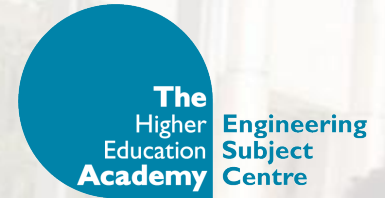




The Royal Academy  
of Engineering



# Engineering Graduates for Industry

Professor Sir William  
Wakeham

# Overview

Setting the scene

Experience-led engineering degrees

The research undertaken

Findings

Recommendations

# UK Economic Priorities



***"Graduates in science, technology, engineering and mathematics are key to providing the higher level skills that are required for economic recovery and long-term prosperity in the UK"***

National Skills Strategy [www.bis.gov.uk/skills-for-growth](http://www.bis.gov.uk/skills-for-growth)

- A message echoed in many other recent reports – *New Industry, New Jobs; Higher Ambitions; Stronger Together* etc

# The needs of industry



**Industry wants engineering graduates  
who have "*practical experience of real  
industrial environments*"**

Educating Engineers for the 21<sup>st</sup> Century, RAEng, 2007

- Real or simulated experience
- Relevant curricula
- Theoretical understanding
- Creativity and innovation
- Teamwork
- Technical breadth
- Business skills

# Meeting the need

## Experience-led engineering degrees

- Components of an engineering degree which develop industry-related skills including, but not limited to, direct interaction with industry



# 'Experience-led' engineering?

- The Race to the Top, Lord Sainsbury 2007
- Recommendation 7.17
- The Royal Academy of Engineering asked to conduct a review of approaches to engineering education
- Research by the Engineering Subject Centre

# The research

To identify the options for encouraging and enabling universities to develop engineering courses that better meet the needs of industry and to identify the opportunities, barriers and costs involved

- Case study approach
- 15 exemplars at 6 universities covering a broad range of university types, geographical locations (within England), engineering disciplines, range of industrial activity / involvement / skills provided

# Research methodology

1. What does industry need?

2. How do universities know what industry needs?

3. What are universities currently doing that meets these needs?

4. What difference are these activities making?

5. What more/else could be done?

6. How can universities and industry cooperate effectively and be best supported in this process?

Publications

85+ interviews  
15 exemplars

RAEng  
Symposium

Oversight Group review

Analysis



# Aston & Coventry

1. Industrial placements (Aston)
2. Foundation degrees (Aston)
3. Activity led learning (Coventry)



# Imperial College London

4. Simulated industrial activities
5. Discipline-based support (EnVision)
6. Large group projects
7. Student-led activities



# Liverpool & LSBU

8. Active learning (adapted from CDIO)
9. Visiting professors
10. Understanding stakeholder needs
11. The CEREB experimental laboratory



# Loughborough

- 12. Industrial placements
- 13. Industrial group projects
- 14. Sponsored degree programmes
- 15. Discipline-based support (engCETL)



# Sample costings

Exemplar	Set up cost	Recurrent cost/student
Sponsored degrees		£100-£300
Discipline-based support	£340k	£211
Industrial projects		£215
Visiting professors	£20k	£400
Chemical pilot plant	£600k	£648
CEREB	£3M	£996
Industrial placements		£1,250-£2,150
Active learning	£19M	£1,600
Activity led learning	£59M	£1,888

- Funding already falls short of what is needed by an average of 15%
- Introducing or enhancing experience-led components almost always incurs additional costs
- Industry already provides significant support

# Analysis



- Identification of cross-cutting themes
- Systematic analysis of each case study for supporting evidence
- Triangulation of data with other published materials
- Discussion of initial results with wide range of stakeholders
- Agreement of findings

# Research findings (1)

One size doesn't  
fit all

- *Learning takes place in different places and in different ways*

Experience  
counts

- *Students need direct experience of industry integrated within their degree course*

Relevance  
motivates

- *Students are motivated and engaged by industrially relevant course content which should be integral within every undergraduate engineering course*

Change needs  
champions

- *Learning and teaching champions play a vital role in driving forward change within engineering degrees*

# Research findings (2)

Responsibility  
must be shared

- *Both industry and the universities must commit to championing enhancements to experience-led engineering degrees*

Management  
leads change

- *The ability to change is heavily dependent on having the right senior management support*

Resources matter

- *New teaching methodologies require appropriate learning spaces, equipment and supporting technologies*

Financial  
sustainability

- *Delivering more experience-led components in engineering degrees will require focused and prioritised funding both to set up and maintain.*



# Recommendations



Experience counts and relevance motivates. Experience-led components must be embedded into every engineering degree



Investment in experience-led HE engineering is required to deliver the higher skills needed



Significant time and energy should be directed towards building, enhancing and sustaining university/industry partnerships



# Summary

- The government is clear that engineering is a priority for future UK prosperity
- Industry is clear about their needs
- Experience-led engineering degrees meet industry needs
- Funding is needed to support new or enhanced development
- Enhanced university/industry partnerships will support experience-led engineering

# Read all about it!

- [www.raeng.org.uk/egi](http://www.raeng.org.uk/egi) (report only)
- [www.engsc.ac.uk/graduates-for-industry/](http://www.engsc.ac.uk/graduates-for-industry/)  
(report and case studies)



# Any questions?



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