The American Society for Engineering Education and the
Morrill Act of 1862

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Abstract
The American Society for Engineering Education (ASEE) has played a central role in shaping the content of American engineering education over the last 120 years. It was founded as the Society for the Promotion of Engineering Education in 1893 due to the growth in the number of American engineering schools in the late 19th century. This growth was due in large part to the passage in 1862 of the Morrill Act, also known as the Land Grant College Act. As a result, the number of American engineering schools nearly tripled between 1860 and 1872, and enrollment continued to grow over the next several decades. Since these engineering schools were state rather than federal institutions, their offerings were highly diverse in content and method of instruction. A primary focus of the ASEE in its early years was to establish common educational standards to help unify the engineering profession. The ASEE was successful in these efforts, and the Society’s current role in accreditation grew out of those efforts.

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1. Origins of the ASEE

The ASEE has grown considerably since its first meeting in Chicago in the summer of 1893. That meeting was a small part of the huge World’s Columbian Exposition, a celebration of the four hundredth anniversary of Columbus’s discovery of America and the progress that the United States had made during its first century of existence. In conjunction with the exposition, a series of world congresses were held as forums for the discussion of achievements in science, education, labor, women’s issues, and other areas of human activity.

One of those forums was the International Congress of Engineering. As the result of the efforts of Professor Ira Osborn Baker, chair of the civil engineering department at the University of Illinois, the Congress included sessions on engineering education separate from those devoted to engineering practice. During the discussion and presentations that followed, the participants founded the Society for the Promotion of Engineering Education (SPEE), now known as the American Society for Engineering Education (ASEE), one of the oldest engineering societies in America. Over the last century ASEE has played a significant role in shaping engineering curricula, improving teaching methods, improving academic quality, and affecting national policy towards engineering education.

From the beginning, the ASEE has been an international organization. Although all of the officers elected that first year were Americans, two of the 21-member council were from Canada, and the general membership included engineers from Great Britain, France, Germany, Russia and Switzerland. The new organization deliberately cast a broad net, inviting anyone with an interest in engineering education to join. This invitation included women, a rare thing among professional societies at the time. In contrast to organizations like the American Society of Civil Engineers, which went to court in 1915 to keep females out and did not admit its first woman to regular membership until 1927, the ASEE welcomed women from the start. In his inaugural address, the society’s first president, Professor De Volson Wood, specifically pointed out that the Society’s constitution did not
contain the word “male” and that women were able to join. Today, the ASEE has members in 63 counties and its membership is 23 percent female, continuing that tradition of inclusiveness.

So why was the ASEE founded in 1893? The primary motivation was the enormous growth in the demand for trained engineers in the United States and Canada in the second half of the 19th century. In 1800 there were only a handful of engineers in North America, and even as late as 1860 there were fewer than 1,000. In contrast, by 1893 American engineering schools alone were graduating over 1,000 students per year. These graduates found jobs primarily with large corporations, providing the skills needed to develop and run complex systems like railroads, telephone and telegraph networks, and other new technologies. [1]

2. The Morrill Act

The increase in engineering education was made possible by government support for the establishment of new colleges and universities. In the United States, the Morrill Act of 1862, also known as the Land Grant College Act, provided the financial basis for the establishment of land grant colleges by giving public lands to state governments. The new land grant schools were required to provide instruction in the “mechanic arts” - what we would today call engineering. As a result, nearly fifty new public engineering schools were established by 1872, and enrollment in engineering programs grew by leaps and bounds over the next few decades. In Canada, the increase in engineering education came somewhat later, but the population increases due to immigration after 1900 led provincial governments to expand existing engineering schools and to open new ones in western Canada.

Justin Smith Morrill, then a Congressional Representative from the state of Vermont, first proposed the Morrill Act in 1857. The intellectual origins of the Act were at least two decades older, growing out of a movement in mid-western states to found agricultural colleges to aid in economic development. This movement drew on European examples of state-supported workingman’s educational institutions. Although the movement was centered in the state of Illinois, backers believed that it would be politically advantageous for the proposal to be introduced by a Congressman from an eastern state. Morrill was willing to put the bill forward, and so his name became associated with the law.

Morrill was a native of Vermont and a successful businessman. He had wanted to attend college as a young man, but his father was unable to afford tuition for all of his sons, so he elected to send none of them. He was a conservative politician by the standards of his day, pro-business and opposed to reforms like the eight-hour day and women’s suffrage. During his long Congressional career (he served from 1855 to 1867 in the House and from 1867 to 1898 in the Senate) he was known primarily as an expert on taxes and tariffs. He was also primarily responsible for the construction of the building that currently houses the Library of Congress. Morrill always regretted his lack of formal education, and this played a major role in his willingness to sponsor the Land Grant College legislation. He also saw the need for practical education in agriculture and mechanics as an aid to the economic development of the United States.

Morrill’s proposal was rejected by Congress in 1857, but passed in 1859. President James Buchanan vetoed the legislation, however, believing it to be unconstitutional. Morrill resubmitted the legislation in 1861, adding a provision that the schools set up by the act would be required to teach military tactics in addition to other subjects. President Abraham Lincoln finally signed the Morrill Act into law in July of 1862.

The law had the following purpose, as defined in the enabling legislation:

“...to the endowment, support, and maintenance of at least one college [in each state] where the leading object shall be, without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.” [2]

In order to accomplish this goal, each state was allocated 30,000 acres of land for each member of Congress from that state. The land could come from federal lands within the border of the state, or, as was the case for most Eastern states that had little federal land within their borders, from federal land in other states. States would then sell the land and invest the proceeds in federal bonds or other safe investments to create an endowment to support college education. The income generated by the endowment could be spent primarily on operational expenses – no
more than ten percent could be spent on capital projects. States were otherwise free to spend the income from the endowment as they wished – they could fund existing institutions, either public or private, or they could found new institutions, as long as education in “agriculture and the mechanic arts” was offered. Many states chose the last course, establishing new institutions of higher learning. However, other states used the Morrill Act to fund existing institutions.

Iowa, Vermont, and Connecticut accepted land under the law’s provisions in 1862, and eleven more states joined them the following year. By 1870 thirty-seven states had instituted some kind of program that met the Morrill Act’s requirements, and there were a total of 72 engineering schools in the United States (some states had elected to support more than one school. With a handful of exceptions (most notably the Massachusetts Institute of Technology and Cornell University), the Land Grant colleges were public institutions. As a result, they were open to a broad variety of students (including women and minorities), and offered a much broader opportunity for the pursuit of a college degree. By the end of the 19th century, they had grown considerably in size and were educating the majority of college graduates in the United States. [3]

3. The ASEE and Changes in Engineering Education

The ASEE played a major role in shaping the nature of engineering education in North America in the 20th century. In the early years of the 19th century, American engineering schools had looked to Europe to provide models, most notably the Ecole Polytechnic in Paris, the oldest engineering school in the world. By the end of the nineteenth century, however, engineering education in the USA had moved away from its European roots, experimenting with a variety of styles of education. Broadly speaking, American engineering schools fell into one of two camps: school culture, which stressed theoretical education in the classroom, and shop culture, which stressed hands on learning in the laboratory.

However, both styles of American education were strongly tied to industry. Most American engineering professors had a decade or more of industrial experience, and few had doctoral degrees. Since most engineering schools were run by the states, there was political advantage in producing graduates who were suited for local industry. As a result, in 1904 an SPEE committee reported that American schools offered 90 different engineering degrees, many of them highly specialized. Students could get a B.S. in streetcar engineering, for example, or municipal illumination engineering. Degree programs also varied considerably in content when it came to mathematical preparation, and length of study varied from three to six years for a B.S. degree. With no national standards or federal regulation, engineering schools were free to do as they pleased.

Concern over the growing splintering of engineering as a profession and at the narrow focus of some engineering programs, the SPEE moved to study the situation and finds avenues for reform. The Mann Report, released in 1918 after a decade of work, was the first comprehensive study of American engineering education. The report made clear the diversity of existing degree programs, and made clear recommendations as to the need for establishment of common standards and the need to cooperate with engineering professional societies to set those standards. The Wickenden Report followed the Mann Report in 1929, which moved to create standards for B.S.-level programs through cooperation between engineering schools, and follow-up report in 1934 devoted to less-than-baccalaureate programs.

The primary result of this work was the creation of a central body to set standards and to inspect engineering schools for compliance with those standards. That body was the Engineer's Council for Professional Development, or ECPD, later known as the Accreditation Board for Engineering and Technology (ABET), and now simply ABET, Inc. Through these efforts, the Society for the Promotion of Engineering Education was able to unite the engineering schools, the professional societies, and the state licensing boards around a common set of standards.

The result was considerable reduction in the diversity of engineering degree programs and a focus on a common core curriculum. The ECPD encouraged the merger of the concepts of school and shop culture, firmly establishing both the need for instruction in theoretical math and science as well as hands-on work in the laboratory. The ECPD also worked to define the nature and role of technical institutes that would train engineering technicians. By defining these institutes as distinct kind of institution that served a different population of students, the ECPD made it possible to create nationally recognized credentials that firmly established the role of technical institutes and
made them widespread by the end of the 1930s. ECPD also committed itself to providing a forum for the faculty of these institutes, which led in 1960 to the creation of the Engineering Technology Division for individual members and the Engineering Technology Council to represent the institutions. As a result, ECPD and then ASEE meetings became the center for the discussion of engineering education in North America, and more recently for discussing engineering education around the world. [4]

References

Biography
Mark Clark is Professor of History and director of the Oregon Tech Honors Program at the Oregon Institute of Technology. He received his BS in Mechanical Engineering from Rice University, his MA in Public History from the University of Houston, and his Ph.D. in the History of Technology from the University of Delaware. He is the Associate Editor of ICON, the Journal of the International Committee for the History of Technology, and has been a visiting professor at Aarhus University and the Technical University of Denmark. He is the author of books and articles on the history of magnetic recording and other historical topics. He is currently working on a book on the relationship between the history of engineering education and nerd culture.

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