

EPC

Future of Engineering Education

Professor Barry Clarke

Vice President EPC

Professor of Civil Engineering Geotechnics

University of Leeds



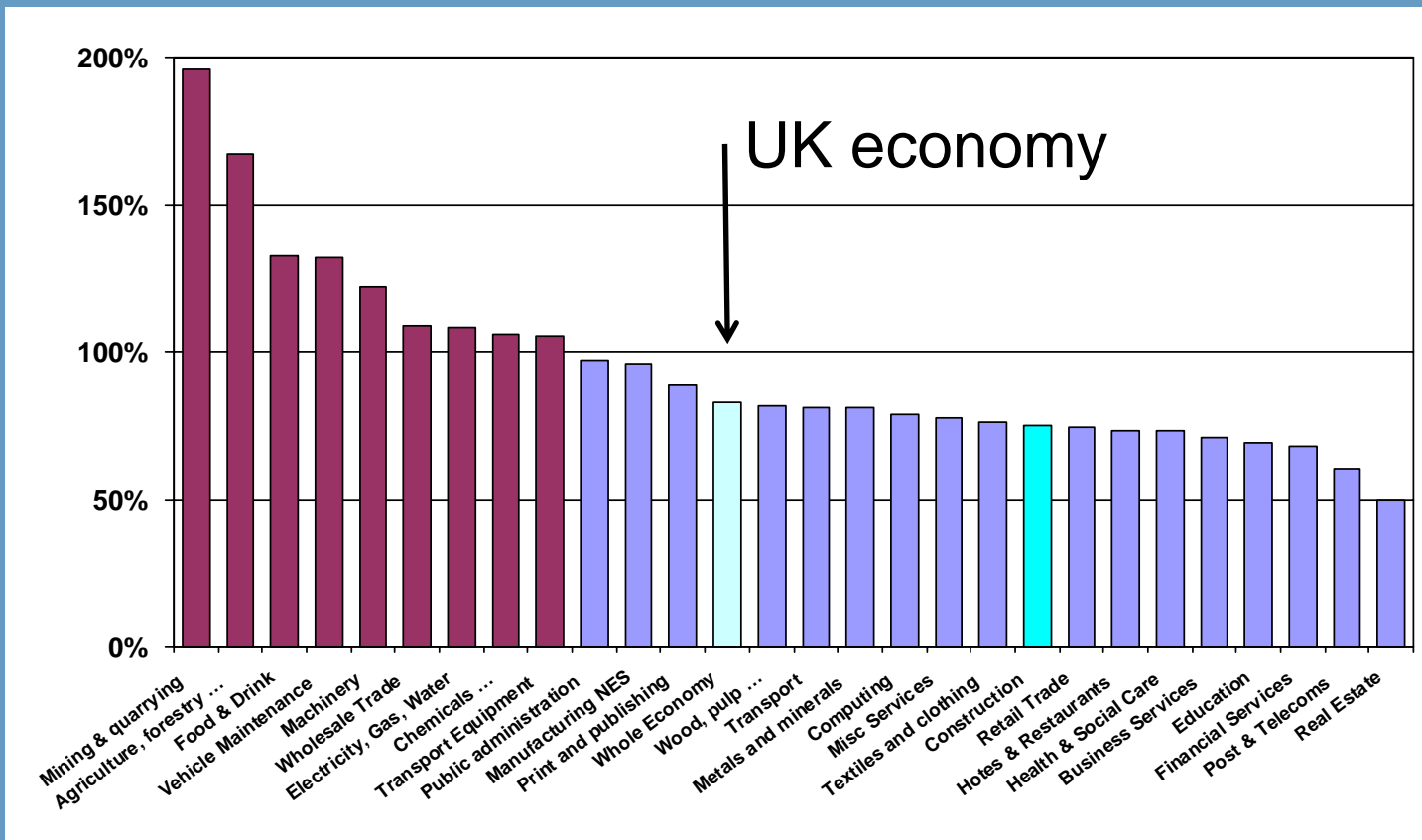
Engineering Education

- 250,000 students in further education studying engineering, manufacturing and technology courses.
- Around 90 higher education institutes in the UK have engineering departments, teaching over 140,000 students, 100,000 of whom are undergraduates.

50 years of Promoting Excellence in Engineering Higher Education



UK Productivity as % of Europe

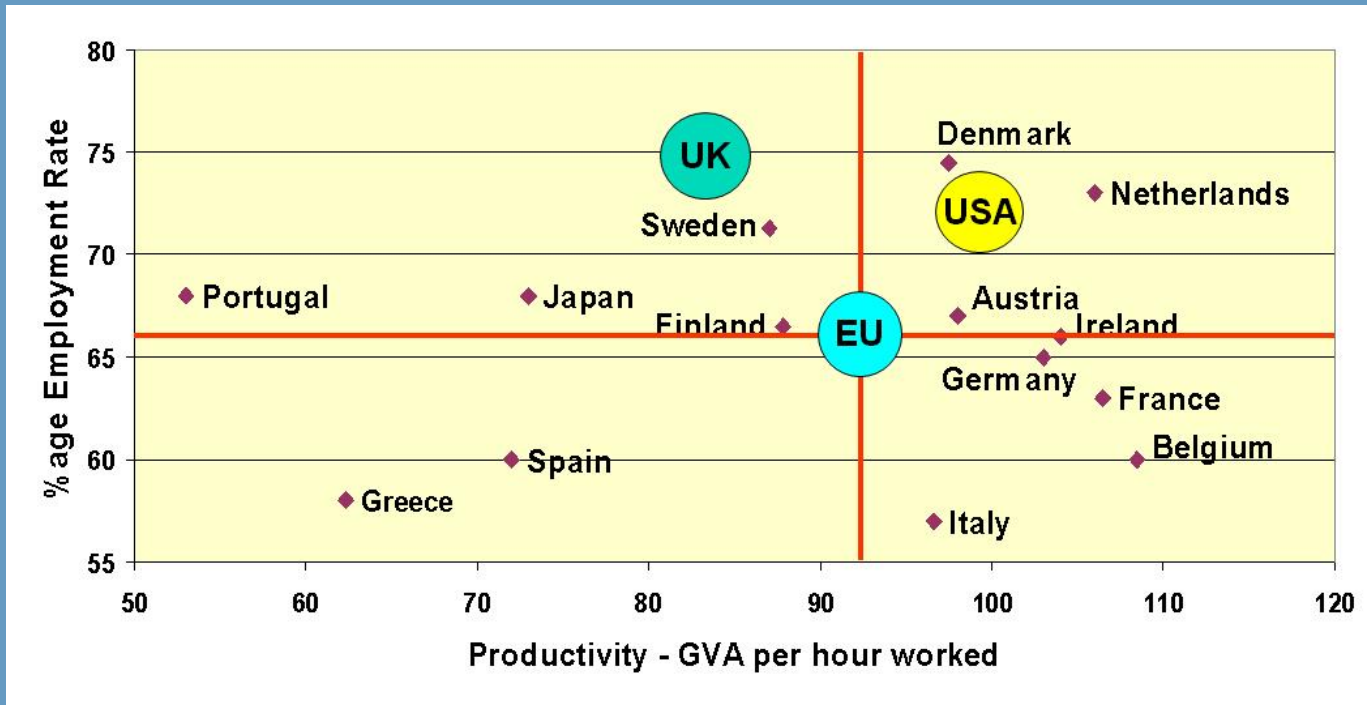


50 years of Promoting Excellence in Engineering Higher Education



Labour Market Trends, 2005

- Prosperity depends on jobs and productivity – and both depend on skills
- Employment – UK is 4th in EU; 8th out of 30 in OECD
- Productivity – UK is 10th out of EU 15; 15th out of 30 in OECD

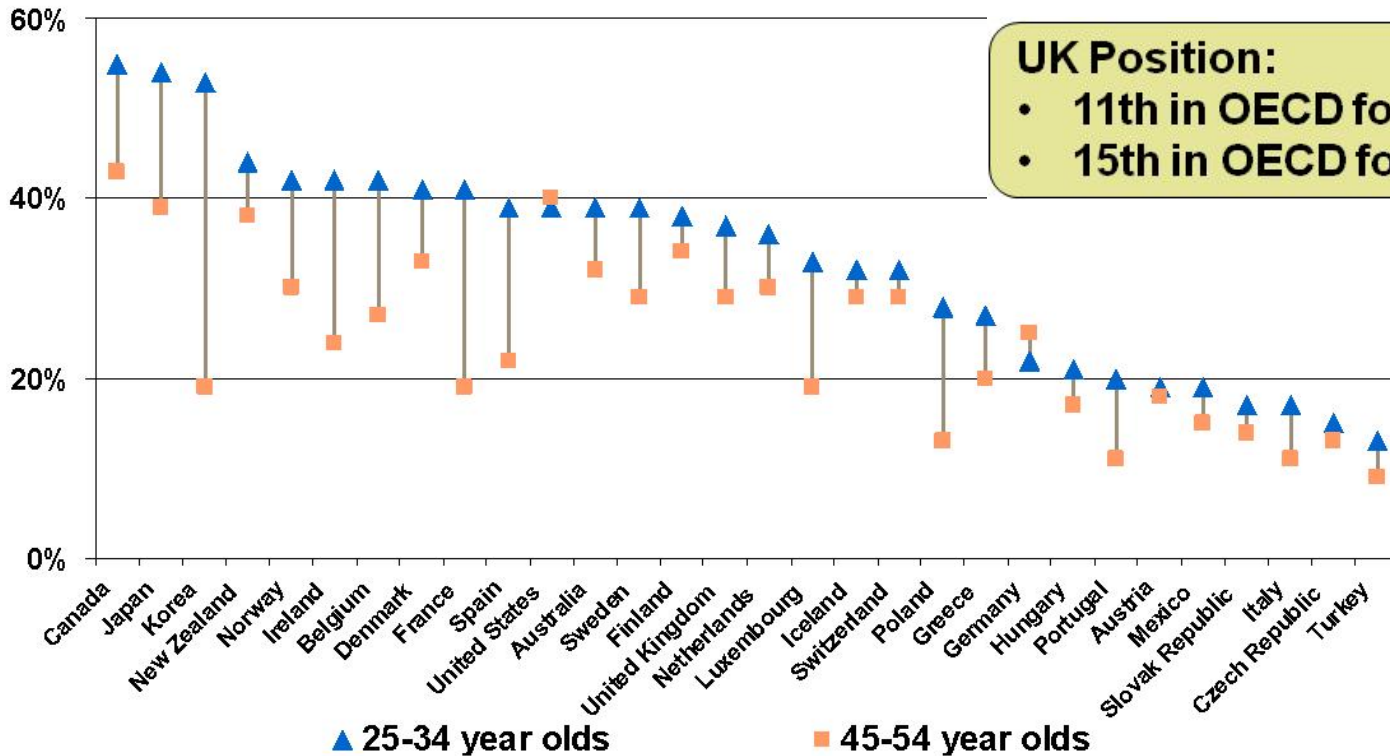


50 years of Promoting Excellence in Engineering Higher Education



OECD, 2007

Population with tertiary education, 2006



Source: OECD, Education at a Glance 2007. Table A1.3a



Views from Outside

- Unless action is taken a shortage of high-calibre engineers entering industry will become increasingly apparent over the next ten years with serious repercussions for the productivity and creativity of UK businesses.

(RAEng, 2007)

- We aren't that great at developing the workforce.

(Humphries, 2009)

RAEng Report 2007

- The best of UK graduate engineers are still world class and industry is generally satisfied with their overall quality, but there are simply not enough of them;
- Engineering courses at UK universities are now seriously under-funded;
- The funding and ranking-driven focus on research in many universities is constraining the development of innovative learning and teaching in engineering;
- Universities and industry need to find more effective ways of ensuring that course content reflects the real requirements of industry and enabling students to gain practical experience of industry as part of their education;



RAEng Report 2007

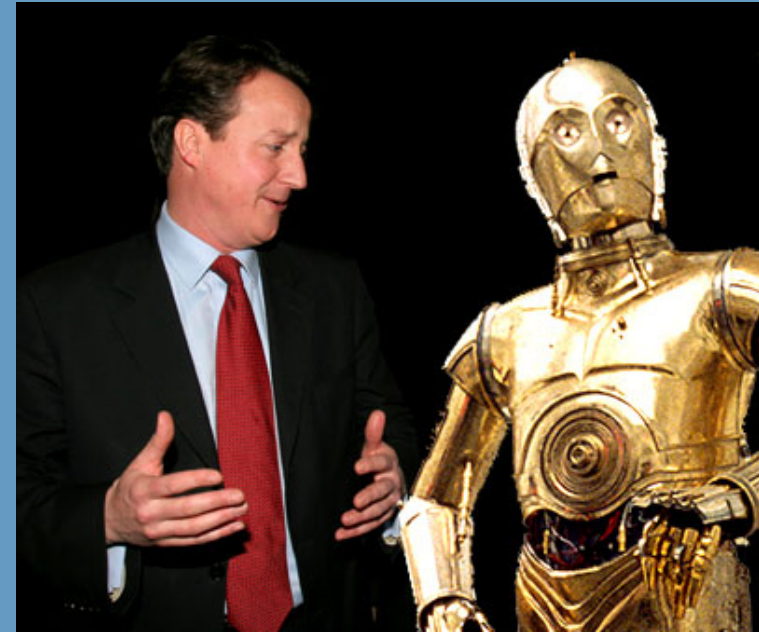
- Accreditation process for engineering courses should be proactive in driving the development and updating of course content, rather than being a passive auditing exercise;
- Reform of the engineering qualifications system at European level should focus on the importance of output competences as the primary means of assessing educational achievement;
- Ensure that school students perceive engineering as an exciting and rewarding profession that is worth pursuing;
- Foreign graduates of UK engineering degree courses should be allowed to work in the country for an extended period;



- On every level science and technology must be boosted and supported
(Cameron, 2007)

- We have to broaden our economic base to include more science, more hi-tech services, more green technologies, more engineering and more high-value manufacturing, drawing upon a much wider range of industries, markets, people, towns and cities

(Cameron, 2008)



DIUS Select Committee

- Engineering is one of the UK's great strengths and UK engineering and engineers are highly regarded internationally, more than they are at home.
- Strength of the UK's engineering base means that the UK can play a major part in solving global problems such as climate change, food and water supply, energy security and economic instability.
- The recent economic crisis has presented the Government with a once-in-a-generation opportunity to restructure the economy by building on the existing substantial strengths of UK engineering.

Innovation, Universities, Science and Skills Committee (2009)



Government Position

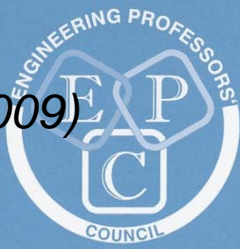
- Government's existing declared principles on high levels skills (2008) have developed from the Leitch Report (2006)
 - To generate more, and more employable graduates (quantity and quality)
 - To raise the skills and capacity for innovation and enterprise of those already in the workforce

(Higher Education at Work - High Skills: High Value, 2008)

- Government, DIUS and HEFCE are encouraging publicly funded higher education to expand skills provision and on a basis of co-funding with employers.
- Government, DIUS and UKCES are clearly expecting SSCs to engage with higher education, and to do this systematically.

(BESA, 2009)

50 years of Promoting Excellence in Engineering Higher Education



Current Actions

- RAEng study into 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
- EC(UK) pilots into research led MSc programmes and aligning initial profession development with education through MSc programmes
- BESA (alliance of sector skills councils and PIs) developing HE strategy for built environment

Factors that could affect HE

- Need to attract suitable candidates
- Need to ensure employment forecasting is used to encourage provision towards meeting labour requirements
- Need to get the best out of the 'normal graduate' age range in terms of level and quality of achievement
- Move towards increasing the levels of attainment and performance of those already in the workforce
- Improve content quality in terms of employer preferences
- Improve to access and delivery particularly for 'less traditional' learner constituencies (including apprentices, 14-19 Diploma holders and mature, employed entrants).

Curriculum and Provision

- The value and use of National Occupational Standards and NVQ/SVQs to inform Higher Education curricula;
- The value of models that combine higher education with occupational qualifications to cover work, theory and generic skills;
- The need for Professional Institutions to better reflect the changing needs of employers in their requirements and to adopt more collaborative approaches to accreditation of higher education programmes.
- The need to include multi-disciplinary and cross-cutting theme approaches in higher education curricula and provision.
- The need to provide for more flexible patterns of entry including qualifications that reflect phased progression.

Provision and Delivery

- The preferred relationship between content, place and timing;
- The need for real world work experiences;
- The need to apply knowledge rather than just balancing theory and practice;
- The need to distinguish between learning for the workplace and learning in the workplace;
- Identification of 'hard/practical skills' and 'soft skills' in the context of finding means and location for delivery that works best;
- The need for relevant/up-to-date industry experience in teaching, industry involvement in course provision and industry expert direct teaching input.

HE Provision

- Creating ease of access for employers, employees and mature entrants;
- Development of HEI infrastructure to support flexible provision
- Allocation of resources to support flexible provision;
- Provision of support for mature entrants and guidance for employers.
- Assessment methods related to flexible delivery patterns.
 - Relationship between content, delivery and level of attainment;
 - Alternatives to traditional assessment methods, including work-based and simulation under defined conditions;
 - Equivalence of requirements for assessors in HEIs and employers.

Building closer links between employers, including those within the (construction) industry, and higher education institutions is crucial for equipping graduates and those already in work with the higher level skills businesses will need to get through these challenging economic times and reap the benefits of the upturn.

(Lammy, 2009)



- Our ambition must be nothing less than to be world class in education and to move to the top of the global education league
(Brown, 2008)
- The time has come to build a society that seeks high-value engineering, not financial engineering
(Brown, 2009)



- If you really want to change the world, choose a career in engineering (*Mandelson, 2008*)
- Mandelson and Denham announce review of Engineering Construction sector (2009)
- Less financial engineering and more real engineering (*Mandelson, 2009*)



Conclusions

- Mapping onto National Qualifications and Credit Framework
- Government recognition of importance of engineering to UK economy
- Recognition that engineering benefits society
- Move towards skill based education with increasing emphasis on employer engagement in educational process
- Flexible approach to HE entry points
- Flexible approach to learning and assessment
- Develop programmes that meet the needs of industry
- Accreditation processes to proactively develop programmes
- Create the right infrastructure including resources and staff
- Move to a financially sustainable future for HE

50 years of Promoting Excellence in Engineering Higher Education



Acknowledgements

- Kath Galloway (Construction Skills)
- Bob Ditchfield (RAEng)

50 years of Promoting Excellence in Engineering Higher Education

