#ASEE at 125 History Wall

This history of ASEE condenses a paper in the 1993 Journal of Engineering Education by Terry Reynolds and Bruce Seely, both of Michigan Technological University, titled, "Striving for Balance: A Hundred Years of the American Society for Engineering Education." It fills in the intervening 25 years with the assistance of internal society documents and annual reports.

Two major continuities in ASEE's history that Reynolds and Seely identified in their 100-year history are:

1. the search for methods of improving instruction.
2. the pursuit of national recognition as the primary entity to speak for engineering education

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ASEE
AMERICAN SOCIETY FOR ENGINEERING EDUCATION

The Early Years

SPEE membership grew to 400 within 10 years. It had a shared sense of purpose—improvement of college teaching—but struggled to be a voice for multiple disciplines (one president called it "functionally the educational division of one universal engineering society, with the 'universal society' removed"). Nevertheless, membership jumped from 503 in 1907 to 1500 in 1916 and committees formed to deal with issues such as standard symbols and engineering nomenclature, industrial education, and books for technical libraries. Institutional members were accepted in 1913 and the first regional section appeared in 1919.

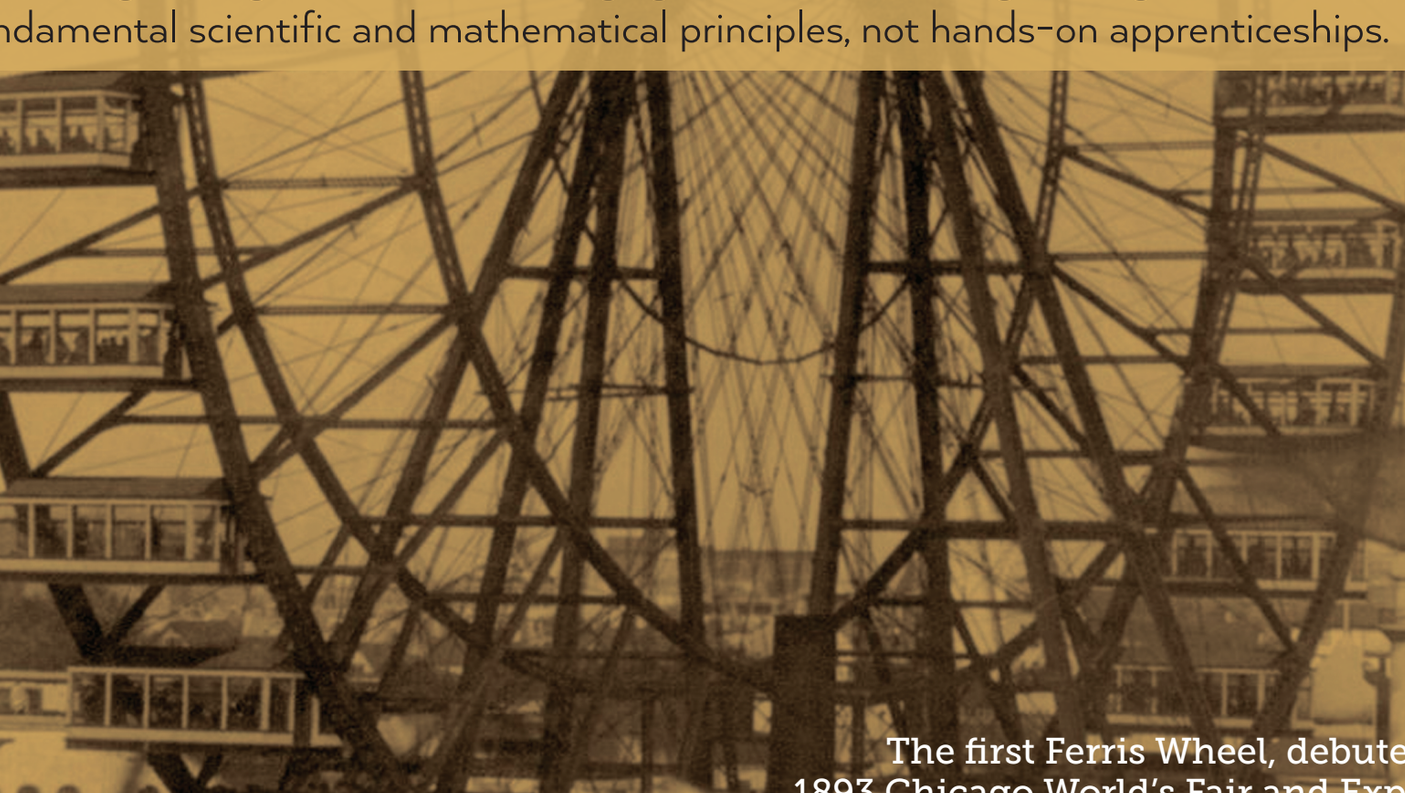
This growth demanded organizational changes—in 1906-07 SPEE President Dugald Jackson professionalized society operations by encouraging the election of a treasurer and publishing a monthly bulletin as an outlet for society news. In 1913 the society set compensation for the role of Secretary at $1,000 and made it a permanent position; in 1914 F. L. Bishop of the University of Pittsburgh became the first secretary of SPEE, a post he held until 1947.

Introduction and 19th-Century Origins

For much of the 19th century, engineers trained on the job. The first academic program, combining engineering with military instruction, was initiated at West Point in 1802; in the 1830s Rensselaer Polytechnic Institute began treating engineering as a graduate program by adding a year of professional study to a liberal arts degree. Other colleges taught engineering outside the regular curriculum as a non-degree course or offered engineering within general bachelor of arts or, later, bachelor of science curricula.

After the Morrill Act of 1862 established land-grant colleges, these schools endorsed the premise that young men should enter an engineering profession after four years of undergraduate study. The question then became: should curricula focus on teaching the fundamentals or on providing hands-on skills? In response, American engineering schools adopted radically different strategies.

Thus, in an effort to standardize the engineering colleges, engineers began forming teaching associations; Ira O. Baker, a civil engineering professor from Illinois, convinced the International Congress on Engineering to devote attention to engineering education at its meeting at the World's Columbian Exposition in Chicago in 1893. At the close of this meeting the organization announced the founding of the Society for the Promotion of Engineering Education (SPEE), the forerunner to ASEE. SPEE's formation signaled acceptance of the college as the locus of professional training for engineers and an emerging consensus that engineering curricula should stress fundamental scientific and mathematical principles, not hands-on apprenticeships.



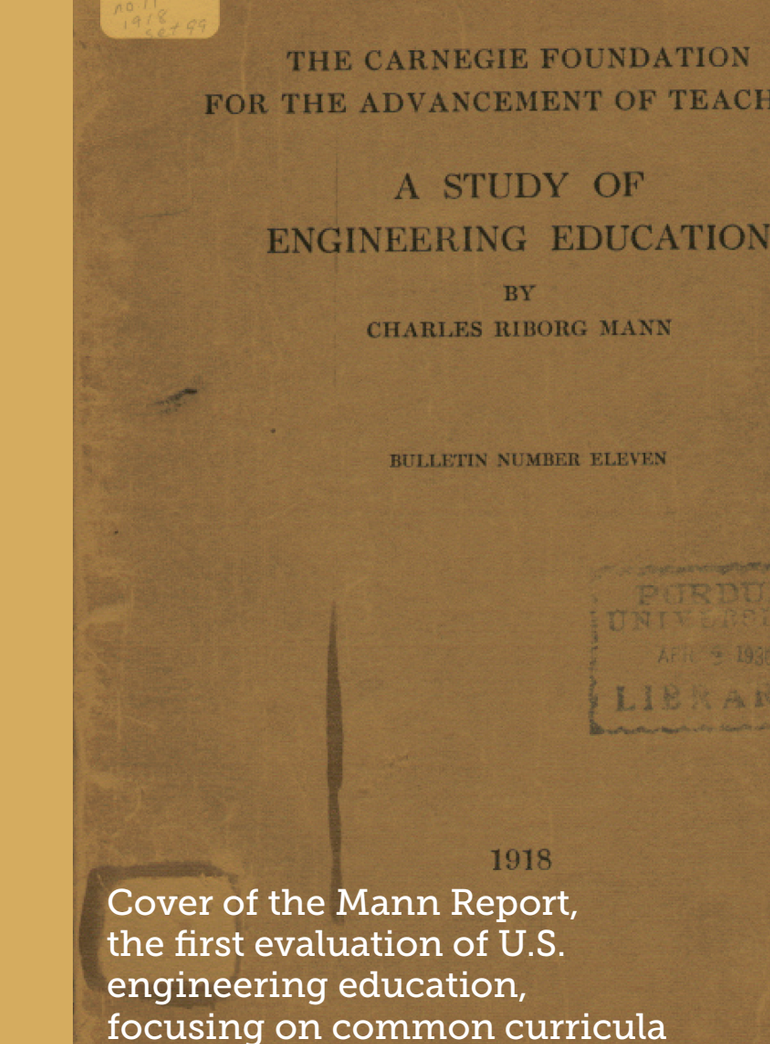
The first Ferris Wheel, debuted at the 1893 Chicago World's Fair and Exposition, where ASEE was created.

Mann Report

The Mann Report (released in 1918), the first detailed study of engineering education, had its genesis at SPEE's 1907 annual meeting when Jackson introduced a motion inviting SPEE's founding societies and the American Chemical Society to join SPEE in reviewing engineering education. The Carnegie Foundation for the Advancement of Teaching offered to help fund it, and appointed and paid study coordinator Dr. C.R. Mann, a physicist from the University of Chicago.

Mann recommended, among various items, that educators better define what engineering students needed to learn. He called for a common curriculum for the first two or three years, with attention to both engineering in industry and to theoretical science and mathematics and that more attention be paid to values and culture. He also urged dropping foreign language requirements, making shop courses more meaningful, teaching theory and its application to practice simultaneously, and promoting cooperative education programs.

Some schools made changes directly tied to the recommendations, but the report's impact was internal as well as external: the report encouraged the society to regard broad studies of education as a critical area of activity. After Mann, members realized SPEE could achieve national recognition and equity with the older, disciplinary-oriented societies. In 1923, SPEE President Charles Scott noted that because of the Mann study, "Never before . . . has there existed [among engineering faculty] such a keen interest in the possibility of improving their methods and product and such a ready willingness to cooperate toward that end." In short, the Mann Report encouraged the Society to regard broad studies of education as a critical area of activity.



THE CARNEGIE FOUNDATION FOR THE ADVANCEMENT OF TEACHING

A STUDY OF ENGINEERING EDUCATION

BY CHARLES RIBORG MANN

BULLETIN NUMBER ELEVEN

1918

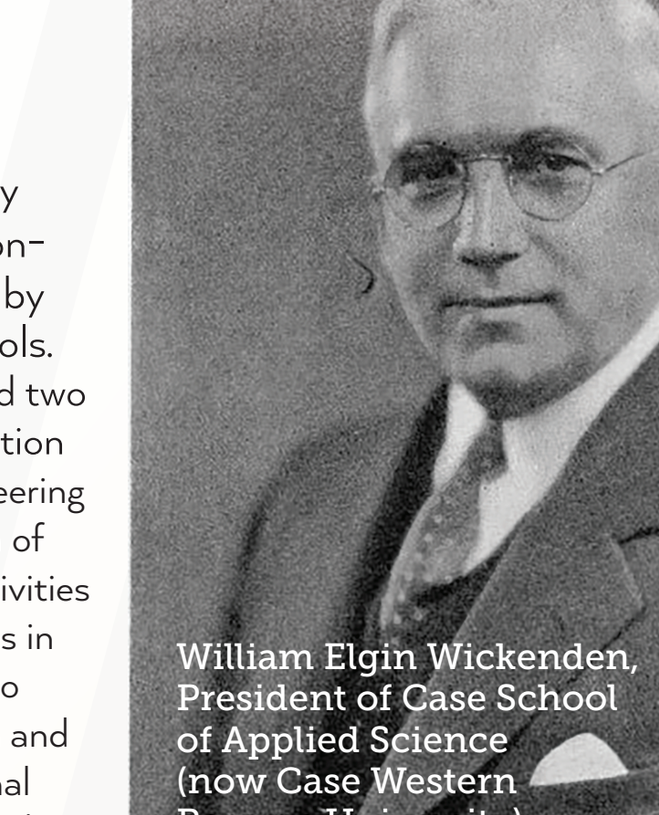
Cover of the Mann Report, the first evaluation of U.S. engineering education, focusing on common curricula and values, published in 1918.

The Wickenden Study and Accreditation Consideration

The Mann Report increased SPEE efforts to exercise leadership in engineering education; in 1922 President Charles Scott set goals to focus the society on improving instruction. The next year SPEE received $108,000 from the Carnegie Corporation for a study, headed by William Wickenden, a vice president at AT&T.

The study and related activities consumed much of SPEE's energy during the interwar years. Local committees at 150 engineering schools—involving more than 700 faculty—collected data on curricula, students, graduates, and teachers. In addition, national committees carried out sixteen distinct studies. The result was a thorough appraisal of engineering education.

Thanks to engineering school participation and more moderate recommendations than Mann, the Wickenden Study (released in 1930) led to considerable self-examination by American engineering schools. Moreover, the study inspired two additional activities: the creation of summer schools for engineering teachers and the accreditation of engineering schools. These activities reflected the major continuities in the society's history—efforts to improve classroom instruction and to make the society the national spokes-entity for engineering education.



William Elgin Wickenden, President of Case School of Applied Science (now Case Western Reserve University)

Wickenden personally recommended SPEE take the lead on accreditation. Society members opted against it—drastic financial reorganization would be required and four leading engineering colleges strongly opposed SPEE involvement in accreditation, noting that "such an activity would be inconsistent with the traditions and aims of the Society." Moreover, there was no guarantee that SPEE could have become the umbrella for accreditation at that time, even if it had tried.

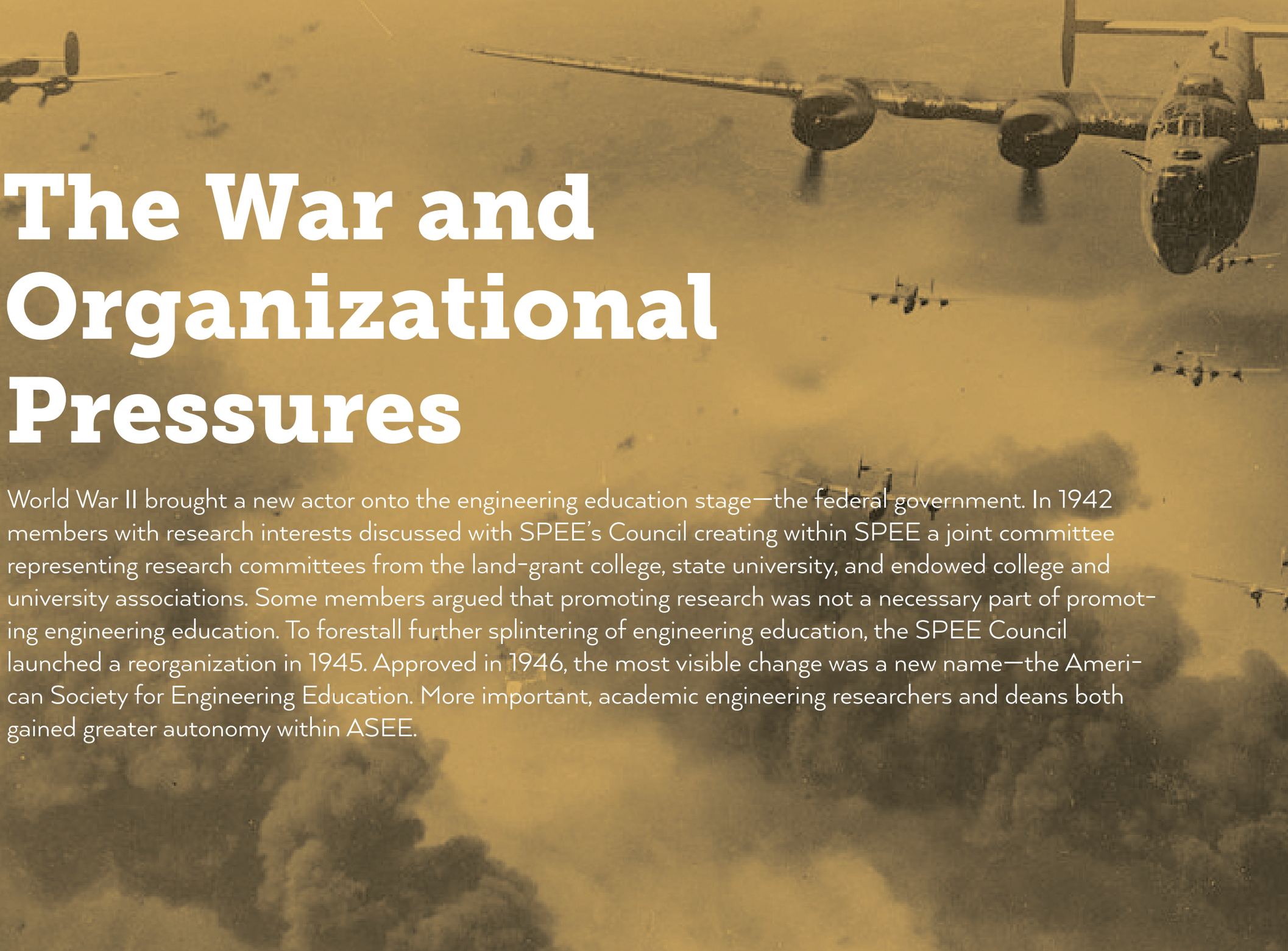
Grinter and the Post-War Period

With the postwar expansion of engineering instruction, ASEE membership grew from less than 4000 in 1946 to nearly 7000 by 1951. ASEE continued to stress classroom teaching, publishing a teaching manual in 1949; summer schools reappeared in 1949 with multiple offerings, but with the focus still on instruction. But events quickly overtook the emphasis on teaching. Whole new fields of engineering were emerging with ties to research, including nuclear engineering and computers. Moreover, a host of external factors were impinging on engineering, led by federal research contracting and by manpower questions and draft deferments during the Korean conflict. These non-classroom issues were exceedingly important to engineering administrators. Pressure mounted for ASEE to become involved in these and other matters and to reestablish itself as the spokesman for engineering education. Stanford's dean of engineering, Frederick Terman, always an activist, pushed this view as ASEE vice president in the late 1940s.

Another study was thus undertaken in the early 1950's, with L.E. Grinter as the chair, the final report (released in 1955) of which played a key part in transforming engineering education. Engineering educators had long called for curricula emphasizing scientific and mathematical fundamentals, but until the 1940s most programs retained significant practical components. The report aided change that began in earnest in the 1950s, with massive federal funding of fundamental research following World War II. Importantly, the report legitimized the new path and encouraged scientificizing curricula at even traditional, mainstream engineering schools.

The report also signified a new level of maturity and activity at ASEE. Greater national recognition began to come in the early 1950s. During this time when NSF had a question about engineering education, it turned to ASEE. By the late 1950's ASEE could rightly claim it was the voice of engineering education.

Analog computers, which were well suited for real-time integration, were used at many engineering schools.



The War and Organizational Pressures

World War II brought a new actor onto the engineering education stage—the federal government. In 1942 members with research interests discussed with SPEE's Council creating within SPEE a joint committee representing research committees from the land-grant college, state university, and endowed college and university associations. Some members argued that promoting research was not a necessary part of promoting engineering education. To forestall further splintering of engineering education, the SPEE Council launched a reorganization in 1945. Approved in 1946, the most visible change was a new name—the American Society for Engineering Education. More important, academic engineering researchers and deans both gained greater autonomy within ASEE.

The first four-year engineering technology program emerged at the University of Houston in 1951.

Challenges in Membership and Influence

Starting in the 1960s ASEE was finding difficulty in attracting young faculty, who quickly learned their path to success lay in reduced teaching loads and success in research. This trend led to the perception that ASEE had little to offer faculty and faculty increasingly elected not to join ASEE. ASEE's increasing attention to teaching did not help this situation, and despite the focus on members, the number of dues paying members stagnated from 1966 to 1980 at about 12,000 (a number that included all member types, including institutional). Official figures showed a slight increase in the late 1970s, but membership fell dramatically in the early 1980s, in part because teaching-oriented faculty hired after World War II were retiring. From a peak of more than 13,000 in 1980, membership dropped to 9,500 by late in the decade. ASEE had claimed about half of engineering faculty were members in the late 1960s, but by the late 1980s only about a third were members.

Declining membership after 1970 raised questions as to ASEE's role as the spokesman for engineering education. ASEE's Long Range Planning Committee noted in 1980 that engineering education had been "caught up in the confluence (or maelstrom?) of several forces and groups," including the disciplinary societies, NSF, the National Academy of Engineering, the National Society for Professional Engineers, and the National Council of Engineering Examiners. In fact, in the mid-1980's NSF (and other funders) chose the National Research Council to conduct the study Engineering Education and Practice in the United States, a project that in decades past would have logically belonged to ASEE.

Eric Walker and the 1960s

Eric Walker, dean of engineering at Penn State, was elected president in 1960 and addressed a long-lingering issue of a too-small office staff at headquarters by proposing an expansion. In addition Walker argued that ASEE move its headquarters to Washington, DC, "where the money is and the rules are made." By 1964 the ASEE board concurred and ASEE moved to the Dupont Circle neighborhood of Washington and by the end of the decade the staff had grown from 13 to 28. Walker also initiated one of ASEE's most important efforts of the decade, the Goals Report (short for Goals of Engineering Education). Walker felt it was again time to evaluate the field and in 1962 persuaded ASEE to appoint a committee to begin the project.

Walker's Goals Committee released a preliminary report in 1965 with many familiar suggestions, but these were lost in the controversy surrounding Walker's more radical proposals. The growing difficulty of incorporating professional and general education in the four-year curriculum led the committee to recommend a specialized master's degree as the entrance to the profession, pursued after completing a uniform, general engineering bachelor's program. The committee argued that rapid technological change, the need for more science, and the equally pressing need for a grounding in the humanities and social sciences demanded that engineering follow every other profession and move specialized, professional studies to the master's level.

Walker later explained that the report was deliberately provocative to foster comments, but the committee "was somewhat surprised at the violence of some of the reactions." Chemical engineers, who saw a uniform curriculum as ignoring their special need for a base in chemistry, were furious. Three-quarters of the engineering organizations and more than half of the individuals who responded to the preliminary report opposed the master's as the first professional degree. Trade and professional groups, as well as industrial representatives, feared the impact of this idea on the supply of technically trained workers and managers. Others reacted emotionally, denouncing the reduction of those with bachelor's degrees to second-class status.

The key to the "violent" reactions may have been the changing nature of academic engineering, which had begun to lose touch with industry after World War II as it gravitated toward academic science. By the mid 1960s, this shift was evident in the form of a dichotomy between research and graduate institutions pursuing federal contracts and those emphasizing undergraduate teaching. ASEE leaders viewed engineering science, even in the proposed research-tier schools, as a tool for engineers in industry, but by the 1960s engineering educators in the leading schools paid little attention to industry. Driven by federal research contracts, especially in the military arena, they had developed a culture and values more akin to the pursuit of knowledge for its own sake than to practical engineering, seriously weakening the links between industry and academia. The harsh reaction to the Goals Report by industry engineers and their professional societies illustrated just how far engineering education had drifted.

New Constituencies

In the 1970's, signs of a turn toward classroom teachers appeared in ASEE publications. The organization began publishing a monthly "Engineering Education Newsletter" in 1974 to highlight society activities, freeing space in Engineering Education for more articles, a higher proportion of which were devoted to nuts-and-bolts teaching issues. In 1975, the first volume of a new journal devoted to research about engineering education—the Annals of Engineering Education—appeared. The tilt toward teaching showed in other ASEE activities as well. A few had roots in the expansion of the 1960s, including ASEE's administration of summer faculty fellowships for NASA and Civil Defense Summer Institutes and Fellowships for the Defense Department, and a major study of programmed learning funded by the Ford Foundation. Others, such as summer schools for chemical engineers, ASEE's absorption of Stanford's "Engineering Case Library" for classroom instruction, and small business workshops for engineering extension specialists emerged in the 1970s. The theme of the annual conference in 1971 was "Teaching Really Matters," and ASEE officers and staff made a major effort to develop Campus Activity Coordinators, representatives on each campus who attempted to involve students and faculty in local ASEE programs. Perhaps the most important products of the emphasis on teaching were ASEE's support for recruiting minorities and women into engineering. In 1964 ASEE initiated the Exchange of Faculty-Institutional Development program with industrial funding to upgrade faculty development in "developing institutions," especially historically black colleges and universities. By the early 1970s, the renamed Black Engineering College Development program had raised more than $500,000. With Sloan Foundation support, ASEE developed a public information program on these schools in 1975, and distributed Minorities in Engineering: A Blueprint for Action widely. A similar grant from Western Electric underwrote a review of American Indians in engineering in 1974-1975, all while ASEE consistently sought to attract women to engineering.

This renewed emphasis on teaching meshed well with an important ASEE constituency—faculty in technical institutes. ASEE had long been concerned with these schools: As engineering education shifted more towards science in the 1960s, technical institutes expanded their two-year programs to four years of "engineering technology" to fill the gap between practical engineering and the new theory-oriented curricula. These technology programs were often viewed by engineering colleges as rivals for students and state funds, however, and within ASEE, similar, sometimes severe, tensions existed between these two groups. Animosities diminished as the Society began to place greater focus on teaching, with the previously unrecognized needs of the engineering technologists now being met, and a more balanced approach to the groups presented by ASEE

Students studying architectural engineering at Washington State University.

Return to Big-Picture Thinking

In the early 1980s engineering education experienced a shortage of faculty. This crisis, which most directly concerned administrators, drew ASEE back to broader concerns. In 1984 ASEE President John Hancock asserted that ASEE's "ultimate goal" should be to become "the society representing engineering education." Another indicator of change was the initiation in 1981 of a joint ASEE-American Association of Engineering Societies study of the faculty shortage. In June 1983 ASEE's Board voted to continue gathering data and broaden the scope of the inquiry to look more broadly at the "Quality of Engineering Education." The final report of this project was published in 1986 and symbolized ASEE's attempt to reestablish a balance between administrators and classroom teachers. It focused on broad problems but urged a reemphasis on teaching as an "essential" criterion for appointment and promotion in engineering schools.

Other broad-based studies followed. In 1986 ASEE's Board appointed a task force chaired by Edward David to produce A National Action Agenda for Engineering Education. Published in late 1987, this report called for repackaging curricula to place more emphasis on design and on manufacturing. It also called for more practice-oriented, rather than research oriented, master's degrees and better stipends to entice undergraduate engineers into graduate schools. Distributed widely, the Action Agenda helped build a consensus about future directions for engineering schools.

The determination of the Engineering Deans Council (EDC) to reassert its voice was a central part of building a better balance. Early in the 1980s many engineering deans had become so disenchanted with ASEE they were giving serious consideration to withdrawing and forming a new organization. Because ASEE's large Board of Directors seemed unable to act decisively, the EDC increasingly took the lead. In June 1983, for example, the EDC persuaded ASEE to establish a federal liaison office, paid for by assessments on their own institutions, to provide more timely news to deans about federal activities and to offer better guidance to federal policy makers. Also, in 1987 and 1988 the EDC launched studies of the engineering student and the engineering faculty pipelines.

The 1990s to The Present

For 10 years starting In the early 1990s ASEE saw many changes, most notably Significant staff growth (a doubling, to about 70 employees), fueled in part by the expansion of the fellowships department, which had administered fellowships and internships for the federal government for several decades.

Membership during this period continued to grow, with the number of individual professional members passing 10,000 for the first time in 2008. In addition, the annual conference during this period was revamped and expanded, thanks to IT support and growth of conference office staff. The annual meeting hit record attendance repeatedly in the 2000s. This was particularly noteworthy given the increased cuts in funding that many engineering and engineering technology schools faced at this time, and that ASEE members contended with smaller travel budgets and stagnant wages.

The society threw considerable effort into overhauling its publications. In 1991, two publications were created to fulfill a dual mission: ASEE Prism premiered as the society's principal monthly magazine; Engineering Education was renamed as the Journal of Engineering Education and repositioned to be the society's scholarly professional journal. This change was driven in part by the national events in the 1980s and especially by the rapidly expanding support for engineering education by NSF following the 1986 National Science Board report, Undergraduate Science, Mathematics and Engineering Education, and the need for such a publication outlet for engineering educators. In the 2000s Advances in Engineering Education was launched to disseminate significant, proven innovations in engineering education practice, particularly those that are best presented through the creative use of multimedia channels.

The data that ASEE regularly obtained from engineering schools was fine-tuned and turned into the annual Profiles of Engineering and Engineering Technology Colleges, which was used (and still is today) to inform the influential U.S. News and World Report engineering college rankings. The data—and its quality and accuracy—increased ASEE's profile, as staff regularly were contacted for statements in national media outlets and the society came to be viewed as the voice for engineering education statistics. ASEE also launched a faculty salary survey.

In the mid-2000s ASEE launched the initiative "Advancing the Scholarship of Engineering Education: A Year of Dialogue," involving discussions within the society on the role and importance of educational scholarship to ensure the long-term excellence of U.S. engineering education, then expanded to include the broader U.S. engineering community and other national and international stakeholders in engineering education. Their recommendations and suggested actions were contained in the report, Creating a Culture for Scholarly and Systematic Innovation in Engineering Education. The second phase of this project resulted in a report in 2012 titled Innovation with Impact, with seven recommendations for building a stronger foundation for the engineering education enterprise.

ASEE invested considerable resources in expanding international effort in the 2000s, and in 2002 the society hosted its first international meeting overseas. Held in conjunction with the European Society for Engineering Education and the Technical University Berlin, the International Colloquium drew approximately 300 attendees from 30 countries. The program addressed critical topics of international interest: accreditation, entrepreneurship, and technology. This was the first of several such meetings and for some time ASEE served as the headquarters for the International Association for Continuing Engineering Education. In addition, ASEE was a founding entity of the International Federation of Engineering Education Societies in 2006.

Another theme for engineering education in the 90s and 00s was expanding the pipeline to include typically underrepresented groups and to attract more youth to engineering as a career in general. ASEE attempted to do this by starting a K-12 center and a yearly K-12 teachers' workshop, held the day prior to the annual conference. The middle school- focused website—and associated bi-yearly magazine—Engineering, Go For It launched in 2003 attempting to make engineering interesting and connect it to the lives of young people.

In the late 2000s, "STEM" gained significant political currency, and perhaps at no time since Sputnik was there as much support for STEM-focused funding as at the start of the Obama administration (though primarily at the K-12 level). In 2012 President Obama addressed the engineering deans to announce that the President's Council on Jobs and Competitiveness would work with ASEE to measure, evaluate, and celebrate excellence in retention, graduation, and diversity in engineering education. The effort was to meet a goal of a 10 percent increase in engineering graduates over the following decade. ASEE subsequently received funding from several sources to study student retention at the collegiate level and had already had a grant from the Sloan Foundation to collect data on retention of engineering students.

Conclusion

In 1893 the engineering educators who founded the Society for the Promotion of Engineering Education discovered that most engineers and professional societies were not deeply interested in education, so that SPEE clearly needed to promote academic engineering education. The Society's success in this endeavor has at times challenged its very existence and continued relevance. Over a century later engineering education is considered so important that almost every engineering organization is deeply concerned, rendering ASEE only one voice among many.

Nonetheless in 2018, ASEE remains the only society that addresses issues spanning all engineering disciplines. The Society provides a crucial link in the network of engineering education, enabling deans and department heads to meet and exchange crucial information about curricular issues, salary structures, personnel, and administrative challenges. Indeed, this may be ASEE's core value to administrators and faculty at all levels; no other engineering organization fulfills the role quite as well. Opportunities are ripe for the Society to lead in national conversations on engineering aspects of STEM education; the engineering and technology workforce; and student retention at the collegiate level. With a dedicated professional staff, important publications, and a large and active membership, there is every reason to believe that ASEE will continue to play a key role in engineering education in the future.

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