Engineering Education In Transition

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Our Present

- Today the field of engineering is viewed as outdated
- There do not seem to be exciting opportunities or careers in engineering
- Engineering education has changed little since we were in the University as graduate students

Our Present

- Engineering enrollments are declining world wide
- Dynamic young people, often the brightest, are not seeking admission to engineering fields
- Engineering is a global profession, with international opportunities, but few young people are aware of the breadth of opportunity

Global Engineering

- Growth of multinational companies
- Worldwide outsourcing of manufacturing
- Impact of production on the environment
- Economic importance of global markets
- Imbalance in world's engineering resources

Global Engineering

- National borders no longer limit opportunities
- Engineering graduates have world-wide mobility
- Content of engineering programs is important
- Transportability of education is essential
- Registration/certification/licensing may be required in some countries

Global Engineering

- World economy is dependent on engineers
- We are involved in technological development
- We develop new systems and processes
- We are responsible for public health and safety
- We are responsible for engineering education

Engineering Education Transition

- Moved from slide rule to calculator to laptops
- Increased focus on analytical and numerical modeling and simulation
- Decreased focus on experimental applications
- Modified courses to accommodate changes in technology

Engineering Education Transition

- Students have a limited challenge in terms of real problems that benefit humankind
- Limited focus on alternative energy or other modern problems/technologies
- Limited focus on development of technologies to solve today's and tomorrow's problems

Engineering Education

- Excitement in engineering education is:
  - Derived from cutting edge technology
  - Involvement in interdisciplinary activities
  - Pursuit of modern world problems
  - The quest for new horizons

Engineering Education in Hong Kong

New technology opportunities that could impact the Hong Kong economy – high value, low weight

* New software technologies
* Biotechnology and human assistive devices
* Energy system controls
* Fuel cell technologies (new battery systems)

Engineering Education in Hong Kong

New technology opportunities that could impact the Hong Kong economy – high value, low weight

* Solar cell technologies
* Personal energy generation systems
* Sustainability
* Envirnomental technologies

Future Engineering Education

Includes a strong science and engineering component, as well as

- A strong design capability with project skills
- Interdisciplinary teamwork with leadership skills
- Economic, legal, regulatory, political knowledge
- A commitment to professionalism and ethics

Future Engineering Education

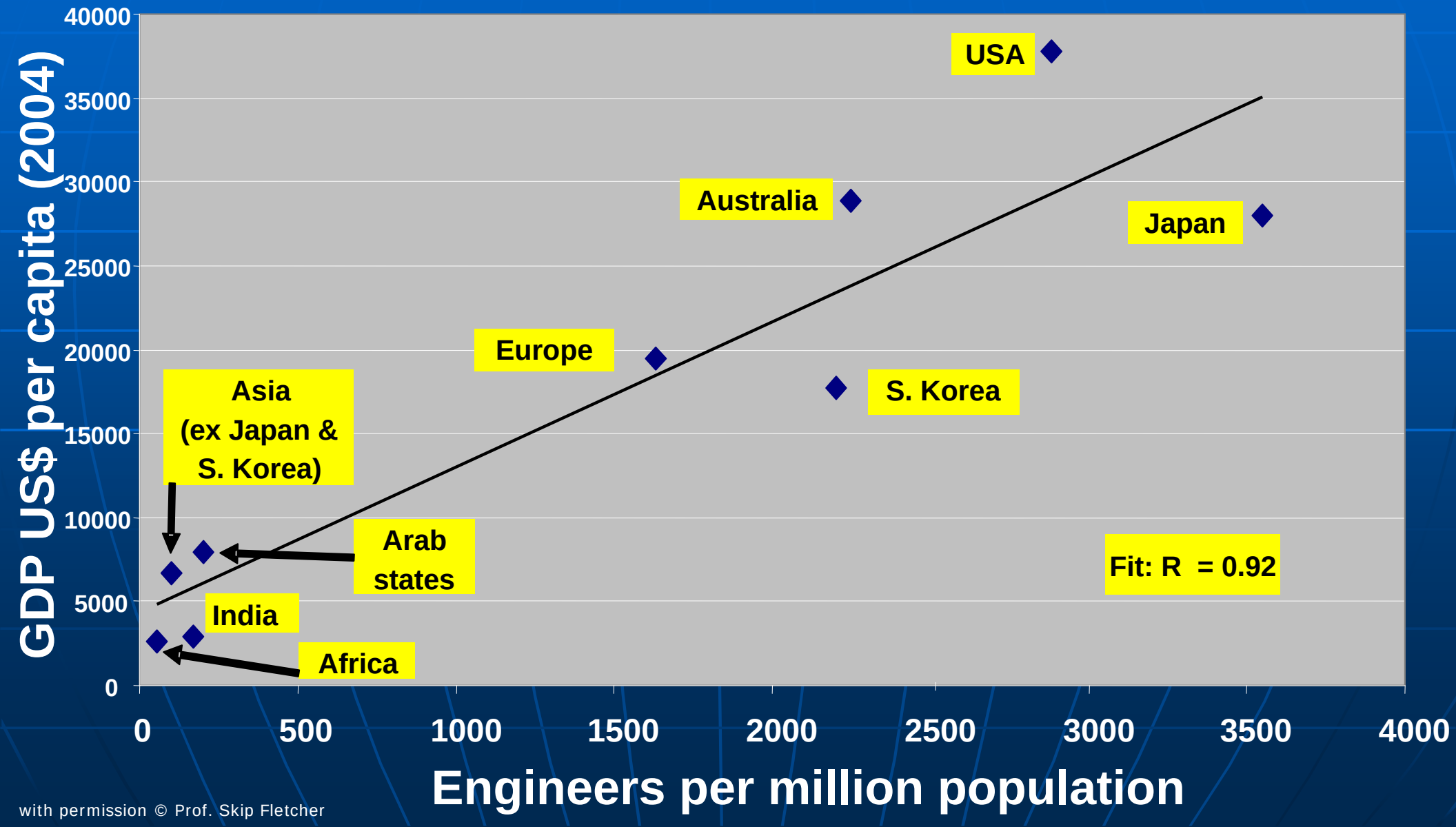
- Understanding of engineering in the international arena
- Importance of bilingual and multicultural capabilities
- Quest for continuing education/professional development
- Pursuit of advanced level education/degrees

Future Engineering Education

- Engineering Graduates in the future may have a "Mosaic degree" with coursework from:

  - Community Colleges or Junior Colleges
  - Web-based educational systems
  - One or more international institutions
  - One or more traditional Universities
  - Cooperative education experiences
  - Differing educational delivery systems

Why is it vital to produce Quality Engineers ?



Equivalence of Engineering Education

- BS/BE engineering graduate capabilities require evaluation or assessment
- Assessment of engineering education programmes is increasing world-wide
- Managed by national accreditation organization
- Many countries have or are developing, outcomes based accreditation processes
- Equivalence of engineering graduate capabilities is a world-wide concern

Multinational Engineering Organizations

- UPADI – Central and South America
- APEC – Fourteen countries in Asia
- FEANI – Twenty-two countries in Europe
- Washington Accord – A Multinational Organization

The Washington Accord
An International Partnership

- Recognizes the "substantial equivalency" of an accreditation system within a country – that assesses/assures that **the graduates of accredited programs in their country are prepared to practice engineering at the entry level of the profession**

Washington Accord Status

- Agreement signed in 1989 by the engineering accrediting bodies in six countries
  - Australia
  - Canada
  - Ireland
  - New Zealand
  - United Kingdom
  - United States
- Signatories meet every two years
- Secretariat rotates among the Signatories

Washington Accord Recognition

- Programs accredited prior to acceptance of the country's accreditation system as a full signatory are not recognized
- Licensure/registration/certification of graduates from WA recognized programs rests with the receiving country
- Each full signatory encourages the licensing body in its own country to accept the substantial equivalence of engineering education programs accredited by other signatories

2007 Washington Accord Signatories

- Australia – EA 1989
- Canada – CCPE 1989
- Chinese Taipei – IEET 2007
- Hong Kong – HKIE 1995
- Ireland – IEI 1989
- Japan – JABEE 2005
- Korea – ABEEK 2007
- New Zealand – IPENZ 1989
- Singapore – IES 2006
- South Africa – ECSA 1999
- United Kingdom – EC 1989
- United States – ABET 1989

International Accreditation

- Increasing interest by some countries in joining the Washington Accord
- Many countries do not have an engineering accreditation organization, accreditation criteria or process
- Increasing interest in developing accreditation systems within countries or regions
- Some countries use ABET Criteria 2000, and other countries ask ABET to assist with accreditation of engineering education programs

The Dilemma

- Traditional educational providers will be different in the future – the Mosaic degree
- Boundaries between traditional disciplines will be increasingly fuzzy
- Exciting technical areas will be at the boundaries of engineering and non-engineering disciplines
- Educational delivery systems may change dramatically

The Challenge

- We must work together to assure the equivalency of our engineering education programs
- The establishment of accreditation processes for all countries and/or regions is essential for the mobility of engineers
- Engineering education programs must adapt to outcomes assessment and continuous educational improvement

Summary

Engineering education, as we know it today, is facing a major dilemma in the near future.

The challenge is - how can we address this dilemma and provide global engineers that are viewed as equivalent around the world.

Clearly, we must work together to ensure that equivalency exists between all of our engineering educational programs

Summary

Engineering Education is in Transition