

Engineering Education

Adopted: July 2001

According to Professional Policy No. 14 of the National Society of Professional Engineers, engineering education is considered to be the foundation of the engineering profession. As such, all NSPE members, committees and task forces, and especially the Professional Engineers in Education Practice Division shall actively assist in establishing appropriate professional aims and objectives for engineering education. The following position was prepared by NSPE to guide such proactive efforts. This position was developed for PP 14 and was revised and reaffirmed many times by action of the Executive Committee and Board of Directors of NSPE.

Introduction

Responsibility for prevention and control of air pollution involves local, state and federal levels of government, private industry and individual citizens. Abatement of air pollution through regulatory action should be the primary responsibility of state government, subject to the required standards and operating procedures of the federal government, and with assistance of local government when feasible.

Scope of Engineering Education

The National Society of Professional Engineers believes engineering educational programs must prepare graduates for the practice of engineering at a professional level. These programs should include certain elements that distinguish the engineering function, namely, the analysis, design, and synthesis of engineering systems. NSPE further believes that basic and advanced programs of study should be designed to provide engineering graduates with competent technical and managerial skills as well as broad, cultural education in the humanities and social sciences. This will enable engineers to provide the technical and managerial leadership in industry, government, and society needed to fulfill the engineering profession's public purpose. Further, NSPE favors limited experimentation and encourages schools to develop creative and imaginative programs as new approaches to engineering education.

Graduate Study

The National Society of Professional Engineers recommends graduate study for qualified students in either or both advanced engineering or engineering management.

Professionalism and Ethics

The National Society of Professional Engineers strongly believes that engineering curricula should incorporate instruction designed to inculcate engineering students with professional concepts. This instruction should emphasize the primary purpose of the profession as being the pursuit of a learned art in the spirit of public service. The sense of professionalism should convey the responsibility to evaluate the impact of the opportunity and obligation of the practitioner, to be in concert with peers, guide, and direct the profession. Although a specific course may be provided for this purpose, bringing professional concepts to the attention of the student should be the responsibility of all engineering faculty.

Support by Government

The National Society of Professional Engineers believes that state and federal financial and other assistance and major tax incentives to support engineering education are warranted in the following areas:

- a. Graduate study and research through the doctoral level of engineering.
- b. Research and study for advanced nondegree engineering programs.

- c. Faculty, facilities, and equipment which enable engineering schools to meet their responsibilities for high quality engineering graduates.
- d. Facilities and equipment to establish or expand technical institutes and colleges at the post-secondary school level for the education of engineering technicians and technologists.
- e. Undergraduate engineering and technical institute study, including assistance to students studying in these areas who have demonstrated ability and who can establish financial need.

Any federal financial aid which may be extended in support of these areas should be made available to all educational institutions having ABET-accredited programs in recognition that the national interest requires the services of all qualified institutions to meet educational requirements. State financial assistance should be extended to ABET-accredited programs in educational institutions.

Support by Private Sector

The National Society of Professional Engineers believes that those in the private sector have a large stake in the improvement of the engineering colleges from which they draw their talent for research, design, and management.

All NSPE members should attempt to interest those in the private sector in assisting education in general, and engineering education in particular. Examples of ways in which industry can render assistance are:

- a. Grants for general use in engineering education.
- b. Contributions of and donations for equipment.
- c. Sponsored research projects.
- d. Employment of faculty members as consultants or summertime employees.
- e. Fellowships to graduate students, half going to the individual, and half to the college, the latter to provide the difference between the actual cost of the student's education and the tuition paid. Scholarships to undergraduate students may be on the same basis as above.
- f. Providing opportunity for qualified personnel from industry to teach in the engineering colleges.
- g. Funds to support attendance of engineering students at professional society meetings.
- h. Funds to support projects of professional societies directed to guidance of young people, student professional development, and other programs implemented at the secondary school and college levels.
- i. Tuition and materials expense reimbursement to employees who are part- or full-time students in employer-approved courses or curricula.

Administration of Schools of Engineering

It is the policy of the National Society of Professional Engineers to oppose the combining of engineering and nonengineering degree-granting programs into a single administrative unit. The Society believes that such combinations are adverse to the professional character of schools of engineering and that engineering educators, being professionals, operate most effectively in a professional engineering climate under professional engineering leadership.

Career Guidance

It is the policy of the National Society of Professional Engineers to assist school administrators, teachers, counselors, students, and parents in becoming acquainted with the engineering profession; to encourage qualified and interested students to consider an engineering career; and to work to improve and expand the teaching of science and mathematics in the elementary and secondary schools.

Career guidance should continue through college level. It should offer information about changing opportunities within the engineering profession, including the need to prepare for managerial duties that may present themselves.

NSPE activities should include guidance for prospective engineering technicians and technologists in the same manner that guidance activities are conducted for prospective professional engineers. (See related PP No. 128—Technology/Engineering.)

NSPE believes that in considering various occupations, students at junior and senior high schools, community colleges, or engineering schools need an understanding of the general area in which engineers and scientists and their supporting colleagues work. Accordingly, NSPE advocates use of the following definitions as a sound basis for distinguishing between the fundamental characteristics of the various occupations:

Engineer—The engineer applies knowledge of the mathematical and natural sciences gained by study, experience, and practice to develop ways to economically utilize the materials and forces of nature for the benefit of humankind.

Scientist—The scientist discovers and systematically investigates the fundamental laws of nature and defines the principles which govern them.

Engineering Manager—The engineering manager employs the art and science of planning, organizing, directing, allocating resources (including personnel) for, and controlling activities which have a technological component.

Engineering Technologist—The engineering technologist applies scientific and engineering knowledge and methods combined with technical skills in support of engineering activities. The technologist's occupation lies in the spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer. The engineering technologist works in support of and under the technical direction of professional engineers or scientists. (See related PP No. 66—The Engineering Team.)

Engineering Technician—The engineering technician carries out in a responsible manner either proven techniques which are common knowledge among those who are expert in a particular technology or are especially prescribed by a professional engineer, and which are mastered through experience in the field or in educational laboratory situations. The engineering technician works in support of and under the technical direction of professional engineers, scientists, or engineering technologists. (See related PP No. 66.)

Craftsman—The craftsman uses manual skills obtained through experience to convert engineering drawings and instructions to tangible objects for humankind's use.

Professional Schools of Engineering

It is the policy of the National Society of Professional Engineers to urge all segments of the engineering profession to seek the highest standards of preparation for engineering practice. The enhancement of engineering education is clearly in the interest of protecting the health, safety, and welfare of the public and therefore a worthy objective of a learned profession.

NSPE recognizes the need for broadened educational preparation of persons entering the engineering profession and the importance of innovative and creative approaches to the use of technology for the benefit of mankind within certain environmental constraints and yet provide improved quality of life for all. Recognizing the diversity of engineering education programs existing in the United States, NSPE does hereby adopt the following definition of a Professional School of Engineering:

A Professional School of Engineering is a recognized educational unit which provides formal engineering education beyond the baccalaureate degree.

The unit operates programs under the direction of qualified practitioners, with appropriate academic and nonacademic experience, and provides elements of general, scientific, and professional education within guidelines established by the profession. NSPE urges increased commitment of the profession to further the development of engineering educational units, including faculty, facilities, and programs, as they strive to meet the needs of society for well-qualified engineering manpower.