

From the
PRESIDENT

Engineering education—dare we go there?



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NCEES President

The Council has long endorsed the three-legged stool of licensure: education, experience, and examinations. One could argue that the education leg is the foundation of our licensure system and should be strong and sturdy like oak. If this qualification is so fundamental, why does the Council seem to have so little control or influence over the desired outcomes of engineering education?

Since the Council's inception in 1920, the qualifications to become a professional engineer have been debated, agreed to, revised, debated again...and the cycle continues today. Around 1932, a Council Committee on Accredited Engineering Schools formulated a Suggested Schedule for Rating Engineering Schools. This schedule included entrance requirements, graduation requirements (credit hours), curriculum, degrees, and faculty. One of the more interesting of the 14 requirements stated that, "No college will be accredited until it has been inspected and reported on by the National Council of State Boards of Engineering Examiners (NCSBEE)." NCSBEE is, of course, now called NCEES.

That same year the Founder Societies—the American Institute of Mining, Mineral, and Petroleum Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the Institute of Electrical and Electronic Engineers, and the American Institute of Chemical Engineers—promulgated a parallel effort known as the Engineers Council for Professional Development (ECPD), now known as the Accreditation Board for Engineering and Technology (ABET). The Council was invited to participate, and eventually the ECPD was

established as the accrediting agency for schools of engineering. The minimum qualifications for an engineer were codified that same year and included a four-year approved course in engineering, a specific record of four or more years of engineering work, and successful passing of written and oral examinations covering technical, economic, and cultural subjects.

So what has happened to engineering education over the last 68 years? Is it sufficient? Is it keeping up with the changes in technology and the added demands of professional practice? Is it still encompassing the required body of knowledge? And is it of a quality that allows the public to rely on the proficiency and competency of the students that graduate?

Engineering education is decidedly more than teaching technical competence, and the evidence seems to be mounting that there needs to be still "more." Now that there is a population of engineers close to retirement, the "good old days" of 150 or more credit hours (with few electives) are now no more than a basis for bragging rights. These old standards do die, and legislative edicts, concern for student overload, increased costs of higher education, and a plethora of other reasons have now reduced an engineering degree to somewhere between 120 and 130 credit hours. With this reduction, something has to give, and often the faculty and student choices are wedged between accreditation criteria (albeit less prescriptive) and the desired outcomes. Is this reduction in the required credit hours significantly affecting the level of student competency with respect to the licensure track?

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Is there a need for more “non-engineering” activities or additional “non-engineering” education at the university level? Some senior managers claim that management activities, public speaking, and association involvement during students’ years at university would enhance and improve their leadership skills during their careers. I recently heard that engineers are hired for the technical skills, fired for their people skills, and promoted for their leadership skills.

Many engineering programs have formulated some successful methods to integrate coursework with upper-level design and eventually with industry and private practice constituents. I certainly do not have the expertise to assess such innovations, nor do I have training to judge curriculum content. The education community has acknowledged that a paradigm shift has been made away from ticking off a set of (some say) prescriptive plug-and-chug engineering courses to examining a set of engineering program objectives and desired learning outcomes. Constant feedback and continuous quality improvement are of cardinal importance under this new paradigm.

Accreditation has, since the formation of the ECPD, assured quality in higher education. Now that there is an institutional change in how education is administered and how learning outcomes are measured, does the Council still have that quality assurance and are the end products of this system meeting our minimum competence standard? I do not have the answer, and we as a Council may never have a clear directive. However, if the Council is to do its due diligence with regard to our pledge and duty to protect the public health, safety, and welfare, we must not take anything, especially education, for

granted. We must formulate a clear Council policy with respect to education and define our objectives based on that policy. If deemed necessary, we must create an action plan to assure our Member Boards that candidates for licensure do indeed have the quality education needed as a foundation for professional practice.

Change cannot be completed in a vacuum, and change will come to fruition only with a committed and sustained effort, and an effort that includes relevant stakeholders. I believe that assuring quality education is much more than counting credit hours or adding a graduate degree or measuring outcomes or even passing exams. It is an attitude, and it is a passion not to accept anything less than the rigor required, and then taking the responsibility to make it happen. The indications are that our institutions are committed to quality education, but we must be involved as a partner in the process. For our Member Boards, there must be assurance that accredited education and the outcome of that education is positively linked to licensure qualifications. Moreover, the Council should renew its commitment to its ever so important first leg of licensure—education—and protect it as we have pledged to protect the public.

In February at the Board Presidents Assembly in Anchorage, Alaska, we will address some of these very difficult issues. With regard to education, the decisions on where we are going, where we want to go, and how we are going to get there will be yours, as leaders in the Council, to make. Please prepare yourselves for this critical discussion and interact with your own board members, so that you can bring along their concerns, ideas, and feelings on education. See you in Alaska.

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Send letters to *Licensure Exchange Editor*: NCEES, P.O. Box 1686, Clemson, SC 29633 or e-mail to william@ncees.org.

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