Summary from Engineering Education Discussion Group
Monday, 10 September 2018
1:30 pm – 3:30 pm

Discussion Participants:

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Advance Materials Provided (posted on CAETS website)

- Germany
- Netherlands
- Canada
- United States
- United Kingdom

Framing Questions regarding Engineering Education:

1. **Is it changing?**
    - If so, what motivated the change? What are the barriers/impediments to change?
    - If so, who is driving the change? Faculty? University Leadership? Professional Organizations? Government? Other key stakeholders (e.g. Industry)?

2. **Is quality improving?**
    - **What are the relevant measures of quality?**

3. **Are new techniques being used?**
    - **If so, what are the most widely used? Have measures of effectiveness been implemented?**

4. **How are topics like project-based education, multi-disciplinary education, and innovation being integrated?**

5. **Is your academy directly involved in stimulating change?**
    - If so, how? What can you share with other CAETS members?
    - How could CAETS help facilitate the sharing of relevant information?

6. **Is there a role for CAETS to help motivate/facilitate evolution of engineering education from an international perspective?**
    - **If so, what is that role and what are the necessary next steps?**

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Key Points from Discussion

Changes in Engineering Education

- Common key developments in engineering education
    - Experiential learning through multi-disciplinary team-based projects
        - e.g. Capstone projects in the US and other countries
        - Assessment of the overall project by the Faculty
            - Some countries doing peer assessment of individual students
            - Others are doing individual assessments at the beginning of the project by only admitting the best students into thee attractive projects
    - Project/Problem Based Learning, even in early years of the course
    - Flipped classrooms[1] are increasingly common
    - Broadening the learning to include business and 'soft' skills
    - Incubators to encourage entrepreneurism
- Other developments
    - Slovenia: basic sciences in first 2 years including topics such as quantum chemistry and quantum physics so that students have enough background to deal with new topics (such as nanotechnology and quantum computing) and biology (for biomimetics)
    - UK: New Model in Technology and Engineering (University of Hereford)
    - France: Course in higher years is adapted for regional setting
        - Companies can influence the course via funding of projects
- MOOCs (Massive Open Online Courses)
    - Universities want to develop MOOCs but seemingly few want to adopt MOOCs from elsewhere as part of their own course

Assessment of Quality

- Most (all) countries have an accreditation body
- A number of countries measure:
    - Student satisfaction via surveys
        - Slovenia: obligatory
        - UK: influences funding of the university

[1] Flipped classroom is an instructional strategy and a type of blended learning that reverses the traditional educational arrangement by delivering instructional content, often online, outside of the classroom. It moves activities, including those that may have traditionally been considered homework, into the classroom.

  - % of graduates that find employment
  - Starting salaries of graduates
  - Diversity of graduates
  - Diversity of faculty
  - Success rates of students

<u>Role of Academies in Engineering Education</u>

- Common theme
  - Academies trying to improve the attractiveness of engineering to students
    - US Grand Challenge Scholars program with their 5 criteria
      - 54% female enrolment
    - UK doing a large-scale media campaign ("This is Engineering") to attract students
- Some Academies trying to improve research translation through networks and mentor programs

<u>Possibilities for next steps</u>

- A Grand Challenge
  - Lower the cost of engineering education by an *ORDER OF MAGNITUDE*
    - Shared online content
    - Personalized learning systems
    - Simulated laboratories
    - Automated assessment systems
- Define meaningful quality assessment metrics
- A shared resource of global best practices