ethical, Strong Values
  – Lifelong Learners

• Institutions – *Be the Change*
  – Develop Balance - pursuit of knowledge v. economic relevance
  – Master Collaboration – leverage resources and magnify impact
  – Behave Strategically – develop an integrated plan
  – Engage with Society – ensure an educated populace

• Practical Ideas – *Increase Engagement, Shape Your Value*
  – Faculty Sabbaticals in Industry, Visiting Scientists
  – Industry as Advisors and Instructors
  – Curriculum Revision re. Sustainability, Energy, Environment, etc.
  – K-12 early intervention – inspire a love of learning
Conclusions

• Liberal Education is Essential to Healthy Business

• Diversity of Thought Breeds Innovation

• Collaborations Work Only Where Mutual Interests Align

• National Competitiveness Depends on OUR Flexibility

• Students are NOT What They Were

• Industry Needs a Workforce – either here or there…
Thank You

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