Proceedings

Enhancement of the Global Perspective for Engineering Students by Providing an International Experience

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Preparation of US Engineering Students for International Practice

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PREPARATION OF US ENGINEERING STUDENTS FOR INTERNATIONAL PRACTICE

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Driving Forces re International Preparation for Engineers

- Engineers must design and develop products for multinational markets
- Materials and components must be sought worldwide to be competitive
- Engineers may practice directly in foreign countries for part of career
- Multinational company engineers must work with international teams
What is needed to prepare engineers for international practice

• Foreign language proficiency
• Cultural background development
• International business knowledge
• International technical knowledge
• ...and do not dilute the traditional math, science and engineering studies which provide the career-long technical base
Institute for International Education

Core elements for transnational competence

- Ability to imagine, analyze, and creatively address the potential of local economies/cultures
- Knowledge of commercial/technical/cultural developments in a variety of locales
- Awareness of key leaders (and ability to engage such leaders in useful dialogue)
... more IIE core elements

- Understanding of local customs and negotiating strategies
- Facility in English and at least one other major language, and facility with computers
- Technical skills in business, law, public affairs, and/or technology, and awareness of their different nature in different cultural contexts
US Foreign Service Officer Program knowledge requirements

• Historical antecedents of international affairs to aid understanding of foreign governments and societies
• World geography to understand the geographic context of foreign relations and US foreign policy
• Foreign political systems
• Major contemporary international economic and commercial issues to understand the impact of economic conditions on a foreign country and on US programs and policies
• Major events, institutions, and movements in the history of the US, to facilitate understanding of the US system of government
... more Foreign Service knowledge requirements

- History of US intellectual, artistic, and cultural life in order to interpret US cultural life to foreign nationals
- Social, political, and economic trends in the US
- Contemporary cultural trends in the US
- The US political process and its impact on policy
- The Constitution and the structure of the US government
- The US economic system, its institutions and philosophical principles, to interpret policies and actions to foreign nationals
- US educational system
Current programs and approaches

• Traditional study abroad (Global E3)
• Study abroad enhanced by language immersion (University of Rhode Island)
• Electronic trans-national project team work (University of Michigan)
• Group term abroad (WPI)
• Double degree approach (PUC-Rio)
• Engineering Cultures study (Virginia Tech)
• Engineers Without Borders (Cornell, Colorado)
• Technical internships (IAESTE-US)
Traditional Study Abroad Programs

• Available at many schools, through campus-wide international programs office
  – Small numbers, due to lockstep engineering curriculum

• Global Engineering Education Exchange (Global E3) program is a consortium of 36 US schools and 53 foreign schools
  – Requires two way exchange – pay tuition at student’s home school
  – Small numbers to date, 100+ per year
Study abroad plus language

• University of Rhode Island International Engineering Program
  – Dual degrees in engineering and a language – German, French or Spanish – in 5 years
  – International internship with foreign corporations (up to a year abroad in combination of study and work)
  – Small, high quality program: 100+ graduates to date, 170+ current students
Electronic trans-national teams

• Design project teams from US and foreign engineering schools collaborate on a project relevant to both countries
• Communications are all electronic (e-mail, shared data files, fax, phone)
• e.g., University of Michigan plus South Korea and United Kingdom
• Typically try to have teams meet in person at least once – for either introduction or final presentations
• May interest students in study or work abroad period
Group term abroad

- Worcester Polytechnic Institute requires international experience for most students
  - Teams of students travel to a foreign country for a several week term, with faculty member, to work on, relevant project there
  - Part of an overall project based curriculum
  - Teams consist of engineering and other students from the WPI campus
  - Limited immersion in local language, culture
Double Degree Approach

École Central - France

Basic
Common core
Specialization

Brazil - PUC-Rio

Basic
Engineering
Specialization
Engineering Cultures Study

- Program developed at Virginia Tech analyzes the cultures of engineering in various countries (UK, Russia, France, Japan, US ...)
  - Examines how engineering approaches vary around the world, to prepare US graduates to work with diverse cultural approaches
  - Mini-courses available on cd, with web support
  - Future plans: Korea, Taiwan, China, India, Egypt
Engineers Without Borders

• Engineers Without Borders – University of Colorado
  – Assists developing communities to resolve a particular infrastructure need, using student engineers who get international experience

• Engineers Without Frontiers USA – Cornell University
  – Students learn concepts of sustainability, appropriate technology, social responsibility, etc. while getting international cultural exposure
Technical Internships Abroad

• International Association for the Exchange of Students for Technical Experience (IAESTE United States)
  – Serves technical students looking to intern outside the US
  – On-the-job training to develop global skills in tomorrow’s technical leaders
  – Salary covers student cost of living abroad
  – Network of 70 member countries
Issues for the future

• Need to get international experience for vastly higher percentage of US engineering students (4139 studied abroad in ’99-’00)
• Electronic experiences can be scaled up more easily than study or work abroad
• Need to expand faculty international experience too
For further interaction

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