Proceedings

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

Engineering Conferences International  Year 2003

Need for Global Perspective: An Industrial View

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

Need for Global Perspective
An Industrial View

Tomar, April 7, 2003

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Some facts and figures (2002)

- Employees:
  - world-wide: 460,000 (100%)
  - in Germany: 160,000 (35%)
- University graduates: 150,000 (33%)
- Engineers: 120,000 (26%)
- Global presence in: 195 countries
- Sales: 85 billion €
Driving factors

Globalization

- Economy
- Society
- Education

Change

- Technology
- Organization
International orientation

Engineers see themselves as an integral part of a global society.

They are also embedded in their local environment.

The slogan "think global, act local" is part of their philosophy of life.

They have the will – and ability – to work across all political, cultural, and ethnic boundaries.
International orientation

They are aware of the cultural differences between different regions of the world

They are flexible and eager to learn

They master foreign languages

They adapt to their international partners and avoid misunderstandings that can arise due to cultural differences

They practice real and virtual mobility on a global scale
Characteristics of an excellent Engineer

An excellent engineer has/shows evidence of:

- Providing leadership and vision
- Focus on business / clients
- Focus on international opportunities
- Focus on required roles / results
- Commitment to ethical and social responsibilities
- Team-working: multidisciplinary / cultural
- Management of projects / events
- Management / motivation of people
- Management of knowledge / IT
An excellent engineer has/shows evidence of:

- Management of self / time
- Communicating, verbal and written
- Learning, developing and improving
- Flexibility in adapting to change
- Technical knowledge / expertise
- Commercial / financial knowledge / expertise
- Application of relevant knowledge / expertise
- Systematic and logical approach
Europe - a continent of great diversity
Some facts and figures

- ~ 40 independent countries
- ~ 32 different languages
- 15 countries in European Union
- Simultaneous translation in at least 3 - 4 languages in every official EU / EC meeting
- All official documents of the EU must be translated into 11 languages in order to be understood in every Member Country
Variety of educational systems
Secondary level

According to the national needs and attitudes the major differences begin already in school education at secondary level.

From country to country there are different

- types of schools
- different emphasis on certain content
- different pedagogical approaches and
- different standards and lengths of education
Variety of educational systems
Tertiary level

Similar differences we can find in university education at a tertiary level too:

- different types of universities with their own educational profiles
- different levels of theory and practice in education
- different academic values of degrees
- different titles and again
- different lengths of study
### Example:
**Variety of academic engineering titles in Europe**

<table>
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<tr>
<th>Norwegian</th>
<th>Portuguese</th>
<th>German</th>
<th>Danish</th>
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<td>Ingeniero Superior</td>
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<td>Ingeniero Técnico</td>
<td>Ingeniero civil</td>
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Higher Education Systems
Different models

Consecutive Study Programme ~ 5 Years
Doctorate ~ 3 Years

Integrated Study Programme

Doctorate ~ 3 Years

Short Study Programme

Bachelor Study Programme

- Undergraduate Study 3 - 4 Years
- Graduate Study 1 - 2 Years

Postgraduate Study 3 - 4 Years

Global Standard
Continental Europe
USA, UK

Compatibility problems

Compatibility problems

Long Education

Global Standard

"Long" engineering program

Basics

Graduate Study

Undergraduate Study

Basic level

Advanced level

Master level

No defined entry

Forget it!

Back to the Basics!
New European Higher Education System (EHES)
Bologna declaration (1999) & Bologna process until 2010

Consecutive Study Programme ~ 5 Years
Doctorate ~ 3 Years
Postgraduate Study 3 - 4 Years
Graduate Study 1 - 2 Years
Undergraduate Study 3 - 4 Years

Short Study Programme

Global Standard
Continental Europe

New EHES

In Germany ~ 50 % of Eng Graduates

Long Doctorate
4 - 5 Years

Short Study Programme
3 - 4 Years

USA, UK
Recruiting of Graduates with University Degree (2002)

11,000

Germany
RoEurope
Asia / Pacific
Americas
Recruiting of Graduates with First and Second Cycle Degree

D ~ 80 %
- RoEurope: FCD 75%, SCD 25%
- America: FCD 85%
- Asia: FCD 85%
- Germany: FCD 60%, SCD 40%
Students' mobility models

One country

Another country
Students' mobility models
Organized mobility

One country

Another country

Study period abroad
Students' mobility models
Organized mobility

One country

Another country

Double degree
Students' mobility models
Free mobility

One country

Graduate Study
Undergraduate Study

Another country

Graduate Study
Undergraduate Study

Mobility changes
Recommendations

Declaration

from Siemens International Symposium on Engineering Education in a Global Society

held in Berlin in 1998
A global society and the profession requires engineers with different competencies.

These engineers must be highly qualified whether research oriented or application oriented.

This implies an understanding and appreciation of basic science, engineering, and different cultures including foreign languages.

Engineers must also possess interpersonal skills such as communication and teamwork.
Engineering education must recognize, promote, and reward the global mobility of students and professors in the spirit of mutual recognition of the various approaches to engineering education.

This mobility includes courses, research, practical experiences, and degrees.

The de facto international standard based on bachelor's, master's, and Ph.D. degrees appears to be a suitable model for engineering education in the global society.
Engineering must promote an understanding that technology is an integral part of society ...

... in order that young people, their teachers, and parents appreciate the fundamental role of engineering and technology in their everyday lives and work.
There is a need for quality assurance systems which are transparent and are based on mutual recognized minimum standards.

These should be responsive to changing technology and world conditions.
There is a need for global networks of universities cooperating at the professional level in order to integral an understanding of other cultures and differing approaches to engineering education.
Engineering education must introduce global marketing strategies and structures to attract students from other countries and cultures to participate in programs in initial and continuing engineering education.

This may involve the delivery of education in foreign languages and may utilize modern technology such as quality assured distance learning.
Conclusion

European Industry welcomes the European Higher Education System based on Bologna Declaration.

Expectations on authorities and universities:

- adapt national legislation
- implement new courses in Universities
- integrate the traditional system into EHES scheme
- learn from experience and best practice of other countries

as soon as possible!
Ladies and Gentlemen. Thank you for your attention ...
...
questions and discussion are appreciated

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