

A S E E P R I S M



MARCH + APRIL 2011

AMERICAN SOCIETY FOR ENGINEERING EDUCATION

LAST WORD

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ENGINEER OR EDUCATOR? A FALSE CHOICE**Change is needed to strengthen both kinds of expertise.**

When it comes to practice, engineering educators straddle a somewhat unique divide. In disciplines from medicine to accounting, on-the-job experience is part of the required route to becoming a professor. That is not the case for engineering faculty. Has an institutional emphasis on theory hindered students from learning how engineers work, thus limiting their career prospects in today's global economy? Should professors be engineers, educators ... or both?

Results from our organizations' examination of effective instructors suggest that a mix of academic and professional expertise is optimal. The informal survey, prompted by concerns about the competitiveness of recent engineering graduates, sought to pinpoint attributes of the ideal engineering professor. It was conducted in the fall of 2009 by the International Federation of Engineering Education Societies (IFEES) and the Student Platform for Engineering Education Development (SPEED). Though the sample was small, the 88 respondents hailed from all over the world and represented engineering faculty, students, and industry. Roughly one third (28) were professors in Brazil, Canada, India, Portugal, and the United States, with students from Belgium, France, India, Macedonia, Mexico, the Netherlands, Portugal, Russia, Serbia, Spain, South Africa, Turkey, Ukraine, and the United States making up all but four of the rest.

Their ideal instructor represented a blend of what it takes to be a successful engineer and an effective educator. Someone with "deep connections with enterprises and in-depth knowledge of the challenges of enterprises and society," was how Seeram Ramakrishna, former dean of engineering at National University of Singapore, put it. More specifically, as we highlighted in a 2010 ASEE conference paper on the Engineering Professor of 2020, respondents described the ideal professor as a technical expert and engineering practitioner who also was an excellent communicator and an effective, culturally inclusive teacher and mentor with a deep commitment to global citizenship.

Unfortunately, that does not describe most engineering professors in today's classrooms. While research and teaching are equally important to society, all engineering educators should possess, or strive to develop, a minimum set of ideal instructor qualities. Consider, for example, a prime attribute revealed by the survey: knowledge of the subject in theory and practice, an ability to convey this knowledge, and the perspective to see why it is important. The engineers of today and tomorrow must master new skills, technologies, and competencies; shouldn't the same requirement apply to those who educate future engineers? Engineering

educators should understand what it takes to practice engineering in the real world and how to be effective mentors.

Engineering educators have invested considerable time and energy in discussing “what” needs to be changed. More attention should be addressed to “how” those changes occur and “who” needs to drive them, since that will largely determine the pace, quality, and sustainability of the effort. If we seek to alter engineering education to better serve society, then change must take place among those primarily responsible for directing it: professors. For example, schools might provide engineering faculty with opportunities for significant industry experience, such as sabbaticals or postdoctoral experiences in the workplace. Professors will only rise to the challenge, however, if higher education’s incentives and rewards shift as well. As the saying goes, “If the system is not working, do not blame the worker; blame the system.”

Responsibility for change lies squarely in the hands of the engineering education leadership, including deans, university presidents, the National Science Foundation, industry, and professional societies. The ranks also include the new assistant professor or freshman student who doesn’t believe he or she can change an entrenched system. Rather than defend current structures, practices, or disciplinary fiefdoms, let’s apply our collective brainpower and engineering problem-solving skills to figuring out how to motivate all stakeholders to make necessary changes in the system — and reward those who do it successfully.

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