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Engineering Program Accreditation: Where Have We Been and Where Should We Go?

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Abstract:

We examine the soundness of the idea and practice of engineering accreditation and look critically at the process as currently implemented in some regions around the world. We suggest areas for improvement and propose guidelines for a revised accreditation framework that addresses some of the challenges of the current system.

Keywords: Accreditation, ABET, Engineering program, Engineering education

1. Introduction

Accreditation is “a process by which an institution...formally evaluates its educational activities, in whole or in part, and seeks an independent judgement that it substantially achieves its own objectives and is generally equal in quality to comparable institutions.” Its origins date back to the late 1700s in the U.S. [1]. Accreditation requirements for engineering programs and programs in other disciplines have since spread around the world.

The benefits of accreditation come at a cost. Challenges include the burden that accreditation reviews place on university faculty, staff, and evaluators and rigidity in requirements that may hinder innovation as programs experiment with new approaches.

Our purpose is to reaffirm the soundness of the idea of accreditation and its benefits while looking critically at the process as currently implemented in some systems around the world and identifying potential improvements. We start with a discussion of the role and value of engineering accreditation and the strengths of the current ABET accreditation process. We suggest areas for improvement and propose guidelines for a revised accreditation framework that addresses some of the challenges of the current system. While different national boards may have somewhat varying criteria, signatories to the Washington Accord international engineering alliance have criteria that are consistent with each other and hence with ABET, allowing these countries to have mutual recognition of their accredited degrees [2].

2. Purpose and Importance of Accreditation

The philosophical basis for accreditation is to ensure that the needs of stakeholders including students and others are met. Higher educational institutions serve an important social purpose---they prepare young people to work productively in industry and make positive contributions to society. Institutions are naturally accountable to students, their parents and families, government institutions with oversight in education, and to society in general.

Accreditation protects the “brand” associated with a recognized degree title. The benefits of accreditation include more uniform quality among degree programs, a way for students and other stakeholders to recognize quality programs, some uniformity in the body of knowledge taught in the discipline, a formal process to identify and improve substandard programs, and a process for ongoing improvement for accredited programs. Naturally, institutions around the world take the process seriously.

3. Strengths of the Current Approach

There are two basic approaches to accreditation. One is to verify that resources are adequate and classes cover a reasonable body of material. The other is to let the program define itself based on the needs of stakeholders and to provide a process for improvement at meeting the goals of the program.

ABET’s EC2000 revision was an attempt to shift from the former to the latter. The revised accreditation standard adopted by ABET in 1996 is based on the premise, derived from management theory, that every program defines its educational objectives, sets out a path to work towards them based on student learning outcomes, and measures to what extent the goals were reached at the end of the process. Thus EC2000 imposes a process-based approach to program improvement.

A significant positive aspect of the process is that it encourages departments to engage in ‘deeper thoughts’ [3] about what they want students to accomplish after graduation and to consider ways to move towards those goals. These goals can provide a useful framework for the creation and improvement of the curricular structure, course content, and assessment methods.

Many assessments required by EC2000 are quite valuable. For example, ‘alumni and employer surveys, open and honest input from seniors at exit interviews,’ and feedback from external advisory boards can significantly motivate faculty to improve curriculum and educational activities [4]. These assessments are generally qualitative in nature.

4. Where the Current Criteria May be Improved

Across the educational world there is fundamental tension between empowering teachers and requiring accountability. To a motivated teacher, the institution provides resources and a framework, then steps out of the way to let the teacher create powerful learning experiences for students. To the institution, dealing with many faculty with different skill and motivation levels and approaches, a way to ensure quality throughout the student experience is needed.

National governing bodies and other stakeholders rely on accreditation to ensure that schools under their purview achieve a basic standard for educational quality. How can we have a

process that requires accountability for educational programs but still empowers faculty to do what they do best?

There is likely no perfect approach or final answer to this fundamental dichotomy. The challenge of balancing autonomy and accountability provides a creative space in which many ideas and potential improvements can be explored.

In this spirit, we identify four challenges presented by the current approach to accreditation. These critiques apply to lesser or greater degrees in various countries, where cultural norms may influence the way that accreditation requirements are applied and enforced.

(i) *Excessive documentation requirements*

Current approaches to accreditation require large amounts of documentation in the required format, thus requiring a ‘purely administrative process’ with the risk of becoming a ‘pencil drill’ [3]. Paperwork is required for the initial evaluation and for later revalidation visits. Evaluators request more documentation than could be realistically read by a small team in a few days’ time. Programs create more paperwork by an order of magnitude than evaluators can review, often with the intention of playing it safe. An administratively heavy process may inhibit the passion and depth of thought needed to creatively improve a program. This may be for many faculty the most significant issue with the current accreditation criteria [3].

If a program is found to be substandard, the resulting implications for faculty (“stick”, rather than “carrot”), may not inspire real improvement. It may be possible to ‘make cosmetic changes in the course descriptions,’ or in assessments, ‘to adjust an existing program to conform to the accreditation framework’ [3] or to create massive documentation that appears to satisfy the requirements, while the actual impact of the program on students may be weak.

By a similar argument, ‘the accreditation of a program is not, in itself, a guarantee that the spirit intended by accreditation bodies is captured and implemented in the program’ [3].

(ii) *Contrived outcome assessments*

The assessment methods inspired by the criteria could appear to be ‘somewhat contrived and artificial’ and at variance with the actual methods used by competent faculty to effect course improvements [4]. There is a temptation to produce large amounts of data and analysis, while failing to consider the meaning of the assessment results, as faculty members may not perceive these data as providing any useful information at the first place.

Universities, not being ‘enterprises with a defined product,’ cannot strictly be run by ‘standardized processes.’ Universities ‘generate a wide diversity of outputs. In research, they create new possibilities; in teaching, they shape new people’ [5]. Since ‘the consequences of the encounter between minds, between a mind, a problem and evidence, and between the minds of successive different generations are profoundly and marvelously unpredictable,’ any quantitative analysis of outcomes is inherently incomplete.

A natural consequence of time-intensive administrative requirements is to overburden and demotivate faculty. In the worst scenario, young teachers who joined the profession out of passion might observe activities done more to satisfy accreditation requirements than to lift and benefit students. This may not be in the long term interests of academic institutions and hence society.

(iii) *Credit hour constraints*

The present accreditation criteria impose credit hour requirements for specific course topics. It would have been philosophically cleaner to abandon specific course topic requirements and allow each program to identify its objectives and construct its curriculum accordingly with minimal external constraints. The hybrid approach may be justified by observing that a program must be identified as a particular flavor of engineering program before it can be evaluated by a given accrediting body. Considering the increasing emphasis on broad-based, holistic education [6], however, it would be desirable for universities to have more flexibility in course design. Some engineering departments have planned not to go for ABET accreditation [7].

(iv) *Variations among institutions and regions*

Standardized accreditation requirements imply that all accredited programs are equivalent in content and ‘output’ quality. In reality, there is a wide variations in aptitude and abilities among engineering graduates across institutions and regions.

Given the generally accepted notion that ‘external forces are needed to promote change in higher education,’ the challenge for accrediting agencies and universities, is to determine ‘how external assessment and accreditation activities should best combine with the natural, internal motivations of university faculty to create true excellence’ [4]. How can accreditation be made more meaningful to the programs and faculty tasked with implementing the process? We now attempt to propose some guidelines to this end.

5. Guidelines for a New Framework

There may be a tradeoff between processes designed to ensure educational quality and the flexibility that enables rapid innovation and agility in adopting new teaching techniques and curricular topics. It is the authors’ experience that ‘most significant program improvements’ are often done by ‘inspired faculty who review courses and curriculum on their own, and without external motivation’ [4]. An outstanding faculty committed to the discipline needs the flexibility to adjust the curriculum and create new courses without a heavy administrative burden imposed by accreditation process. This tradeoff could be more carefully considered as accreditation processes are adjusted. The guiding principles should be encouraging and enabling faculty autonomy and requiring faculty and programs to demonstrate accountability for student outcomes. Where the latter currently dominates the process, the pendulum could profitably swing in the former direction.

At the broad level, we believe the following primary factors should guide the accreditation framework and the actual audit:

(1) Trust, rather than distrust, as that is a central factor in working towards excellence. This would require that we remove some of the detailed requirements for programs from accreditation standards, and give evaluators more latitude to make qualitative judgements.

(2) Documentation of assessments and evaluation should be lean. Conscientious, well trained evaluators should look beyond assessment data and focus on the linkage between evaluation of assessment results and program improvement. For reasons discussed in the previous

section, there may need to be more reliance on qualitative rather than quantitative data. If there is not a real connection, the program should be docked for overdoing the documentation, no matter how massive it is. A program with limited data and real improvement should be rewarded. In no case should a program prepare documentation that would require evaluators more than a few hours to review.

(3) In order that the above factors can properly inform the accreditation process, in respect of evaluator choice, the following requirement may be desirable:

- In respect of industry evaluators, those either with significant academic inclination or academic experience should be preferred so as to hopefully ensure even application of evaluation standards.
- As far as possible, academic evaluators should themselves be passionate educators so that they can spot efforts towards excellence, or lack of them, and encourage/advise them further during the audit.

(4) A minimal pre-visit documentation, such that it can be prepared by the faculty and reviewed by evaluators in a few hours of time. In fact, since accreditation is about the processes and methods employed by an institution in its day-to-day academic activities, in a certain sense there should not be any need for special documentation at all.

(5) A lean evaluation visit. The accrediting committee should visit an institution at reasonably short notice, talk to stake holders, look at the documents that the departments prepare in course of their day-to-day work, and render a decision.

(6) In addition to traditional accreditation decision outcomes (full accreditation or weaknesses or concerns to address), the evaluation visit could provide the program with a brief statement of the strengths and unique contributions of the program and its faculty as recognized by the evaluators. Given the importance of intangible motivators in the teaching enterprise, this type of formative feedback shows respect to the need for faculty autonomy and could be as impactful in guiding and encouraging a thoughtful faculty as the accreditation process itself.

6. Conclusions

In a sense, our purpose here is to assess the assessment regime currently imposed by accreditation. Is it helpful? Is it promoting program improvement? How can our approach to accreditation be improved?

Accreditation currently consists of two basic pieces: (1) a standard for program topics and course content and (2) a process-driven approach for evaluation and improvement. We are proposing that the first area, a standard for course topics, be continued but with more flexibility to the institutions, the second area, data driven improvement processes, be reduced in magnitude and focus on qualitative assessments, and a third element added: (3) recognition of the need for faculty empowerment and freedom to innovate, a central requirement in ensuring faculty enthusiasm and hence in an effective educational experience for the students [8]. One way to support this third aspect of accreditation is that the assessment report focus on the strengths of the program rather than simply rendering a critical assessment decision. As has been noted in [5], formal requirements alone cannot motivate the inspiration, devotion, and enthusiasm that is the backbone of academic excellence.

It is our hope that the discussion and suggestions we provide will be heard and considered by accrediting bodies, so that the impact of the accreditation process can be improved for programs around the world. Our recommendations are informed by our experiences in different world regions, so some of our proposals may already be in place in some areas while lacking and more pressingly needed in others.

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