

WHY GET YOUR ENGINEERING PROGRAMME ACCREDITED?

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ABSTRACT

In many countries engineering degree programmes can be submitted for accreditation by a professional body and/or graduate engineers can be certified or registered. Where this is available most academic institutions feel that they must offer accredited engineering programmes. I suggest that these processes are at best ineffective (they do not achieve their aims) and at worst they are destructive of creativity, innovation and confidence in the academic community. I argue that such processes (including any internal certification within CDIO) should be abandoned completely. I propose alternative ways of maintaining the quality of engineering design and manufacture, which place the responsibility where it properly lies – with the manufacturer or contractor. This is a polemic piece, not a referenced review of accreditation.

KEYWORDS

Accreditation, registration, certification, professional bodies.

THE CASE AGAINST ACCREDITATION

In many countries undergraduate engineering programmes can be submitted to a national body for “accreditation”. Graduates from accredited programmes are eligible, often with an additional requirement for relevant work experience, for registration as a professional engineer. In the UK this accreditation is overseen by the Engineering Council via UK-Spec and opens the way to C.Eng, I.Eng or Eng Tech qualifications. In the USA ABET serves a similar function, while in Australia the appropriate body is Engineers Australia. In all cases the programme, its students, and sometimes its graduates, are scrutinised by a committee of professional engineers before accreditation is awarded for a fixed period such as five years. The accreditation process involves substantial paperwork and usually a one or two day visitation, so is quite costly both for the educational institution and the professional body. I argue in this paper that this considerable effort does not represent good value for money and in some cases may have a negative effect on the quality of engineering education.

Did the accreditation of professional engineering programmes prevent the disastrous crash of the Airbus 330, flight AF 447, in June 2009? Equally, is it responsible for the fact that the Eiffel tower has remained standing for 120 years? Or that my iPhone is so brilliant? No, no and no. So what is accreditation supposed to be for? At the highest level I presume that the intention is to ensure and enhance the quality and safety of engineered products throughout the world. At a more mundane (and self-interested) national level it might be intended to enable the world-wide transferability, and thus profitability, of a nation’s engineering industry by ensuring the international credibility and employability of its engineers.

These seem to be laudable objectives, but delivery of them is several steps away from the accreditation of university programmes. The logic is presumably that the employers of

professional engineers must have confidence, via external testimony, in their skills and their fitness to practice. This confidence is engendered by their status as professional (*chartered* in UK parlance, *registered* in other jurisdictions) engineers, part of the qualification for which is that, at some time in the past, they graduated from an “accredited” degree programme. These engineers also have to demonstrate some appropriate experience in employment and the membership of a professional body.

I find the whole system of accreditation unsatisfactory in two ways: It does not deliver the intended outcome (and so is ineffectual) and, additionally, it can damage our education system and thus our students and graduates.

First, the charge that it is ineffectual: Engineered products are conceived, designed, made and operated (CDIO-ed) by engineers employed by large or small companies. Some, but certainly not all, of these engineers may be chartered. They will usually have earned their chartered status by virtue of the work undertaken in their first few years of employment, backed up by the degree they were awarded several years ago. Since receiving their chartered status they will have been encouraged to undertake continuous professional development, but this will not have been checked. A fifty-year-old chartered engineer is thus operating on the basis of a validation process twenty years ago and a degree awarded about 25 to 30 years ago. The accreditation of this degree, so long ago, has almost no relevance for the engineering practices in use today. Indeed if the degree was typical of those awarded 25 years ago it will have contained a significant amount of engineering science and very few tests of engineering aptitude or attitude. (Which is of course why we have the CDIO movement.) The fitness to practice of an individual engineer will in reality depend on what they have done, seen and learned during their working life, which is almost independent of the content of their first degree. Indeed the technical content of a degree in one engineering discipline may have almost no overlap with the content of another engineering discipline so it is hard to argue that subject content has anything to do with being, or thinking like, an engineer.

Furthermore an engineer employed today may be working in an area unrelated to their original area of study. This is very likely for bioengineers, nanoengineers, environmental engineers, nuclear engineers and others working in interdisciplinary areas. Their original degree would either have been un-accredited or the accreditation would relate to a different disciplinary area. How can this in any way validate or assure the quality of their current work?

A third issue is the effectiveness of the quality assurance provided by chartered status. I have already asserted that there are almost no checks on the continued professional development of chartered engineers, but equally there are almost no cases of the de-registration of rogue chartered engineers (and even if there were, they would certainly – like doctors – be de-registered after they had committed a grave misjudgement or offence, not before!).

So the accreditation of programmes is certainly ineffectual, but it is also damaging to the education process. University departments of Engineering spend a great deal of time preparing for accreditation visits, and tuning their degree programmes to fit the perceived requirements of their professional bodies. They do this not to improve their programmes (most programme leaders do not believe that the comments of accreditors will achieve this) but because of the fear that they will no longer be able to compete in the marketplace for students if they are not accredited. This fear is probably misplaced, but no department has the courage to put it to the test! Accreditation panels almost always feel that they should make some critical (framed as “helpful”) comments but these usually reflect the prejudices of individual panel members, who are rarely experts in higher education and frequently elderly and tending to be out of date. [I have resolved never to accept another invitation to sit on an accreditation panel now I have

reached 65.] The damage to the system is that the threat of accreditation makes our engineering departments more conservative, less willing to change or innovate, as well as taking time and money which would be better spent on the education of their students. It also reinforces (unhelpfully) the audit culture which has over-run our universities in the last twenty years (at least in the UK).

It would be unreasonable to criticise the existing system of accreditation without making some attempt to suggest what might replace it to provide the assurance of quality demanded by society. My suggestion is that the responsibility for the safety and quality of products (from multi-billion tunnels to five-penny toys) should remain where it legally is – with the manufacturer or major contractor. These businesses should assure themselves that their workers are appropriately skilled and work to appropriate safety and ethical standards. To achieve this they might need to strengthen their recruitment procedures to include a real assessment of candidates' current abilities and skill sets. They would also want, as many do, to ensure periodically that their employees are up to date. They might wish to buy in the necessary training expertise, perhaps even from a local university, but they will not be much helped by a past "accreditation". The proof of the quality of training, and of initial education, will be demonstrated by the performance of the employee – supervised and checked by experienced colleagues – not by their possession of a yellowing piece of paper.

I notice that I have not mentioned professional bodies. What might their role be? Certainly not as accreditors, but perhaps as honest brokers between employers and trainers and educators, or as forums for discussion (but not regulation) of best practice. In which case perhaps there should be an upper age limit for service on any committee or as an officer – shall we say 50 – and those in their dotage (like me) should only speak when asked.

The arguments I have advanced here also apply to the certification of undergraduate programmes as (for example) "CDIO-compliant". Such a scheme would cost effort (and almost certainly money) to implement, it would cost even more to police (so this would be unlikely to happen) and would still offer no assurance of the quality of a engineering graduate. A further particular argument which applies to CDIO members is that (unlike many other engineering teaching departments) they have already shown their commitment to improving engineering education and are thus the least likely programmes to need the additional discipline offered by certification process. So I strongly suggest that we do not bother.

BIOGRAPHICAL INFORMATION

Peter Goodhew is Emeritus Professor in the School of Engineering, University of Liverpool, UK. He is one of the Directors of CDIO and the joint Leader of the UK & Ireland region. He is interested in many aspects of engineering education and has recently published a short book on the subject: "Teaching Engineering", downloadable from <http://www.materials.ac.uk/resources/Teaching-Engineering.pdf>

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