Using Learning Outcomes to Enhance the Quality of Engineering Education Programmes

Ian Freeston

Professor Emeritus, University of Sheffield
Higher Education Adviser, Engineering Council UK
Member of EUR-ACE Label Committee, ENAEE
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Ian Freeston.BEng Workshop, Boston, 30 April and 1May, 2012

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UK Engineering Council

- **Responsible for establishing and maintaining standards of engineering formation**

- **Maintains a Register of qualified engineers**

- **Three grades of qualified engineer:**

  - **Chartered Engineer (CEng)**

  - **Incorporated Engineer (IEng)**

  - **Engineering Technician (EngTech)**

CEng Formation

- **Three parts:**
  - ➢ **Education - to support the competences**
  - ➢ **Initial Professional Development – beginning to apply engineering knowledge**
  - ➢ **Professional experience – demonstrating competences**

- **Typically a minimum of eight years are required to qualify from starting engineering education at 18+**

- **Competences are assessed at Professional Review which includes a summary of career, reports from three professional engineers, and an interview.**

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Education

- **Accredited engineering degrees to Masters level, either:**

  ➢ **BEng (Hons) and MSc**

  or

  ➢ **MEng (integrated programme)**

- **Content and Level of accredited degree programmes is specified in UK-SPEC published by Engineering Council.**

- **Academic standard of degree (and of HEI quality assurance) must comply with Qualifications Assurance Agency (QAA) requirements.**

Learning Outcomes of Accredited Engineering Programmes

• **General and Specific Learning Outcomes are detailed in *The Accreditation of Higher Education Programmes* published by the Engineering Council UK (www.engc.org.uk)**

• **General Learning Outcomes:**

 ➢ **Knowledge and Understanding**

 ➢ **Intellectual Abilities**

 ➢ **Practical skills**

 ➢ **General transferable skills**

Specific Learning Outcomes in Engineering

• **Underpinning science and mathematics, and associated engineering disciplines, as defined by the relevant professional engineering institution.**

• **Engineering Analysis**

• **Design**

• **Economic, social and environmental context**

• **Engineering practice**

Professional Engineering Institutions (PEIs)

• **Engineering Council UK does not directly assess competences or accredit degree programmes; it licences PEIs to make these evaluations**

• **Licenced PEIs (more than 20) include:**

❑ **Institution of Civil Engineers (ICE)**

❑ **Institution of Mechanical Engineers (IMechE)**

❑ **Institution of Engineering and Technology (IET)**

• **PEIs are both regulating bodies and learned societies, with large UK and international membership**

Accreditation Procedure

- **Threshold decision; does the programme meet the specified standard ?**

- **Self assessment report**

- **Assessment visit by experts.**

- **Report to decision making committee**

- **Decision on accreditation (for a maximum of five years), and any requirements or recommendations.**

Good Things about Accreditation

- Mechanism for maintaining agreed standards.

- Accreditors produce a (consulting) report on possible programme development.

- An opportunity to share good practice and to encourage new ideas in content and teaching methods.

- Every accreditation is (should be) a review and test of the standards of the profession.

Common Criticisms

- Cost to HEI of preparing documentation and of hosting accreditation visit.

- The published Learning Outcomes (and any guidelines for interpretation) limit new ideas for programmes and teaching methods.

- It is difficult (impossible) to aggregate the performance of each student to ensure that all the Learning Outcomes have been achieved.

- Accreditation is a means of maintaining the existing standards but not of enhancing them.

Enhancing Standards

- **A possible method is to assess the quality of programmes beyond threshold.**

- **Assess**
  - **Programme content**
  - **Level attained**
  - **Teaching methods**
  - **Quality of staff**
  - **Quality of resources**

- **Using a four point scale:**
  - **4 Excellent**
  - **3 Very good**
  - **2 Good**
  - **1 Satisfactory (Threshold)**

But …

- **Would it need to be voluntary ?**
- **Should it be separated from accreditation ?**
- **Is a different agency necessary ?**
- **What performance indicators are needed ?**
- **Who would train assessors ?**
- **What are the financial implications?**
- **Would HEIs strive for a high score?**

Any answers
(and further questions)?

ifreeston@engc.org.uk