EDITORIAL

More on the State of Engineering Education

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I read the editorial by Strether Smith entitled "A Commentary on the State of Engineering Education" (S&V, July 2004) and feel compelled to respond. In doing so I'd like to first provide a brief overview of today's ABET accreditation criteria for engineering programs, second, describe how our engineering program at TCU stays connected to the real world, and finally, suggest how specialized areas of engineering such as experimental mechanics should react to perceived shortcomings that might exist in today's engineering education process.

ABET accreditation criteria for engineering programs have evolved over the years in response to the needs of the engineering profession. The current accreditation criteria, EC2000, is based on reform measures first proposed in 1992 and developed over the next several years with significant input from many industries.

EC2000 criteria emphasize quality and professional preparation, while at the same time allow for flexibility in developing program curricula that are responsive to a changing world. Core features of EC2000 include a prescribed set of outcomes (essential competencies) that all program graduates must achieve, along with the requirement for programs to develop a set of educational objectives based on input from their program stakeholders.

Overlying these features, EC2000 requires engineering programs to implement an ongoing assessment and evaluation process that measures how well the program meets prescribed outcomes and stated objectives. This is the ABET 'stick' designed to encourage that accredited engineering programs remain relevant and in touch with industry.

The TCU engineering program is ABET accredited. We are a small program and offer a B.S. degree in Engineering, with a mechanical or electrical emphasis. As elaborated in Strether's editorial, we offer significant 'dirty-hands' experiences. The TCU program's ongoing assessment and evaluation process includes an annual meeting with our Board of Industrial Advisors (BIA), which is comprised of 15 members from engineering-based industries within the metroplex, many of which hire our graduates. TCU's BIA is a primary communication link between our engineering program and the real world. During the annual meeting program, educational objectives are reviewed, the accomplishments of our students and faculty for the year are presented and feedback from the board is requested on what they feel we're doing right and wrong. For example, we are currently in the process of making changes to a freshman-level programming course. At our last BIA meeting we discussed the merits of object-oriented programming versus a more structured language-based course, and ask for members' advice as to what would be more valuable to their industries.

The assessment and evaluation process we use also includes an annual survey sent to our alumni 2 and 5 years beyond graduation that asks them to rate their undergraduate experience. For example, were they satisfied with the design content, the laboratory experiences, opportunities to work in teams and the communication emphasis. So far we're scoring high in these areas. The survey further asks alumni to reflect on where they think the engineering profession is headed and the more important attributes undergraduate engineers should possess when entering today's work force.

And I don't think our program at TCU is necessarily unique. Through my involvement with TCU's accreditation efforts, I've become familiar with a handful of different engineering programs and, in the past two years, served twice as a program reviewer for ABET. These programs all use some form of an industrial advisory board, and receive input from various program stakeholders. I've also been impressed with the sincere desire by each to provide the best engineering students possible to the industrial ranks and to graduate programs. Even more importantly, they have all been willing to listen to the input from the various constituencies and make curricular changes as deemed appropriate. What's been the common denominator among these schools? None would be considered top-tier engineering research universities. These programs all value undergraduate education and that is the primary focus of their faculty.

What can some of the smaller and more specialized disciplines such as experimental mechanics do to insure they get the best trained engineers? First, remember the larger goal of an engineering education – it teaches students how to think in a methodical and systematic way and apply fundamental science to solve problems. An engineering program is not a trade school, so expecting a highly trained technician is unrealistic. Second, remember that schools listed at the top of the *U.S. News and World Report*'s best engineering schools may not be the best places to learn engineering and receive 'dirty-hands' laboratory experiences. Third, get involved.

The leaders of specialized disciplines should become stakeholders in university programs that offer the focus of their choice. If a program is ABET accredited, then there will be a formal process in place to receive your input. It will be welcomed and valued, especially if you hire their graduates. And finally, as it has been since the birth of the profession, it's the responsibility of the old guys to teach the new guys how to be good engineers. S/V

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