

## Professional and Technical Societies

American Academy of Environmental Engineers  
American Congress on Surveying and Mapping  
American Consulting Engineers Council  
American Industrial Hygiene Association  
American Institute of Aeronautics and Astronautics, Inc.  
American Institute of Chemical Engineers  
American Institute of Mining, Metallurgical, and Petroleum Engineers  
American Nuclear Society  
American Society of Agricultural Engineers  
American Society of Civil Engineers  
American Society for Engineering Education  
American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc.  
The American Society of Mechanical Engineers  
American Society for Quality  
American Society of Safety Engineers  
Computing Sciences Accreditation Board  
Institute of Industrial Engineers, Inc.  
The Institute of Electrical and Electronics Engineers, Inc.  
ISA The International Society of Measurement and Control  
Materials Research Society  
The Minerals, Metals, and Materials Society  
National Council of Examiners for Engineering and Surveying  
National Institute of Ceramic Engineers  
National Society of Professional Engineers  
Society of Automotive Engineers  
Society of Manufacturing Engineers  
Society for Mining, Metallurgy, and Exploration, Inc.  
Society of Naval Architects and Marine Engineers  
Society of Petroleum Engineers  
Society of Plastics Engineers



### Accreditation Board for Engineering and Technology

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**Viewpoints**



# Vol. I

## Issues of Accreditation in Higher Education

### Foreword

Engineering education, like so many areas in today's world, is undergoing change. Change not only in the vanishing of obsolete technologies and the addition of new technologies, but also change in the methods by which education is delivered. Education delivered anytime, and anywhere in our global economy is becoming increasingly common and is challenging ABET's goal in maintaining quality assurance in education.

ABET's pursuit of its vision to encourage the highest quality for engineering, engineering technology and applied science education, has drawn upon the skills of leaders in industry as well as education to lead, advise and direct ABET's efforts. Industry leaders provide input in two ways, one is through appointment to ABET's board of directors, accreditation commissions and visiting teams by their technical participating body; another is through participation on ABET's Industry Advisory Council (IAC).

**By the Members of the  
Industry Advisory Council  
of the Accreditation  
Board for Engineering  
and Technology, Inc.**

The IAC, composed of prominent engineering leaders in industry, provides ABET with access to industrial viewpoints on issues related to accreditation. As part of this charge the IAC has prepared three papers, attached herewith, on the issues of Ethics, International Mobility of Licensed Engineers and Distance Education.

These valuable viewpoints from industry leaders are provided to you, our stakeholders, for your information and response. ABET values your input, so please take some time to provide us with your comments.

Our sincere appreciation goes to the members of the IAC and to you for your continued support of ABET.

A handwritten signature in black ink, appearing to read "C.R. Pennoni". The signature is fluid and cursive, with a large initial "C" and "R".

C.R. Chuck Pennoni  
ABET President, 1998-99

Improving  
**Ethics**  
**Awareness**  
in Higher  
Education



### **Introduction**

The immense power of modern technology extends globally. Many hands guide the controls and many decisions move those hands. A good decision can benefit millions of people, while a bad one, particularly one based on unethical behavior, can cripple the future. Such decisions have more widespread ramifications than ever before. As a federation of engineering, technical, and professional societies representing over 1.8 million practicing engineers nationwide, ABET is pleased to present the views of its Industrial Advisory Council (IAC). The IAC believes that there is a critical need to improve and increase ethics awareness in higher education.

### **Why Ethics Matters**

The ability to uphold one's values and the unwillingness to compromise are sometimes tested when dealing with diverse groups. As a global society, the business world has no geographic boundaries. Because people of all nationalities and cultures work together, it is very important that they understand that cultural, ethical and professional differences exist. What is acceptable in one culture may be unacceptable in another.

Years ago, the average person had less power, influence, and reach. However, in today's world, many people are empowered by their companies to make decisions that ultimately impact not only their businesses, but also those with whom they work. Poor judgment can produce catastrophic results that affect many aspects of people's lives both personally and professionally. Society today appears to have become desensitized to misconduct. Our standard of ethics must be continuously emphasized to counteract this trend.

### **The role of ABET in the ethics awareness issue**

In keeping with the vision of ABET, the IAC believes that the organization should provide leadership to universities to promote ethical awareness as part of the educational process. The IAC has had experience that is genuine and believes that some of the most effective ways to accomplish this are to:

1. Maintain a climate for ethics and develop an ethics awareness plan.
2. Require ethics awareness as part of the curriculum, including the study of the United States Foreign Corrupt Practices Act (USFCPA).
3. Concentrate on ethics awareness as it pertains to international challenges by conducting exchange programs that allow interaction and dialogue among foreign students.
4. Analyze code of conduct statements and ethics policies of various companies.
5. Provide ethics awareness as part of a capstone educational experience (team project).
  - a. Require each student to create a personal code of conduct statement relevant to the capstone design.
  - b. Instruct the class to draft a code of conduct statement for their group or team.
6. Provide continuity by research into the subject and by having access to the literature of others, such as PRISM.

The IAC encourages the engineering education leadership to maintain a focus on ethics. The 1999 Engineering Dean's Institute had a substantial portion of the program dedicated to ethics and the IAC encourages the continuation of such efforts.

# **International Mobility** of Professional Engineers



## **Introduction**

In 1995, pursuant to the signing of the North American Free Trade Agreement (NAFTA), the United States Council for International Engineering Practice (USCIEP) along with organizations in Canada and Mexico executed a document providing for the mutual recognition of licensed engineers and allowing for greater mobility in the cross border practice of engineering. The USCIEP is comprised of the Accreditation Board for Engineering and Technology (ABET), the National Society of Professional Engineers (NSPE), and the National Council of Examiners for Engineering and Surveying (NCEES). Since that time, organizations representing different sectors of the world's economies have been established with the purpose of facilitating the mobility of engineers across the globe. These include:

- The Asian Pacific Economic Cooperation (APEC)
- The Engineers Mobility Forum (EMF)
- The Transatlantic Economic Partnership (TEP)
- The Coalition of Service Industries (CSI)

Over a decade ago an attempt began to achieve free trade and greater accessibility

to services between Canada, Mexico and the United States. This initial attempt has evolved into a multinational effort to define and agree upon a set of criteria that allows for licensed engineers from member nations to be recognized for professional practice with minimum registration requirements in the respective countries. While this endeavor represents a gigantic contribution to the development of a global economy, it must also be noted that its implementation is complex and multidimensional because of the many barriers impacting its development. Barriers include, but are not limited to, language, turf protection (domestic and international), ethical standards, local engineering standards/codes and the establishment of a multinational set of minimum requirements for engineering licensure. While these obstacles can be overcome, without a solid and consistent educational baseline from which to draw competent candidates, all efforts become greatly diminished. The cornerstone of the entire process is education and the foundation that supports the efforts of each and every program targeted for international mobility is the mutual recognition of educational systems.

### **Why is ABET's role vital?**

ABET's vision is to provide world leadership and assure quality while stimulating innovation in engineering, engineering technology and applied science.

Consequently, ABET's role is pivotal in helping ensure that educational programs around the world are of a caliber that meets the demands placed by industry, the consumer of graduates, and by the engineering academic community. This conclusion is based upon several facts:

1. ABET's international focus is on the promotion and development of multilateral and bilateral recognition agreements with countries whose accreditation systems can be recognized as substantially equivalent to ABET's. Through periodic verification and monitoring ABET ensures the integrity of national accreditation systems. The Washington Accord, signed in 1989 by the accreditation organizations of six nations (Australia, Canada, Ireland, New Zealand, the United Kingdom and the United States) recognizes the accreditation systems of these countries and consequently the engineering qualifications of their respective graduates. Subsequently, engineering accreditation organizations in Hong Kong and South Africa have joined the Accord.
2. ABET's international activities include consultant services and technical assistance to other countries in the development of their own accreditation

systems. Engineering organizations in Mexico and Argentina have already signed Memorandums of Understanding (MOUs) with ABET to collaborate in this process and Japan has plans to follow suit in upcoming months.

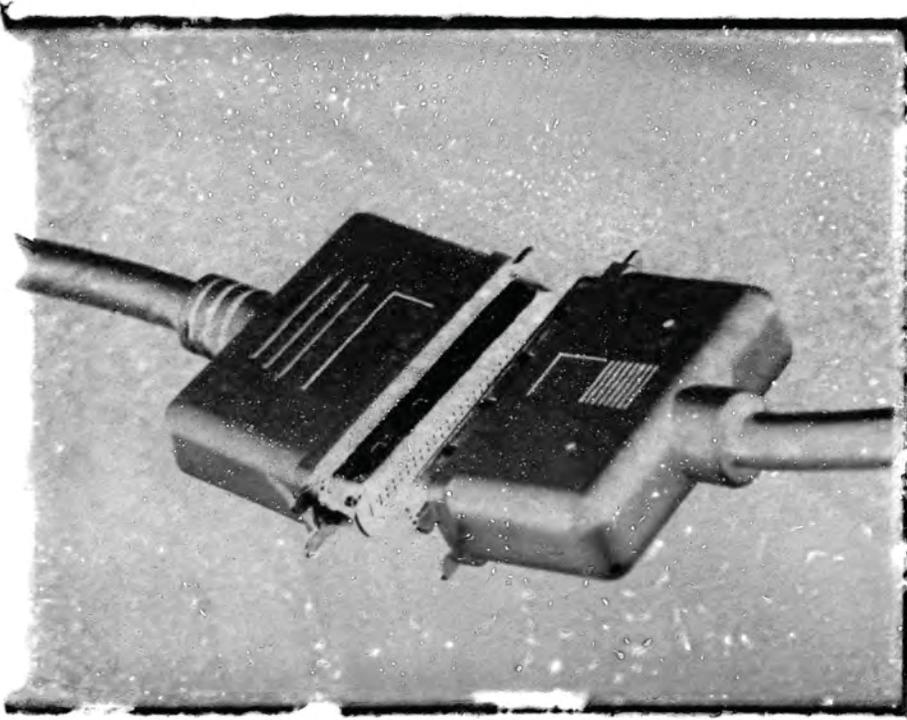
3. Countries seeking assistance from ABET are looking at long term plans of entering into a bilateral mutual recognition agreement with ABET or joining the Washington Accord in the near future.
4. Industry is using more in country engineers due to the economic, political and cultural considerations associated with the extensive use of expatriate engineers. There is a need to ensure consistency of engineering services across international lines without sacrificing quality. ABET s international initiatives contribute to raising the level of confidence in the integrity of national engineering accreditation systems.
5. Distance learning has become a reality and will continue to expand across domestic and international boundaries. The increase in educational accessibility along with the development of more sophisticated distance learning delivery systems makes mutual recognition of transnational programs a challenge. ABET s role will be critical in this new educational venture.

### **The role of ABET now and in the future**

ABET is a recognized leader in engineering accreditation. Since 1932 it has carved the path of the engineering accreditation process in the United States and in the last ten years has gained world leadership in assessing the quality of engineering education through program evaluations, technical assistance and mutual recognition agreements. ABET should continue to focus on the educational aspects of the engineering profession that support the efforts of entities responsible for licensing issues as follows:

1. Maintain its focus on education through international activities that help support the needs of the licensing entities.
2. Continue its work in international quality assurance.
3. Continue to work in concert with international accreditation organizations to develop agreements that meet mutual recognition standards.
4. Continue to provide assistance to other nations in developing their engineering accreditation systems.

## Distance Education



The face of the American student is changing. Baccalaureate students fresh from high school and living on campus are decreasingly the norm. There are more commuter students and more students beginning their college careers at community colleges. Many students are combining work and study in various part time/full time configurations. The need for convenience and accessibility has given rise to an increased demand for distance education as more students from varying situations seek a college education.

Distance education is defined as education in which the student and the educator are separated by distance or time, or both. Distance education and distance learning are not new concepts, but have evolved rapidly with advances in information technology. There are two main types of distance education. Courses may be delivered in a synchronous mode in which the student and instructor are not in the same classroom or laboratory, but the course is conducted in real time. Courses may also be delivered asynchronously with the student participating at a later time than the classroom course or where there is no live class session.

Regardless of the type and method of delivery, accreditation is a critical element in the continued evolution of the modes of education. Accreditation informs students, parents, the institution, employers, and the public that the program has satisfied certain criteria. The Accreditation Board for Engineering and Technology (ABET) is recognized in the United States as the sole agency responsible for accreditation of education programs leading to degrees in engineering. Realizing that one of the strengths of the American educational system is its diversity in programs, ABET's goal is to ensure continued quality while encouraging continuous innovation and improvement.

In recent years ABET has made fundamental changes in the accreditation of programs, the most evident of which is reform of the criteria used to evaluate engineering programs, Engineering Criteria 2000 (EC2000). These criteria support the premise that student outcomes, regardless of the method of educational delivery, should be consistent with the stated objectives of the program. It is the obligation of the institution to have in place a means for assessing student outcomes and a process for using the results to improve the program. While distance education programs and traditional classroom programs may employ different instructional methods, it is essential that graduates of both programs can demonstrate the same capabilities.

The ABET Industry Advisory Council (IAC) strongly supports the role of ABET as the accrediting agency for all engineering programs, regardless of the mode of delivery, and makes the following recommendations to ABET:

ABET should take a leadership role in ensuring quality and continuous improvement in the rapidly developing area of distance education through the application and adaptation of the existing Engineering Criteria 2000.

ABET should develop an assessment process and procedures for accreditation of distance learning programs through participation in early pilot studies of such programs. This process should contain specific metrics for evaluating the effectiveness of distance education.

The IAC is of the opinion that ABET has the opportunity for establishing a seal of approval in distance education accreditation. Furthermore, ABET should explore the possibility of evaluating individual courses or course groupings leading to a degree as well as continuing education and continuing professional development courses. The ABET brand name would

ensure quality for courses, modules, and overall programs.

The Industrial Advisory Council recommends that institutions offering distance education should consider the following:

Methods and metrics to evaluate the effectiveness of distance learning compared to traditional learning

The importance of clearly establishing and communicating to students the performance objectives as well as the grading criteria before the course begins

The opportunity to use virtual teaming of students in class projects facilitated by distributed simulations where appropriate

Methods to deliver experiential learning through some means, such as lab simulations, on the job or co op experiences

Ways to foster team teaching across disciplines

Methodologies for authentication of student work

Participation in pilot studies of distance education accreditation

Examination of economies of scale through the development of modular courses

The development of high quality modules which individual faculty could integrate into his or her own courses

Evaluation of needs for additional training or credentials for faculty in distance learning settings

## 1999 ABET Industry Advisory Council

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The Accreditation Board for Engineering and Technology (ABET) is a federation of professional and technical societies that represent more than 1.8 million engineers and other professionals. ABET's main objective and responsibility is the maintenance and improvement of the quality of education in engineering, engineering technology, and applied science programs. Through its accreditation commissions, committees, and Board of Directors, ABET addresses current and future issues, implements studies, and develops policies, some of which become part of the criteria used by the accreditation commissions to evaluate educational programs in their respective fields.

