

Editorial: Higher Education in Engineering: Need for Paradigm Shift

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There is a considerable growing interest among academia as well, as policy makers in governments around the world, in higher education in the hope of enhancing the return on the massive investments required to provide it to the largest number of students. As the cost of education monotonically rises, it is more difficult to upgrade the quality as the numbers increase with little or no increase in the needed resources. Yet, high-quality education in science and engineering is a key to successful technological innovation, which drives national economic development.

High-quality education at the undergraduate level is essential for high-quality postgraduate programs, leading to cutting edge research and development. With limited financial and human resources available for higher education, it is crucial to make tough choices and optimize the entire process. The practice of maximizing the number of graduates at minimal cost is undesirable, but is most common around the world.

Sciences and engineering are complex disciplines not suitable for everyone. Aside from the right aptitude, they demand a high level of analytical skills and the ability to think critically. Undergraduate as well as graduate studies in these fields require considerable commitment of resources. Awarding a large number of degrees in these areas at minimal cost does not serve the nation well. Excessive production of graduates in any field beyond the needs of the market is counterproductive.

Excessive supply reduces the incentive for high-level talent to steer toward such disciplines. It is important for policy makers to try to strike a balance between supply and demand so that resources are optimally used. High-quality professoriate is needed to mentor high-quality

graduates in any field. Mentoring future scientists and engineers is a difficult and complex task that not all academics are capable of doing well. Mentoring of young faculty by accomplished academics with proven records is one potential solution that is rarely followed in practice.

Without going into a detailed discussion on higher education, I would like to note the critical importance of incorporating aspects of ethics, economics, environmental considerations, and energy in the basic curricula. Academics should emphasize education and training of highly qualified researchers, and not the research output that can be published and somehow “counted.” Basically, we need to focus on research outcome and not the output. Good outcome includes good output, but the converse is not generally true. The criteria set forth by non-academic ranking agencies seem to have derailed the research objectives of many granting agencies, as well as universities around the world. I note some corrections being made sporadically, but not en masse yet. This may happen in the next decade, I am sure.

Finally, I am pleased to have a Guest Editorial in this issue by a truly accomplished world-class educationist and researcher, Professor Seeram Ramakrishna, on this theme. I am sure this will interest our academic as well as industry readership, as the issue affects us all. His vast experience and exceptional expertise, as well as global exposure, make the ideas proposed particularly valuable to pay attention to. Clearly, a paradigm shift is needed and will most likely happen in the foreseeable future.

Arun S. Mujumdar
McGill University, Montreal, Canada
Western University, London, ON, Canada
KMUTT, Bangkok, Thailand
NIFTEM, Kundli, Delhi, India