

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

Engineering Conferences International

Year 2003

Preparation of US Engineering Students
for International Practice

Russel C. Jones
World Expertise LLC

PREPARATION OF US ENGINEERING STUDENTS FOR INTERNATIONAL PRACTICE

Russel C. Jones, Ph.D., P.E.

World Expertise LLC

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

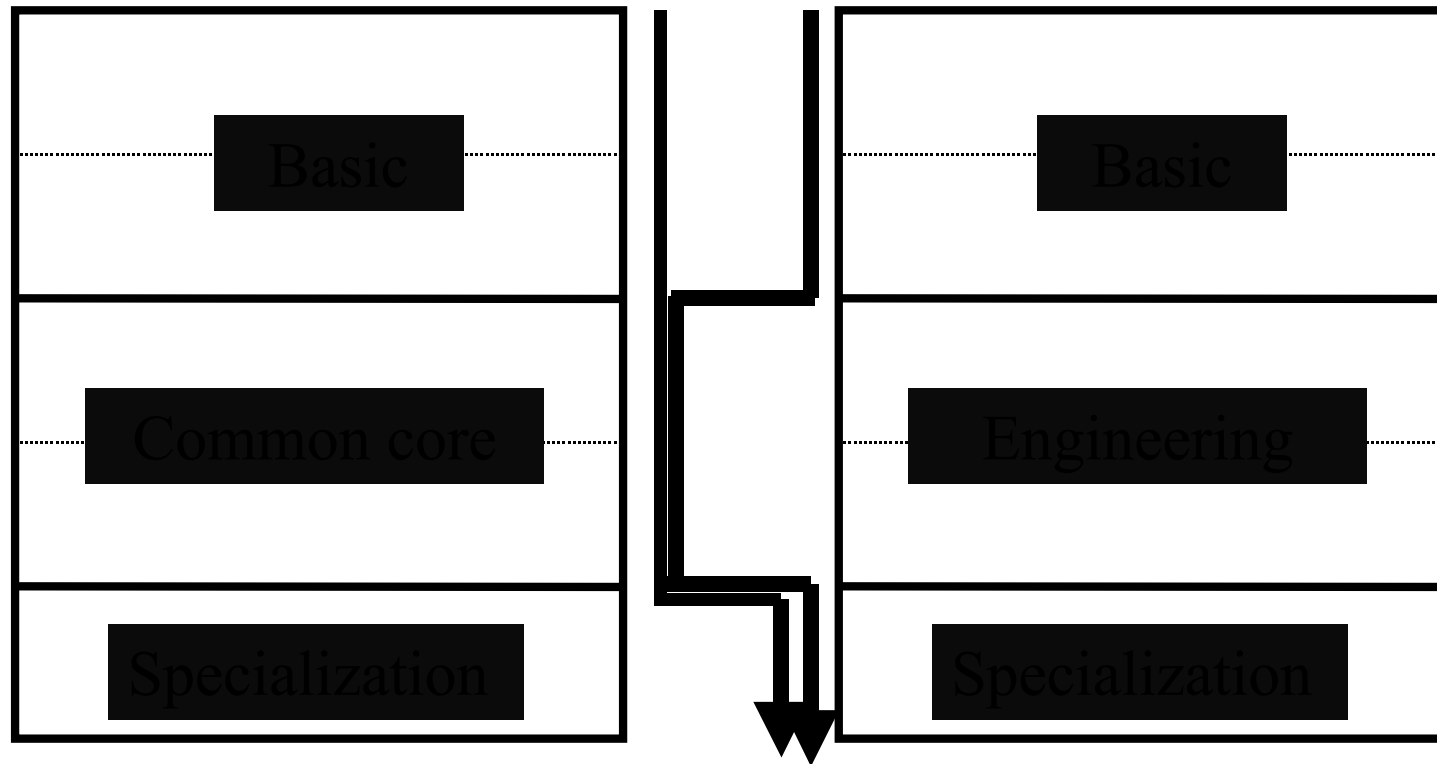
Group term abroad

- 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

Brazil - PUC-Rio



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

- Papers on web site:

www.worldexpertise.com

- E-mail address:

RCJonesPE@aol.com