

Experience-Led Engineering Degrees

Visiting Professors' Workshop

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The Royal Academy of Engineering

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Background

- ▶ *Educating Engineers for the 21st Century Study* –
June 2007
- ▶ *The Race to the Top* –
Lord Sainsbury of Turville's Review of Government
Science and Innovation Policies – October 2007

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- Industry:
 - ▶ 21 in-depth interviews with major companies
 - ▶ 13 interviews with SMEs - including 7 high-tech spin-outs
 - ▶ 3 focus groups with recent graduates
 - ▶ 444 questionnaire responses, 53% SMEs
 - industry changes, skills requirements
 - quality of graduates, changes needed in engineering education
- Academia:
 - ▶ questionnaire to all university engineering departments
 - responses to industry conclusions
 - examples of issues and of best practice
 - ▶ 80 replies

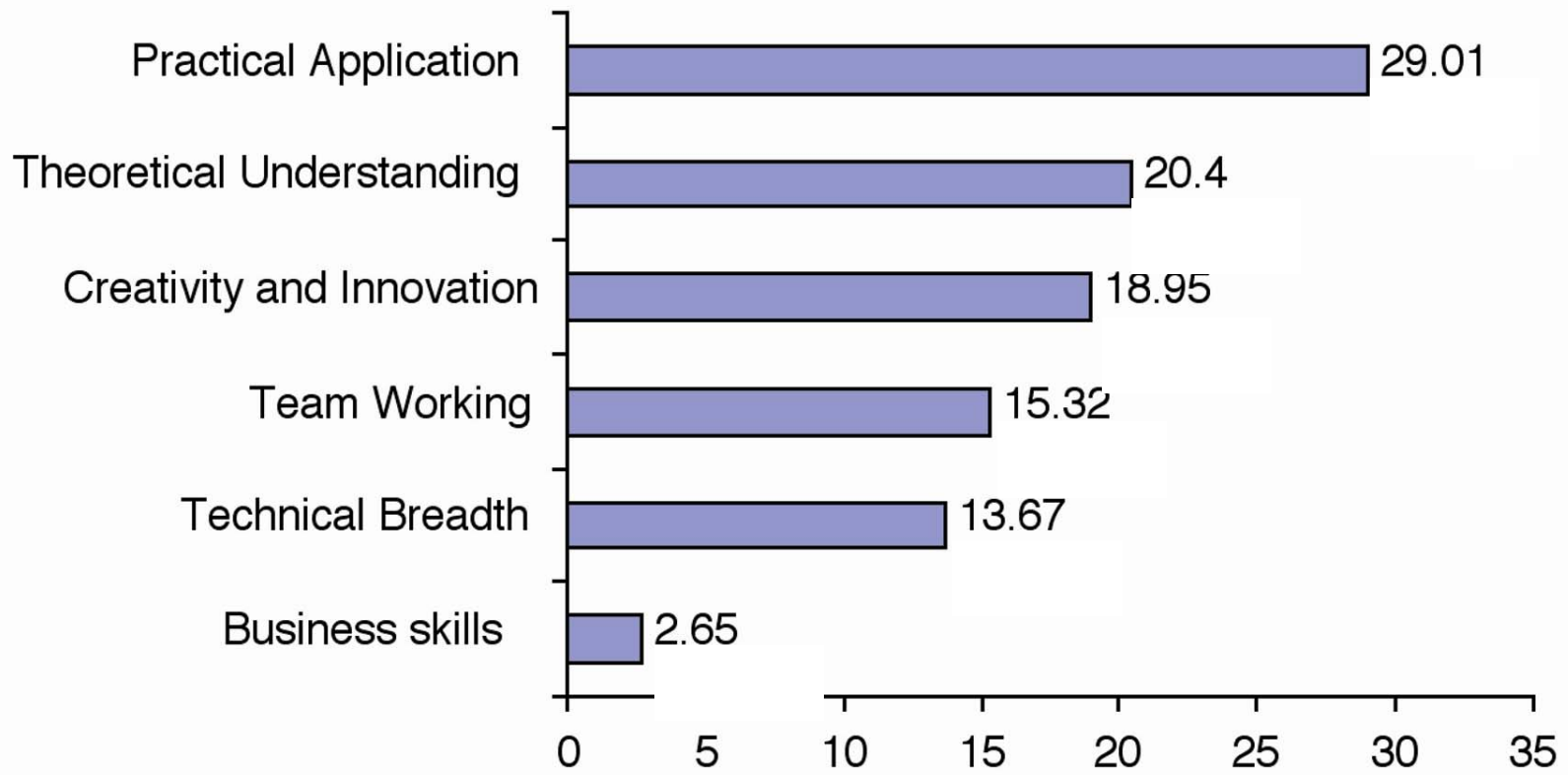
Industry study conclusions

- Business predicts a worsening shortage of high calibre UK engineering graduates
- Graduates need more experience of applying theory to real problems
- Industrial experience during the degree is an indicator of early success in industry
- The best UK graduates are competitive with their peers in Europe
- UK engineering degree courses need attention
 - ▶ to recognise the changing requirements of industry
 - ▶ to attract and maintain motivation of students
 - ▶ to ensure UK degrees remain world-class



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Industry priorities for engineering graduates



Academic Survey Conclusions

- **Strong agreement with industry conclusions and concerns**
 - multidisciplinary teaching
 - more design/make, project and practical activities
- **88% want more industrial involvement**
 - concern that industry doesn't think long-term about engagement with university education
 - but – resistant to universities 'doing industry's training'
- **Enthusiastic for change**
 - 72% support introduction of new engineering courses: Bioengineering, Nanotechnology...
 - 59% promoting CDIO-type approaches to learning and teaching
 - keen to introduce 'systems thinking' - but only 30% think Systems Engineering should be a stand-alone course
- **There are some Major Inhibitors**
 - Research Assessment Exercise – highly detrimental to teaching: 75%
 - Decline in funding per student for teaching
 - Current quality assessment and accreditation approaches: 60%



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The Race to the Top

*Need for **experience-led engineering degree(s) (ELED)***

- ▶ Integrates technical, operation and business skills
- ▶ Meets the constantly evolving requirements of industry
- ▶ Attracts the most able students to study engineering
- ▶ Motivates them to become engineers on graduation

HEA Engineering Subject Centre (EngSC) Taxonomy

- ▶ Enhancement of Traditional Lecture & Laboratory Teaching
- ▶ CDIO Implementation
- ▶ Problem-Based, Scenario-Based and Enquiry-Based Learning Approaches
- ▶ Sandwich Placement
- ▶ Industry Sponsored Bespoke Courses
- ▶ Blended (e-learning and face to face) Learning



Structure of the Day

Overview by EngSC

Case Studies on each methodology to address:

- ▶ What was the baseline?
- ▶ What were the drivers for change
- ▶ What did actually change?
- ▶ How much did it cost?
- ▶ How do you know that it achieved the objectives?

Working Group Discussions

- ▶ Review the Case Studies
- ▶ Identify which best meets the Sainsbury criteria
- ▶ Identify other types of courses not covered by the Case Studies

Plenary Session



Desired Output

- ▶ Identify components that ELED should contain to:
 - Meet the needs of industry
 - Attract and retain the very best undergraduates
- ▶ Estimate the resources required for their delivery



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