Editorial

Mentoring the Body of Knowledge

The Link between Academia and Practice

By Brad Cross, P.E., S.E., Ph.D.

Like many of you, when I was a practicing structural engineer the most rewarding aspect of my career was mentoring young engineers in the office. Few things were as satisfying as pulling out the Steel Joist Institute catalog and describing to a recent graduate's amazement that bar joists would be a structural component in just about every new steel building we would design. Invariably, when I would ask them if they had ever seen a bar joist in school, the answer would be a chagrined "no". I would shake my head and wonder what they were teaching at our universities.

In March of 2008, ASCE published the Second Edition of the *Body of Knowledge for the 21st Century* (ASCE 2008). This important, perhaps revolutionary, document is an attempt by the ASCE Body of Knowledge Committee to define who teaches what to whom and when. It attempts to quantify levels of knowledge required at the three levels of instruction: undergraduate, graduate, and prelicensure professional experience. It is, and will be, used to help guide changes in the Acreditation Board for Engineering and Technolgy (ABET) accreditation criteria. However, just as important is the new emphasis on training required after graduation and before licensure: in other words, billable hours.

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What this licensing procedure makes clear is that students are not even "engineers-in-training" until they complete a bachelor's degree program and pass an objective, external test (the Fundamentals of Engineering Exam). So what were they during university study? Engineers-in-training-in-training. Universities teach them how to train. Professors do the rough cut; practitioners smooth the edges.

Now more than ever, this will require a partnership between academia and practice. Exactly what should be the elements of the rough cut, and what needs to be completed during practice to produce a finished engineer? Should the university be teaching students to pick out joists? To write finally tuned letters to clients? To understand the business aspects of the global marketplace? The exact nature of what is done in the university, and what will be done in practice, is still in debate. As I write this, practitioners are being recruited to specifically describe what will be done in the prelicensure phase of training. The new ASCE committee, "ASCE's Committee on Academic Prerequisites for Professional Practice", was accepting applications through the end of October and will begin meeting soon.

As a professor, I am eager to see results from this committee. It will give critical insight into what should be taught in school, and what should be taught in the "real world". Of course *how* it is taught is very clear in practice: mentoring. What might surprise some is that mentoring is the key to quality university education as well.

There may be some outstanding individuals who do not need a mentor to get them started. But even in the current environment, the immediacy of the one-on-one role of engineering faculty in training students to learn is still an essential component – perhaps the most essential component – of education.

Students are in the university to acquire the craft of learning how to train. Upon graduation, they will become engineers-in-training, only to actually become masters of the craft after an apprenticeship with practicing engineers. All the components of our engineering education should support this "learning how to train" master-apprentice relationship.

As human beings, all students have different ways of absorbing technical concepts, and it is important that we not only help them absorb new concepts, but teach them how to absorb them. This involves more than just approaching the problem from a mathematical or scientific point of view. Problems must also be solved with full consideration of ethical, societal, legal, professional, and environmental impacts. The subtle balancing of all these non-technical issues is best provided within the classroom during interactive discussion, as well as via mentoring activities outside the classroom.

Opportunities for the mentoring role are diminishing in the university. Unfortunately, it is sometimes difficult for faculty and administrators making programmatic plans to see anything more in the engineering college experience than the transmission of technological data from an expert to a learner. While this is definitely a role a university can play, it has the drawback of moving us away from close mentoring relationships with our students. As an example, at some schools there is a move from using engineering professors as advisors to a more centralized, computerized advising system. This has the unhappy result of giving students less time one-on-one with their professors. Personal contacts can result in learning epiphanies for some individuals. To lessen the number of these contacts creates the danger that some students will be unlikely to develop the very mentoring relationship with professors that they are at the university to nurture.

The mentoring link between academia and practice is clear. Professors must never lose sight of the fact that we should be creating more mentoring possibilities in the university, not fewer. Open door office hour polices, advising, student society involvement, competition supervision, and undergraduate project and research supervision, are just a few of the ways we can get involved as mentors with our engineers-in-training-in-training.▪

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