

## **ASCE AND CIVIL ENGINEERING EDUCATION**

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### **Introduction**

Practicing civil engineers share with educators and researchers the responsibility for the education of civil engineers. Their joint responsibility includes not only traditional undergraduate and graduate training in universities, but also the continuing education of civil engineers throughout their careers.

It is the purpose of this address to focus on some of the critical issues which we in the Massachusetts Section and our professional colleagues throughout the country must consider in our attempts to improve civil engineering education.

We might hope to start a re-evaluation of civil engineering education with a review of its history, but such a review is unlikely to be particularly productive for three reasons. First, the degree of sophistication of civil engineering practice is much higher today than it was only a decade or two ago. Second, the climate in which the civil engineer practices today is much more demanding of his attention to social, environmental, and political issues than ever before. The third reason is best summed up in a statement made by Arthur Schesinger, Jr. — “The besetting sin of the historian is to tidy up the past, to impute pattern to accident and purpose to fortuity.”

The only purpose that a historical review is likely to serve effectively is to illustrate some of the classical blunders of the past and warn us against the rigid and self-assured pursuit of our “newly discovered” goals. Who among us today would be so bold as to champion a single-minded focus on handbook engineering (post-World War II); engineering science (late 1950’s and early 1960’s), which would solve grand and complex problems with a few fundamentals and no experience; systems engineering (late 1960’s and early 1970’s), which would solve those grand and complex problems with a great deal of mathematical manipulation of poorly understood data? And what can we make today of the unstructured and undisciplined curriculum demanded by students who know nothing yet of their chosen profession, yet deem themselves competent to design their education to practice that profession?

The following paragraphs suggest in briefest outline some of the matters that deserve our serious attention.

### Areas of Concern

*Undergraduate and graduate curricula.* Undergraduate preparation for any profession must have as its prime purposes to help students to learn new things, to exercise independence of judgment, to develop a catholicity of interest, and to view in tolerant perspective their role in a complex society. These purposes are not achieved during four undergraduate years, nor even in a lifetime. Yet, their continuing realization demands that most of the four undergraduate years be devoted to their embryonic beginnings. If this be so, it must beg the question whether any professional career can be started today from a foundation provided by less than a graduate degree — civil engineering no less than law or medicine or teaching in a university.

The shaping of both undergraduate and graduate curricula requires serious and mutually respectful consideration by practicing engineers and educators, to a degree not achieved today by visiting committees, accreditation committees, or other groups. Educators and practicing engineers must talk with each other on a continuing basis to resolve their differences of opinion about curricula and to reach a consensus as to the best directions to take in the revision of curricula to meet the future needs of the profession.

Various mechanisms might assist in promoting communication between practicing engineers and educators — for example, the use of practitioners to teach courses (a concept basic to the modern American medical school and to engineering schools in many other countries); frequent periods of engineering practice, not mere consultation in their specialties, for educators (say one year out of three or four); and credit for time spent in engineering practice toward promotion, tenure, and salary raises for professors.

*Financial support of university programs.* The recent decline in federal support for scholarships, loans, and research has dramatically altered the financial situation of universities at a time when the demand for civil engineers is rising in response to increasing needs for construction in the energy, transportation, and environmental areas.

Several alternate approaches may prove feasible for improving the financial picture at universities. ASCE should make Congress aware of the need for support of higher education in general and civil engineering programs in particular. Local Sections of ASCE should take similar action in state legislatures to encourage support of the state universities.

Consulting firms must realize that a steady inflow of intelligent, energetic young civil engineers into the profession is their single most important guarantee of future success. There would be no better way to ensure that success than through substantial financial support of students, universities, and research programs.

In Puerto Rico, a tax is levied on construction for the purpose of supporting professional activities, research, and education. Although this might

seem a radical departure from current thinking in the continental United States, it deserves consideration as a vehicle by which the owners of new construction, who benefit from civil engineering research and education, could share in their cost.

*Continuing education for practicing engineers.* Continuing education has been a major focus of ASCE's activities at both the local and national levels. Apart from the traditional publication of professional journals, it has, however, been limited primarily to the sponsorship of technical meetings, specialty conferences, and short courses. Such programs serve a very valuable purpose in illuminating current research and providing stimulation for the practicing engineer. However, the rapid development of new technology in many areas of civil engineering and the need for individuals to learn in depth about specialized areas in which they have not previously practiced require that more comprehensive programs of continuing education be developed or utilized.

ASCE and the universities must work together closely to ensure the compatibility, without redundancy, of existing and new programs. They must be responsive to the real needs of the practicing engineer and the constraints imposed on him by travel, job, and family commitments in pursuing a program of continuing education. Among the many alternatives that must be evaluated are night-school, part-time day programs, in-house training programs, ASCE lecture series, and home-study courses.

*Recertification of practicing engineers.* The licensing of practicing engineers has been a subject of debate for many years. The need to protect the public against incompetence is obvious; the effectiveness of licensing in doing so is subject to some debate. Nonetheless, it is clear that licensing does perform a threshold screening with respect to knowledge of fundamentals of civil engineering, and that the threat of revocation of a license exerts some influence on civil engineering practice.

Serious proposals have been advanced recently in the medical and engineering professions that recertification be required of licensed professionals to ensure that they keep up-to-date with developments in their profession. Although one can find many flaws in various specific approaches to recertification, the public good certainly demands some protection in principle against the incompetence of obsolescence. It is our responsibility to provide that protection by recertification or whatever other means is likely to be most effective.

### **Conclusion**

The preceding paragraphs highlight some of the major questions that face civil engineering education today. They are questions which the Boston Society of Civil Engineers Section will be studying in some depth during the coming year. We hope that practicing civil engineers, educators, and students will contribute their ideas and their time to helping ASCE and the profession improve the quality of civil engineering education.