



Guest Article

The Higher Education Framework

The Rt Hon David Lammy MP

Minister of State for Higher Education and Intellectual Property

In February 2008, the Government launched a debate on the future of higher education. Since then, as we all know, we have witnessed changes in the economy that few could have predicted. During this time of turbulence and uncertainty, it has been constantly brought home to me how important higher education is, to the society of the UK, and to its economy, and how important is the contribution of engineering. This has been backed up by the many discussions and debates I have had with those who work in the HE sector, who use it, and who benefit from it, all of which have been valuable in developing the framework for the future of higher education that will be published shortly.



The framework is of fundamental importance to the engineering sector. It will do several things. It will set out the government's vision for how higher education will develop in this country over the next 10-15 years. In particular it will consider the role that higher education can play in two of the Government's major priorities at this time. The first is social mobility – Alan Milburn's recent report highlighted the extent of the work still to be done here and I believe that ensuring that all students can access the best education for them is vital if we are to achieve a fair society that makes the most of its talents. The second is

Congress 2010

The Engineering Professors' Council's Congress in 2010 will address the key issues faced by engineering education in the light of the government's new framework for higher education and what is expected to be the final stages of the general election campaign. It will focus on:

- Incentivising excellence;
- Internationalisation; and
- Future Funding.

In this edition of the Newsletter, EPC Working Group Chairs set the scene for the debate, following guest articles from two of those leading the wider debate.

Loughborough, 13-14 April 2010

For details, see

www.epc.ac.uk/current/diary/story.php?id=118

economic recovery – the Government is in no doubt that universities have an important role to play in developing the skills that the country needs to be internationally competitive and to emerge from the economic downturn in a position of strength.

The framework will also inform the forthcoming independent review of variable tuition fees which will begin later in the year.

Maintaining and improving the quality of our higher education system is a challenge. But it's a challenge I am sure we can meet, and I look forward to working with colleagues across the sector and beyond over the coming months as we begin to turn our vision into reality.

Guest Article

Sir Alan Langlands

Chief Executive, Higher Education Funding Council for England



I have taken on the Chief Executive's role at the Higher Education Funding Council for England (HEFCE) at a testing time – universities and colleges face very tough financial conditions and yet they are crucial to delivering the country's twin aims of a vibrant economy and a just society.

Universities in England are autonomous, self-governing bodies. They derive income from multiple sources and their overall turnover for 2007-08 was £19.4bn. HEFCE funding in that year was £7.37bn, accounting for around 37% of the total activity in universities. HEFCE funding has grown by 60% in real terms since 1998-99 and the total number of students in all categories in England has increased from 1.57m in 1998-99 to 1.99m in 2007-08.

This level of investment – coupled to the Government's long-term commitment to science and publicly funded research, and the introduction of variable fees – has enabled UK universities to maintain their international competitiveness whilst supporting widening participation in higher education.

However, the strong position enjoyed by UK higher education – there are 17 UK universities in the world's top 100 – is at risk from intense competition from many other countries, reductions in growth in public spending, threats to university income and fluctuations in the financial and property markets. Government, universities, employers, the research councils, HEFCE and a wide range of other bodies need to work together to build on the international standing of higher education.

At the very least this means striking a new balance between public expenditure and student/employer contributions, developing a sustainable system of student support and, even with some further improvements in efficiency, recognising that quality may well have to be

protected at the expense of increased volume and new initiatives which are peripheral to our core mission of higher education and research.

The plurality of funding for university based research, from public and other sources, is a major strength of the UK system. Strong research is a cornerstone of Britain's success and, over time, it can make a real difference to our everyday lives. It is valued by industry and by society but it will continue to need long term commitment, time and money. There are no short cuts on the journey from the laboratory to the marketplace.

Higher education plays a fundamental role in delivering the knowledge and skills required in a rapidly changing economy, both through the supply of graduates and through flexible higher education designed around the needs of employers. Importantly, HEFCE and universities continue to promote study in science, technology, engineering and mathematics (STEM). The funding of the new National HE STEM Programme, which will look to boost demand for as well as develop higher level skills in STEM subjects, and the creation of a permanent funding allocation to support high cost science and engineering subjects demonstrate the ongoing commitment in this area.

HEFCE, working with BIS, encourages close working relationships between higher education and business, public services and the voluntary sector. In return for the public investment higher education has proved to be an asset at national, regional and local level – generating value of £55bn to the economy, and promoting important health and social benefits.

And finally.....

Over nearly twenty years I have worked for about half my time in and around Whitehall and half as the Principal and Vice-Chancellor of a University. My task now is to help broker the partnership between Government and universities and colleges to ensure that we make best use of public money and have the high level skills and the research base we need for long-term success. I doubt if life will be dull.....

The Future of Engineering Education

Professor Barry Clarke

President, EPC



Universities face an uncertain future as a result of the economic crisis. Funding streams from HEFCE, research bodies and industry are likely to be cut. Yet the Government are linking skills to innovation in order to grow the economy. This means that funding is likely to be targeted at transformational activity both in teaching and research. The much delayed Higher Education Framework is likely to highlight the role of universities to support social mobility, lifelong learning and the economy, incentivising excellence in teaching, academia/industry links for teaching and research, postgraduate education and international recruitment. These are the messages from our guest contributors the Rt Hon David Lammy MP and Sir Alan Langlands, Chief Executive of HEFCE.

There has been a perceived shortage of engineering graduates recently though the evidence suggests that the number of graduates has exceeded the demand of industry; graduates are leaving the profession. The increase in applications to engineering programmes in 2009 exceeded the average increase in applications to all programmes. This implies that in three to four years time there is likely to be an increase in the number of engineering graduates; but will the economy be in a position to attract these graduates into the profession?

The skill set required by industry is changing because of the increasing recognition that engineering is about systems but that change is accelerating because of the development of the low carbon economy and the effects of climate change. Therefore degree programmes are likely to be developed to meet these new demands.

At the same time engineering is entering a new era as government recognises that engineering solutions are critical to the success of the economy; that engineering solutions are needed to mitigate against the impacts of climate change; and that the opportunities created by the low carbon economy will require an increasing number of engineering graduates.

This is background to the Congress in 2010. The aim is to debate with those that have an interest in higher education and share their vision of the future. The three sessions will cover the higher education framework and its implications to engineering, international engagement and funding. Each session will start with short presentations by keynote speakers who will then form the panel for debate. This is an opportunity to engage with those who will have an impact on our future. The aim is to help us through these uncertain times as universities, engineering education and research are transformed.

Incentivising Excellence

Professor Denise Bower

*Chair of the EPC
Future Engineering
Staff Profile Working
Group*



In his first major speech on higher education

Lord Mandelson stated, "We also need to look for ways of incentivising excellence in academic teaching."¹ Those teaching engineering degrees need to embrace this challenge because as Paul Ramsden (the outgoing Chief Executive of the Higher Education Academy) has argued, "We have a long way to go in recognizing and

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<http://www.timeshighereducation.co.uk/story.asp?storyCode=407583§ioncode=26>

rewarding good teaching in universities. Yes, we have a range of awards; yes, the Government has funded initiatives such as the Centres for Excellence in Teaching and Learning and the Higher Education Academy. And yes, basic training in teaching skills for academics, linked to a UK-wide professional-standards framework, has become the norm rather than the exception. The threshold of teaching quality has risen, and teaching scores highly in the National Student Survey. But all this has failed to crack the nut of academic scepticism.”¹ While excellence in teaching is perceived to be undervalued it will be impossible to significantly improve the student experience.

Excellence in learning and teaching terms is a function of the lecturer, the student, the learning environment and the subject that is being taught. All of these elements must be aligned for an excellent student experience. The lecturer must have a good knowledge of their subject (covering both practice and theory and understand emerging trends) and they must be good at speaking, being able to convey their enthusiasm for the subject to the students. This means that we need to describe the competencies required of engineering, academic staff who will teach the engineering degrees of the 21st Century. Bearing in mind that these degrees must meet Professional Institution and employer requirements while not straying too far from the basic principle of teaching people how to think logically. Promotions and appointment criteria need to recognise excellence in teaching as well as excellence in research and, as with any incentive, they will only result in excellence if we can clearly articulate our expectations and demonstrate a causal link between excellence in teaching and promotion. The converse is also true, there should be measures in place to address poor teaching performance and it has to

be clear that this cannot be a result of excellence in research; indeed excellence in research should lead to excellence in teaching given the enthusiasm for the subject.

In terms of our students we must instil in them the belief that their inquiring minds will enable them to tackle society's challenges and really make a difference. We must do this at a time when student numbers have significantly increased and staff student ratios are stretched. The excellence of their learning experience cannot be compromised because staff don't have the motivation to deliver. The learning landscape, both real and virtual, is changing and we need to understand how best to use the space and technology available to allow us to become more effective and efficient in our teaching. And, finally, the subject is changing, the first steps are now being taken towards addressing the impacts of the evolving theory, application and competence requirements of engineers within the context of a wide range of European and global pressures but we need to maintain this momentum and consider what the engineering degrees of the future will look like.

We must get the balance right between conservatism and innovation, research and teaching and looking outwards while pushing forward. We want to graduate students that can think for themselves in ways that allow them to tackle the challenges that the world faces, we want to be at the forefront of research development with the recognized experts in their field, we want to make a difference to society both locally and globally and we want a strong and enduring reputation for excellence in engineering education.

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<http://www.timeshighereducation.co.uk/story.asp?sectioncode=26&storycode=407744>

Internationalisation

Professor Clive Neal-Sturgess

Chair of the EPC International Working Group



There will be a major session of the 2010 EPC annual congress devoted to Internationalisation. The UK is second only to the US as being the largest importers of overseas students in the world; we need to guard this position jealously. Internationalisation affects all modes of study from undergraduate, through postgraduate taught programmes to research; but it affects them differently. Overseas students are now the financial lifeblood of most UK undergraduate and taught postgraduate engineering degrees, while at the research level 80-90% of all engineering research in the UK is now undertaken by overseas postgraduates. The UK has been insulated for some time by the English language. However, Bologna has radically changed the various European HE systems, which has led to a rapid rise of postgraduate degrees taught in English. At present there are over 30,000 PG degrees available in Europe, some for very low fees of around €500 per semester.

These positions leave us very exposed to changes in the overseas markets. In terms of the future capacity of the UK to develop its industries the exposure is both short and long term. In the short term we benefit from the financial income to make our programmes viable in the face of the inevitable further decline in government funding. In the longer term, due to UK immigration policy the overseas students who study here (either at UG level or possibly more seriously at PG level) largely the either go back to their country of origin, or migrate to other developed nations. This may benefit the UK, if they have had a good experience, but they inevitably become part of our competition. The US's position is "get the best young and keep them"!

From various surveys it appears that the main student driver is quality, and one of the main distribution processes is word of mouth. Quality has many dimensions, the obvious first point is the quality as defined by the standards of programmes of study. This is a difficult concept to quantify for; if the outputs of a programme are defined by the learning outcomes, which are often vague and refer to secondary sources, then it is very difficult to describe quality by learning outcomes. There is a growing list of rankings available to students, and whether we like it or not they are becoming influential. The quality of a programme of study will also be subjectively rated as to whether or not it is a good student experience, and as students pay more for HE then this pressure will grow. This will also be influenced by the quality of our support services, IT, Libraries, laboratories and infrastructure.

In Europe we have the juggernaut of Bologna wending its inexorable way forward (see key points on Bologna below). The major problem with Bologna from the UK perspective, ignoring political polemics that we are "the best in the world", is in terms of the equivalency of qualifications. Although all the UK has now "self-certified" to Bologna, there remains the problem of the European Credit Transfer System (ECTS). The UK has only 20 student effort hours per ECTS, whereas the rest of Europe and the US have 25-30 student hours per ECTS. This can help our major competitors to suggest that UK degrees are "lightweight". The emerging UK "Framework on Educational Qualifications", which is due to be announced shortly, may add further complication to the credit issue, for as the framework will cover both academic and vocational qualifications, we may have to use the ECVET (European Credits for Vocational Education and Training) system.

The professional accreditation of engineering degrees under the auspices of the Engineering Council is a very important third party benchmarking exercise, which gives the UK a solidly defensible position on international standards. When engineering degree programmes are accredited by the Engineering Council then they achieve internationally agreed

standards according to the Washington Accord for CEng programmes, and the Sydney accord for IEng. Currently many in Europe are envious of the UK's membership of the Washington Accord. There is also a new accreditation label called EUR-ACE (European System for Accreditation of Engineering Education) now available to accredited degrees programmes in the UK, which again gives some Bologna-proofing.

With the above background in mind, the Congress session on Internationalisation will focus on: the extent that engineering relies on overseas income; effects of the financial crisis; the direction the HE Framework is likely to drive us; the student perspective; International engagement; International standards; and International recruitment.

Bologna Process – key points

- The Bologna Process calls for the development of a “European Higher Education Area” by 2010.
 - The overall aim of the Bologna Process, through its ten “Action Lines”¹, is greater compatibility and comparability of national systems of higher education.
 - 46 governments, including UK, are committed to promoting it, but it is not a legally-binding agreement. In the UK, it is for individual HEIs to determine their own responses.
 - The latest Ministerial Conference (Leuven, April 2009²) looked for increased momentum and commitment beyond 2010. Its communiqué emphasized *inter alia* the importance of widening participation, lifelong learning, employability and mobility, setting a target of 20% student mobility by 2020.
- The Scotland and England/Wales/Northern Ireland have successfully self-certified their qualifications frameworks as compatible with the EHEA Qualifications Framework.
 - The European Commission “owns” the European Credit Transfer and Accumulation System (ECTS), which it developed in the context of the Erasmus mobility programme; it has become the standard credit system for the EHEA.
 - The Commission published an updated ECTS Users Guide in 2009³, following which the UK HE Europe Unit issued guidance on the relationship between UK arrangements for academic credit and the ECTS⁴. This includes guidance on how to relate UK credits to the ECTS. It advises that “*UK institutions need to be aware of the basic elements of ECTS and familiar with the Users’ Guide, particularly in discussion /meetings with colleagues and partner HEIs which have adopted ECTS. It should be stressed that the Users’ Guide is exactly that, a guide, and should be respected as such, as is evident as the guide oscillates between prescription, advice and recommendations*”.
 - All UK HEIs are encouraged to provide Diploma Supplements to all successful students⁵. A number also assign ECTS credits to their courses.

Announcements

- The **Royal Society** is inviting proposals by 23 November for its 2011 scientific discussion meeting and its Theo Murphy international scientific meeting programmes – see royalsociety.org/scientists
- The **IET 2009 Young Woman Engineer of the Year Award Ceremony** will be held in London on 1 December – see www.theiet.org/ywe

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http://www.europeunit.ac.uk/bologna_process/10_bologna_process_action_lines.cfm

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<http://europa.eu/rapid/pressReleasesAction.do?reference=P/09/675&format=HTML&aged=0&language=EN>

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³ http://ec.europa.eu/education/lifelong-learning-policy/doc/ects/guide_en.pdf

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[http://www.europeunit.ac.uk/sites/europe_unit2/resources/E-09-06 ECTS Users'Guide.pdf](http://www.europeunit.ac.uk/sites/europe_unit2/resources/E-09-06_ECTS_Users'Guide.pdf)

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<http://www.europeunit.ac.uk/resources/GuideDS.pdf>

Funding: Where will we be next year?



Professor Helen Atkinson

Chair of the EPC Funding Working Group

The EPC recently worked (with the Engineering and Technology Board (ETB)) with independent consultants, JM Consulting Ltd, to investigate the costs of teaching engineering in Higher Education institutions in England and to provide a comparison with HEFCE levels of funding.

In-depth case studies were undertaken at four HE establishments in England, covering a wide range of engineering disciplines, with an evaluation centred on a particular financial year and the differences in the costs of provision. The analysis was based on the management accounts of each institution and outputs from the TRAC national costing system that is in place in every institution in England.

The findings of the study indicated that the present costs and funding levels threaten the sustainability and future quality of teaching. Capital equipment is aging and there has been an increasing dependence on fees from students from outside the EU. The study also suggested that the capacity for further efficiency savings is limited.

The EPC believes that to maintain the long-term capacity and capability of engineering in the UK, which depends upon a high quality output from its HE Engineering Departments, levels of funding must be revised to better reflect the true costs of teaching. Just to match the TRAC sector mean for the subject, an increase of 14% would be required. However, to maintain current teaching standards a significantly higher increase is

needed. The necessity for investment in capital equipment and technological development raises the requirements for funding still further.

If we do not sustain and develop our engineering teaching, not only will our provision for UK students be put at risk, but our ability to recruit overseas students will be too. Overseas students are attracted to the UK to study engineering and technology because of the reputation of our courses and contribute hundreds of millions of pounds to the British economy each year.

Where will we be on funding in a year's time? Have you sat down and worked out the consequences of 10%, 15% and 20% cuts as it is alleged that Whitehall civil servants are being required to do? How do we make a case for the critical importance of our subject area to the economy as it goes through severe difficulties? How do we maintain, and indeed increase, the quality of our graduates in these circumstances? All this and more will be discussed at the Congress.

Announcements

- The Royal Academy of Engineering's **Global Research Award** scheme provides UK-based engineers currently engaged in research the opportunity to undertake a secondment overseas for a period of three months to one year – see www.raeng.org.uk/gra
- With the Royal Academy of Engineering, the Royal Society of Chemistry, the Institute of Physics and the Society of Biology, the Parliamentary and Scientific Committee is holding a **SET for BRITAIN poster competition** for early-stage researchers, concluding with an exhibition in the House of Commons on Monday 8th March 2010. See www.setforbritain.org.uk

Applications and acceptances for engineering programmes in 2009

Subject	Applications 2009		Acceptances 2009	
	Degree	% change	Degree	% change
G4 - Computer Science	49,677	10.90%	11,328	7.00%
H1 - General Engineering	12,108	12.60%	3,261	3.10%
H2 - Civil Engineering	25,073	10.40%	4,432	3.20%
H3 - Mechanical Engineering	31,548	19.10%	5,757	11.90%
H4 - Aerospace Engineering	11,665	22.50%	2,016	20.70%
H5 - Naval Architecture	462		209	
H6 - Electronic and Electrical Engineering	21,496	7.10%	4,654	3.70%
H7 - Production and Manufacturing Engineering	3,188	1.60%	661	0.40%
H8 - Chemical, Process and Energy Engineering	10,068	17.60%	1,826	11.00%
J6 - Maritime Technology	557	12.10%	151	
Grand Total of all subjects	2,224,289	8.10%	425,522	4.60%

Assessment of Learning Outcomes

Professor Fred Maillardet

EPC Committee

The Engineering Council's policy document *Standards and Routes to Registration*, published in 1997 – more commonly called SARTOR 3 – introduced the concept of 'input standards' as a proxy for course quality. While supporting the thrust of SARTOR 3, the EPC reacted strongly to the emphasis on input rather than output, and commenced work on articulating appropriate 'output standards'. This culminated in the publication of *The EPC Engineering Graduate Output Standard* in 2000. This is now seen as a seminal document marking the start of the universal move to focusing on programme output rather than input. The EPC published a set of follow-up reports exploring different aspects including *The Assessment of Complex Outcomes* in 2002.

When the Engineering Council launched UKSPEC in 2004 it prompted the EPC to revisit how to measure learning outcomes objectively and a working group was established in 2006 to address the *Assessment of Learning Outcomes in Engineering* (ALOE). The final report produced by this group was published in 2009 and may be found on the EPC website at <http://www.epc.ac.uk/publications/papers/index.php#28>. The report records the activities of the group

including workshops, professional body discussions, the developments

in other disciplines and a summary of the findings of the international conference mounted in 2008. The report also refers to updating the Engineering Subject Centre *Guide to Assessment in Engineering*, and gives definitions of the key terms currently employed in assessment – a commonly recurring request!

The report draws specific conclusions, reflects on the work carried out and makes recommendations for future actions. Among the latter are a return to the use of Bloom's Taxonomy to help match the nature of the assessment to the level of understanding, and the need to give Programme Leaders greater power to override the demands of Module Leaders if assessment at programme level is to be achieved.

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