



## Degrees of Confidence

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**A**LMOST every reader of this magazine will have a university degree of some sort, mostly from an accredited chemical engineering programme. (Apologies to those readers who have entered the sphere of chemical engineering activity via other, no less worthy routes.) Throughout your degree programme, your mastery of a diverse range of skills and knowledge was assessed. In those countries that, like the UK, operate a classification system, these assessment results were used to determine the class of your degree.

For many, the class of degree obtained, while seeming supremely important at the time, may have had no effect whatsoever on your subsequent career path. For others, the class of degree was decisive – your First Class gained you a doctoral scholarship or secured you a particular job; your 2:1 qualified you for a specialist Masters course; your 2:2 precluded you from employment with some companies so led you down a different path; your Third Class degree inclined you out of chemical engineering – or maybe brought you in from an even harder discipline.

Irrespective of career influences, your degree class also labelled you in terms of your intellectual ability, in your own mind and the minds of those around you. (As I write, we have just held our final exam board, and a student has phoned and left a message on my voicemail: “Grant – I got a 2:1! Whoohoo!”) As such, your degree class may be a source of ongoing pride or enduring bitterness.

Although its influence diminishes over time, a degree class is for life.

### order and direction

Assessment leading to the award of degrees is the most consequential thing we do in universities. The logical argument leading to this statement starts with recognising that, in terms of actual impact on society, the teaching undertaken by universities is much more important than the research. (I write this as a research-active academic who fully appreciates the place of research in universities. I should add that I am writing

“ *research serves to enliven and direct teaching... but research serves a secondary purpose relative to the primary mission of cultivating higher learning* ”



# Degrees of Confidence

Engaging with assessment is the highest obligation of the academic, writes **Grant Campbell**

in an entirely personal capacity, and that the views expressed in this article are not to be taken as indicating the official position of my university or school.) This is true even in a research-intensive university like my own. This notion is not incompatible with our mission to be ‘research-led’; ‘led’ refers to order and direction, not to relative importance; the locomotive that pulls the carriages is not more important than the passengers it transports. Thus, our former president and vice-chancellor, the late Alan Gilbert, wrote in the university’s internal news magazine: “...undergraduate students are by far the largest constituency in our university community, and our primary

stakeholders. Manchester is a research university of international importance... But let us remember that in the eyes of the wider society [...] it is our educational mission that is paramount. Research need not be done in universities. Higher learning, on the other hand, remains largely the preserve of universities.” (*Unilife*, Nov 2009).

In a similar vein, John Haldane, professor of philosophy at the UK’s University of St Andrews, used his 2010 Lord Dearing Memorial Address to argue that teaching is the highest purpose of universities. He refuted the objection that good teaching is impossible unless teachers are also researchers by noting: “First, to keep abreast

of one's subject requires scholarship, which is not the same as the pursuit and attainment of new knowledge, but may well take deeper learning and better judgment."

The graduates that we produce, who go on to have a lifetime of activity and service in society and industry, collectively have a much greater impact than the research papers we publish. This is almost certainly more true of the engineering disciplines than the sciences. Research serves to enliven and direct teaching. Certain types of teaching cannot take place in the absence of viable research programmes, and university-based research has its own independent value, but research serves a secondary purpose relative to the primary mission of cultivating higher learning.

Having established the importance of teaching, three further quotations carry the argument forward and epitomise the issues surrounding assessment:

"Good students can, with difficulty, escape poor teaching; they can't escape poor assessment."  
(paraphrased from Boud, 1995)

"There is probably more bad practice and ignorance of significant issues in the area of assessment than in any other aspect of higher education."  
(Boud, 1995)

"Nothing that we do to, or for, our students is more important than our assessment of their work and the feedback we give them on it. The results of our assessment influence our students for the rest of their lives and careers."  
(Race et al, 2005)

## no escape

Students can't escape assessment, we frequently don't do it well, and it is crucially influential on their learning while at university and their effectiveness and success thereafter. Hence my argument that assessment is the single most consequential activity we undertake in universities. Academics therefore have an overwhelming obligation to develop the skills and competencies to undertake assessments well.

Certainly assessment dominates much of our day-to-day work, arising in a great variety of formats and contexts. Just in the last few months, I have assessed design project reports, industrial experience dissertations, Master's research dissertations and posters, Master's research project proposals, oral presentations, over 400 first

and second year exam scripts, research funding applications, journal papers, doctoral theses, probation portfolios and over 50 promotions cases. In my capacity as external examiner at another university, I have assessed their programme structures, exam papers and graduating students. I am privileged to serve on the judging panel for the IChemE's awards and later this year will assess applications for those awards. Quite rightly Frank Furedi entitled his *Times Higher Education* cover article 'Our Job is to Judge' (17 March, 2011, p34). Assessing, judging, evaluating – these are central to scholarly activity in universities and account for much of our time.

But there is an inherent tension in assessment, a tension that will resonate with engineers more generally – the tension between the necessity to do a task of such consequence that it deserves to be done perfectly, and the impossibility of doing so. Safety is a good analogy. Safety is so consequential that it deserves to be done perfectly – we are playing with people's lives. But safety systems cannot be designed and implemented perfectly. The only completely safe chemical plant is the one that is never built. But never building chemical plants, in order never to have safety problems, is not a viable option.

Now, the analogy with assessment is not perfect – nobody dies as a result of imperfect assessment systems. Or then again, maybe they do. Student suicides in the UK run at around 100 per year – only slightly lower than the total number of worker fatalities in industry – with academic pressures and exam failures being major contributing factors. So the analogy has some merit: in assessment we are also playing with people's lives.

## in the pursuit of excellence

And as with safety, it is impossible to create perfect systems of assessment. As with safety systems, this is not to say that assessment systems cannot be created that are demonstrably better, worse or fit for purpose. Indeed, as with safety systems, much effort should be expended in evaluating assessment systems and educating academics to create better ones. The inability to create perfect assessment systems does not absolve us of the responsibility to create excellent ones.

Within the space of this short article, I can offer little guidance about how to create excellent assessments. My priority is to highlight the importance of assessment in order to encourage commitment towards doing it well. However, I confess an affection for learning outcomes and constructive alignment (Biggs, 1996). These ideas have a particular power for guidance

**“assessment is the most consequential activity we undertake in universities. Academics therefore have an overwhelming obligation to develop the skills and competencies to undertake assessments well”**

and equitable treatment of students undertaking large project work such as design or research projects. If I could offer just one suggestion for enhancing confidence in assessments, it would be to employ criterion-referenced objective marking schemes based on intended learning outcomes as the basis for assessing large project work.

Academic judgement, analogous to engineering judgement, is at the heart of assessment processes. A quick Google search demonstrates that academic judgement is protected against appeal at virtually all UK universities, while the courts repeatedly decline to overrule in matters of academic judgement, recognising that it is outside their realm of competence to do so and uniquely the realm of competence of universities. The same search also throws up an interesting book by Michèle Lamont (2009) with the revealing title *How Professors Think: Inside the Curious World of Academic Judgment*. (The spelling gives a clue that this is an American title, in which 'professor' equates with an academic at any level in the UK, not just those holding professorial chairs.) The title again underlines this defining characteristic of academics. Lamont helpfully unpicks some of the characteristics of academic judgement (in the context of research funding panels), including self-awareness, perspective and humility.

But here's the rub: academic judgement is not automatically conferred upon appointment to a lectureship position. It is developed over time and with experience and reflection. It requires cultivating what Furedi calls "practical wisdom... the capacity to make judgements that are morally right for the situation at hand", noting that "like all forms of judgement, academic judgement is acquired through experience... the more varied and the more extensive its practice, the better we get at

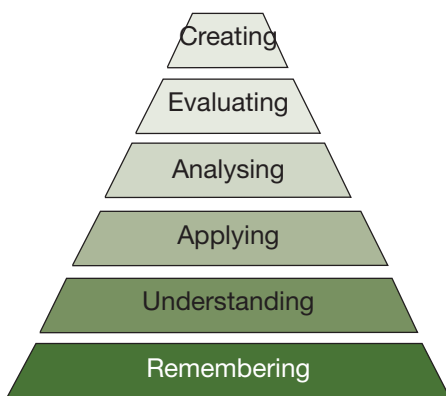


Figure 1: Bloom's Revised Taxonomy is used as a foundation for developing high quality assessments. Adapted from Anderson and Krathwohl (2001).

it." If assessment is the most consequential activity undertaken in universities, then cultivating academic judgement is the highest obligation of the academic.

Yes – but what's in it for the busy academic, who is typically torn between the moral obligation to construct and deliver high quality teaching, assessment and feedback, and the more reliably rewarding focus on research?

Figure 1 illustrates Bloom's taxonomy, often used as a helpful starting point for developing high quality assessments and a shared vocabulary (for use in objective marking schemes, for example). The highest levels of learning in Bloom's taxonomy are 'creating' and 'evaluating'. Constructing assessments that genuinely evaluate is a profoundly creative and uniquely stretching intellectual endeavour. Therefore, in engaging deeply with assessment, we most truly become academics. In turning this into meaningful judgements, to communicate with confidence to students and to employers, we also most usefully serve the community of chemical engineers. **tce**

### references

Anderson LW and Krathwohl DR (Eds):  
*A Taxonomy for Learning, Teaching, and*

*Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*, Longman, New York, US, 2001.

Biggs J: 'Enhancing teaching through constructive alignment', *Higher Education*, Vol 32, 1996, pp 1-18.

Boud D: 'Assessment and learning: contradictory or complementary?', in *Assessment for Learning in Higher Education*, Knight P (Ed), Kogan, London, 1995, pp 35-48.

Lamont M: *How Professors Think: Inside the Curious World of Academic Judgment*, Harvard University Press, Cambridge, Massachusetts, US, 2009.

Race P, Brown S & Smith B: *500 Tips on Assessment*, Routledge Falmer, London, UK, 2<sup>nd</sup> ed, 2005

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