

AC 2008-205: ENGINEERING TECHNOLOGY AND THE 75TH ANNIVERSARY RETROSPECTIVE OF ABET

Lawrence Wolf, Oregon Institute of Technology

Lawrence J. Wolf is a professor of the Oregon Institute of Technology and a distinguished service professor of the Oregon University System.

After experience in the army and the aircraft, petroleum, and chemical industries, he began his academic career in 1964 as the founding head of the MET program at the St. Louis Community College at Florissant Valley. As a research fellow he completed his doctorate in engineering at Washington University and then became an associate professor at the University of Petroleum and Minerals in Saudi Arabia from 1972 to 1974. He was appointed as a dean at Wentworth Institute of Technology in Boston, directing a joint project with MIT in Iran, after which he returned to St. Louis in 1975 as the associate dean of instruction. He headed the Department of Manufacturing Engineering Technologies and Supervision at Purdue University, Calumet, from 1978 to 1980, then served for ten years as the dean of the College of Technology of the University of Houston. After a sabbatical year working on the Relativistic Heavy Ion Collider at Brookhaven National Laboratory, Wolf became the president of Oregon Institute of Technology. He retired from administration in 1998, designated as a president emeritus. He served a sabbatical year with the Boeing Company extending the MfgET program to the Seattle sites and working with PLM software in design and manufacturing. He teaches now in Portland and continues to be active internationally and of service to other universities, industry, and government.

Wolf received his B.S. and M.S. in mechanical engineering and his DSc in structural engineering from Washington University in St. Louis. He is a member of the ASME and of the SME. He is a fellow of ASEE, and ABET. From the ASEE he has received the McGraw Award, a Centennial Award, and the Distinguished Service Award. He is a member of Sigma Xi, Pi Tau Sigma, Tau Alpha Pi, Epsilon Pi Tau, and the AAUP. In 06 he was named a life member of the ASEE. In 07 he was elected a life fellow of the ASME, and received an EngineeringVISION Award from Engineering.com.

Michael O'Hair, Purdue University

Michael T. O'Hair, Associate Dean and Director of Statewide Engagement at Purdue University, received the James H. McGraw Award in recognition of his exemplary 36 year teaching career at Purdue University. Beginning at the Calumet Campus, he developed an outstanding engineering technology school at Kokomo and now serves as Associate Dean, leading the entire eight-campus statewide technology and engagement effort for the Purdue University School of Technology. He has played a national role in the emergence of master's degrees in Engineering Technology and is a statewide and nationally recognized leader in the K-12 education sphere. O'Hair led the Purdue Division of Technology at Kokomo from one associate's degree in Electrical Engineering Technology to the School of Technology at Kokomo with six associate's degrees and three bachelor's degrees. Under O'Hair's leadership, the Purdue Engagement Office established Iventrek as the incubator to encourage faculty and researchers at Purdue to engage incubator clients and companies in north central Indiana. He is also a key leader in the Project Lead The Way national program. In five years, Project Lead The Way expanded programs in Indiana to 92 schools and over 14,000 K-12 students. Indiana ranked second in the number of K-12 schools among 41 Project Lead The Way states (the State of New York ranked first). O'Hair has served extensively throughout the ASEE Engineering Technology Council and Engineering Technology Division. Established in 1950, the James H. McGraw Award is sponsored by the ASEE Engineering Technology Council and is funded by the Glencoe Division of MacMillan/McGraw-Hill. The award is presented for outstanding contributions to engineering technology education.

Engineering Technology and the 75th Anniversary Retrospective of ABET

Introduction

In this 75th year of ABET, a published anniversary Retrospective has been made available. Some of this paper appears in that Retrospective in Chapter Three, which is entitled “Building an Organization, 1938 –1954.” It is included here with the permission of ABET, with the confidence that it will add to the interest in the entirety of that historical retrospective which is hoped will be of great value to engineers and scholars from now on.

This particular paper is admittedly a view of engineering through the particular prism of engineering technology by one who is not by any means a historian. Historical credentials derive only from the fact that the author has been in the field long enough to have had the honor of knowing, or at least having met, many of the actors who are mentioned herein. That first-hand knowledge is further enhanced by the research done as part of the ABET Steering Committee for the retrospective. The work is strengthened with some of the actual documents provided by ABET, and printed in the retrospective (though not included here). This paper goes beyond the year 1954, which was the limit of that aforementioned Chapter Three. It takes us to the present. It discusses the relevance and impact of the generation of the “Characteristics of Excellence in Engineering Technology Education,” which treated 2-year engineering technology programs, and the “Grinter Report.” It discusses key reportage and steps toward the legitimization and accreditation of the four-year programs in this field, including Grinter’s own remarks on that development from the last paper he published. Given that this space and time can accommodate only a touch of the extensive history of engineering technology, others are trusted to delve into the ABET retrospective and be inspired to take us beyond what is presented here and right on out into the future.

Engineering Technology – 1938 to 1954

The genesis of engineering technology was the so-called “Committee of Twenty-One.” Understanding the Committee of Twenty-One requires seeing it in the setting of a world at the close of a war in which 8 million Americans had been in uniform and 22 million more had been in war production. That meant 30 million people being moved back into the civilian economy. Probably not before, nor since, had such a large number of militarily trained persons been reabsorbed into a civilian workforce. Nor had it been done with such smoothness, and positive results as by the Servicemen’s Readjustment Act of 1944. By 1956, 450,000 engineers had been educated under that act known as the “G. I. Bill.”

Engineering was only one of the fields that benefited from the 14 billion dollars spent on the G. I. Bill. There were many successes in other fields as well, but also some failures. According to Michael Haycock, “Virtually all problems occurred in education and training on the *trade*, not the college level. Numerous vocational schools had sprung into existence seemingly overnight. Until Congress tightened the restrictions on vocational/technical training in 1949, much of what was offered in some 5,635 such institutions was useless to those enrolled.” But among these

schools then said to be “not of the college level” there were in fact some fine institutions of technology: Public, private, and proprietary. The Committee of Twenty-One was representative of the latter. They called themselves “technical institutes” or “technical colleges.”

The historical narrative within this discipline that came to be known as “engineering technology” is that representatives of twenty-one technical schools, weary of being associated with the hucksters, came together and decided to ask ABET (then known as the “Engineers’ Council for Professional Development”) to help. The lore is that in 1947 they went to the ECPD and pleaded for accreditation, such as had existed for engineering, in order to set their institutions apart from the many problem schools in the business of technology. This story seems to be essentially correct. But if so, who were these twenty-one heroes or, at the risk of being overly dramatic, these “titans of technology”?

In the post-World-War-II era, ECPD was still quite young in that the actual process of the accreditation of engineering had begun only ten years earlier. Then the war intervened in 1941, and suspended the process for four years. So the request from this Committee of Twenty-one must have arrived at a very inopportune time.

John Alden, who had been a submarine commander during the war and went on to be the Executive Director of the Engineering Manpower Commission in the post-war years, eventually became the Accreditation Director for ABET in 1980. Alden published an authoritative paper in the Tau Alpha Pi journal. Alden, known by all who worked with him to be an extremely accurate person, writes that as early as 1939 an ECPD report was referring to a “technical institute group” that read, “Certification of technical institutes should be encouraged by all concerned but that any such program (of certification) should be conducted by the technical institutes themselves.”

So according to Alden, ECPD President Park E. Kolbe of Drexel Institute called a meeting of technical institute officials that submitted a petition to ECPD requesting “a study of the possibility of some form of accrediting” for technical institutes. “In response, a subcommittee of the *Committee on Engineering Schools* called the *Subcommittee on Technical Institutes* was formed under Dean Barker of Columbia University. In 1941 Dr. Barker was succeeded by B.M. Woods of the University of California, and Dean Holbrook of the University of Pittsburgh became chairman.”

Alden goes on to write, “ In 1943 the committee resumed its deliberations under the chairmanship of Dr. Hammond of what was then Pennsylvania State College. By 1944 the committee had developed a tentative set of qualifications, prepared an inclusive report, and submitted a formal recommendation that ECPD undertake the accrediting of technical institute programs. Before the end of the year, all ECPD societies had approved it; and a new subcommittee was appointed to develop criteria and procedures.”

“The programs accredited between 1946 and 1957 were characterized by wide variability in type, duration, nomenclature, content, and graduation credentials. . . . The *Subcommittee on Technical Institutes* felt that it had neither the authority nor the expertise to establish curricular

criteria, since there was no organized body comparable to the major engineering societies that represented the technical institute community.”

Alden notes some things that suggest why these subcommittee people might be seen as heroes, energetically negotiating the best deal that they could. “In 1947, although many programs titled ‘engineering’ continued to receive accreditation, a policy was adopted denying accreditation to ‘any (technical-institute-type) curriculum for which the claim is made that it produces qualified engineers. … From 1948, accreditation included a prominent statement that all programs, regardless of their title, were accredited as of ‘technical-institute-type. … The *Subcommittee* also voted that it was not its province ‘to pass upon curricula that lead to baccalaureate degrees,’ a policy that would hold good for almost 20 years.”

“In 1948, the word ‘*technician*’ first appeared in the titles of programs accredited at Milwaukee School of Engineering, and ‘*technology*’ in one at R.C.A. Institutes. Associate degrees first appeared in 1951 at the University of Houston and at Rochester Institute of Technology. … In 1958, programs were required to be at least two years in duration and include the word ‘*technology*’ as the final noun in their titles in order to be considered for accreditation.”

The above quotes, all from Alden, clearly establish that the *Subcommittee on Technical Institutes* must have been in full functionality as early as 1943 and on through 1958. So, when one endeavors to identify twenty-one people, it is not quite that simple. Sparse records show that a Committee of Twenty-One couldn’t just have walked in, delivered its request, and then turned about and walked out. ASEE records, according to Engineering Technology: An ASEE History, show that it or something like it existed from 1949 to 1963 within the ASEE. And, it had to have been in existence as early as 1946; because accreditation activity had already begun by 1947. Was the ECPD *Subcommittee on Technical Institutes* actually the Committee of Twenty-One?

Since there had been, according to Alden, “no organized body comparable to the major engineering societies that represented the technical institute community,” it seems that a Technical Institute Committee evolved within the ASEE; and its minutes in 1956 show that it convened under the name of the “National Committee of Twenty-One” for its October meetings. It reconstituted itself every three years by electing or re-electing seven of the members each year. An unpublished document in the Engineering Technology Archives lists the names and affiliations of twenty-one people, entitled “Membership of the ASEE Technical Institute Division, National Committee 1955 – 56.” (Minutes of the “TID” business meeting show that the number, 21, was dropped from the name after 1958, presumably because the number of participating institutions by that time was way beyond twenty-one.)

But was this the same entity as the ECPD *Subcommittee on Technical Institutes*, described by Alden? An oral history by Walter Hartung says that a thing called the Committee of Twenty-One went on to become known as the Technical Institute Council. Then it became the Technology College Council of the ASEE, which is now known as the Engineering Technology Council of the ASEE. The ETC is a council of the ASEE, which in accordance with ASEE bylaws elects one member of the ASEE Board of Directors every other year. Did the *Subcommittee on Technical Institutes* evolve into today’s Technology Accrediting Commission

(TAC) of ABET? Or did it evolve to be the Engineering Technology Council of ASEE? Perhaps it did both.

What Actually Seems to have Happened

Again we must consider the times. In 1945, six American servicemen raised the United States flag on a mountain on the island of Iwo Jima. Although a photo of that event appeared on the front pages of most newspapers throughout the country, and there is a large marble statue of the scene in Arlington National Cemetery, there is some uncertainty as to exactly who those six Americans were. It seems that the photo was actually shot as many as three times, for different reasons, with some different individuals each time. Confusion is understandable since everyone involved in that experience was being sniped at through it all. The feeling of things whizzing by the ears, by the way, might not be unfamiliar to those who have carried the banner of engineering technology.

It is no longer a matter of calling someone and simply asking. Bob Wear, who actually recorded the oral history of Walter Hartung in 1992 and whose number is listed in the book was telephoned to see what he could add. Bob's widow answered that Bob, who had departed four years earlier, "would have just loved" to contribute to this 75th-year retrospective of ABET. If the surviving WW II veterans are today in their eighties, people of the stature of those who would have been named to the Committee of Twenty-One would already be in their one-hundred's.

Alden concluded his paper for Tau Alpha Pi by stating his personal preferences for the future of engineering technology at that time, "Accreditation, state registration, and professional recognition will have to operate at dual levels, recognizing both the bachelor and masters degrees as valid levels of preparation for entry into a broadly defined engineering profession." Masters degrees in engineering technology now exist and are active in producing the scholars and promoting the scholarship that hopefully will take up the search for more documents that are likely to remain out there at the various institutions of technology. Some of these more advanced scholars, admittedly better trained than I, might be encouraged and inspired by this very retrospective to have such an interest.

In 1992 Dr. Walter Hartung said, "We had a Committee of Twenty-one because there were twenty-one members of it in schools. They were sort of a stepchild of the ASEE and gradually took over the accreditation of their programs." This suggests that the *Subcommittee on Technical Institutes* of ECPD and the ASEE Committee of Twenty-One were indeed one and the same. It is quite probable that they were going by one name when accrediting for ECPD and the other when working within the ASEE.

"The engineering schools did not particularly want their name to be used as part of the school name (engineering technology) but nevertheless we had to be developed too," says Hartung. He mentions that "DeVry, Central, Academy of Aeronautics, Wentworth, the 'Rietzke' School, and Capital Tech all came over to the Committee of Twenty-one from a group called the National Council of Technical Schools under which they had already been doing some accreditation in order to qualify for veteran's funds without which they could not have operated."

Hartung said that the engineering deans cooperated, “but not to any great extent until later when they had to give (offer) the programs themselves and the government would only pay for accredited programs. They (the engineering professional societies) did not send any people for accrediting technical-institute programs.” Although the union of engineering and technology was admittedly a bit of a shotgun marriage, Hartung gives substantial credit to engineering deans, such as “Dean Hammond of Penn State” as a “big mover” in the Committee of Twenty-One, who was “a great believer in technical-institute-type programs. (He was followed by Ken Holderman at Penn State.)” Hartung mentioned at the outset they were also joined by the “New York State Schools, Purdue, Morgan Institute of Connecticut, and by Hugh McCallick of the University of Houston.”

As to the actual membership of the Committee of Twenty-One, here is what can be documented as of this time using the 1955-56 roster found in the Engineering Technology Archives, the Walter Hartung Oral History, the Mike Mazzola Oral History, the Hugh McCallick Oral History, and the James H. McGraw Award citations: From these sources, the thirty-four people named below at one time through 1956 served on what *might* have been the Committee of Twenty-One. Some *may* even have been among the original members who carried the request for accreditation to the ECPD, now ABET. But there may have been others, even some of the originals, that were inadvertently missed in compiling this list of thirty-four.

From the Walter Hartung Oral History and the John Alden paper, seven (noted) of the thirty-four can be said with some certainty to have been among a group that composed what *might* have been that original Committee of Twenty-One.

Adams, H. P.	Oklahoma A & M College
Almstead, F. E.	State University of NY, Albany
Beatty, H. Russell (Original)	Wentworth Institute, Boston
Burroughs, K. L.	Aeronautical University, Chicago
Daugherty, Von Roy	Purdue University, Indiana
Dunham, Louis	Franklin Institute, Boston
Foster, C. L. (Curly) (Original)	Central Technical Institute, Kansas City
Gershon, Joe	DeVry Institute, Chicago
Hammond, Harry P. (Original)	Pennsylvania State
Harshman, Joseph B.	Valparaiso Technical Institute, Indiana
Hartung, Walter. M. (Original)	Academy of Aeronautics, New York
Hartley, Herbert W.	Northrup Aeronautical Institute, Inglewood, California
Henninger, G. Ross	Ohio Mechanics Institute, U of Cincinnati
Holderman, Kenneth L.	Pennsylvania State

Hughes, Walter	Franklin Institute, Boston
Johnson, Lawrence V.	Southern Technical Institute, Atlanta
Jones, Charles S. (Casey) (Original)	Casey Jones School of Aeronautics, Chicago
Lohman, Pete	Oklahoma State
Maedel, G. F.	Academy of Aeronautics, New York
Marcus, Joe	Franklin Institute, Boston
Mazzola, Mike	Franklin Institute, Boston
McCallick, Hugh	University of Houston
Metz, D. C.	University of Dayton
Purvine, Winston	Oregon Institute of Technology
Rietzke, E. H. (Original)	Capitol Radio Engineering Institute, Washington, D. C.
Rodes, H. P.	Bradley University, Peoria
Shaw, H. W.	McGraw Hill Book Co., Inc, New York
Sims, A. Ray	University of Houston
Smith, E. W.	Cogswell Polytechnical College, San Francisco
Smith, Leo F.	Rochester Institute of Technology
Tyrrell, Cecil	Broome Community College, Binghamton, New York
Thompson, Walter (Original)	DeVry Institute, Chicago
Ungrodt, Richard	Milwaukee School of Engineering
Werwath, K. O. (Original)	Milwaukee School of Engineering

Engineering Technology – 1959 to the Present

Following the genesis represented by the Committee of Twenty-One, there has been a continuum of heroes and milestones that have led to the professionalization of engineering technology as can be found today. Among the heroes would be those who worked toward the establishment of engineering technology committees, divisions, or interest groups within the various engineering founder societies; those who worked toward the emergence of the Technology Accreditation Commission within ABET; and those who built the Engineering Technology Council, the Engineering Technology Division, and the Engineering Technology Leadership Institute within the ASEE.

The Grinter Report triggered two decades of foundation studies within the ECPD. While it has been advised to paraphrase what follows rather than give such a long quote, it must be pointed out that these are the exact words of Grinter. His words were to have a profound effect upon

engineering industry, practice, education, and the course of world events. In retrospect, each of his utterances turned out to be prophetic. The paper is well worth reading in its entirety. So in the words of Linton E. Grinter himself, as presented to the Engineering Technology Leadership Institute of the ASEE in October of 1982, “..... *the shocking effect of Sputnik was brought to bear upon engineering faculties soon after the final report of the Committee on Evaluation of Engineering Education (The Grinter Report) reached their desks. The fact that the U.S. would need about three years to catch up with the Soviets in engineering-type space research while the Soviets moved further ahead generated a strong following shock wave. The subject of dual engineering curricula or ‘bifurcation’ could no longer be avoided.*
Engineering faculties, as emphasized earlier, were unable to agree in 1955 with the concept of bifurcation of engineering curricula. The Committee’s objective was to provide a dual choice for each student of either a scientific or a more pragmatic orientation of his program in engineering. Nevertheless, the natural forces of student desire and employer need have brought about a nearly complete solution through the development of four-year BET curricula.”

The philosophical basis of engineering technology today rests upon two fundamental national studies that followed from The Grinter Report. The first of them was the *Characteristics of Excellence in Engineering Technology Education* report in 1962 directed by James McGraw of the University of Dayton that names 135 individual “heroes” of that time, 49 two-year technology schools, 50 four-year colleges and universities, and 24 corporate employers. It led to criteria-based accreditation of two-year engineering technology programs. The second study was the 1965 report of four-year technology programs, 60 of which were said to have been already in existence, developed under Dean Hugh McCallick of the University of Houston. A year later an ECPD committee headed by M.R. “Pete” Lohmann of Oklahoma State recommended, and the Board of Directors authorized, the accreditation of bachelor’s-degree programs that met the existing criteria for two-year programs. In 1967 the first two four-year programs were accredited at Brigham Young University and Purdue University, and the ECPD formally recommended the use of the terms *engineering technician* and *engineering technologist* to distinguish the graduates of the two kinds of programs. In 1972 a subcommittee under Winston D. Purvine completely revised the criteria on the basis of the ASEE study. In 1973, the NCA extended its recognition of ECPD to the four-year engineering technology level, finally putting the accreditation of bachelor’s degrees in engineering technology on a formal basis.

A literature of engineering technology has developed thanks to the establishment of the Tau Alpha Pi engineering technology honorary society, the ASEE’s yearly scholarly conferences conducted by the Engineering Technology Division of the ASEE, and that division’s *Journal of Engineering Technology*. The emergence of engineering technology graduate study with master’s and doctor’s degrees complete the infrastructure and are continuing to develop the body of knowledge and the discipline of engineering technology.

The heroes are not all old men. New faces continue to join the ranks of their predecessors and outdo them. Some are heroines, three of whom were among the thirteen people that were nominated to be national officers of the American Society for Engineering Education this past year.

Conclusions

The essential contribution of the Committee of Twenty-One was in bringing the very word, “*technology*” to the ECPD. They put that “T” into “ABET.” Since *technology* has become part of the ABET vocabulary, it has grown from a belittlement to a behemoth. Who could have foreseen at the outset that *technology* would become the name for a major segment of the economy of America, and indeed that of the world? Who in the 1940’s could have anticipated the Internet, and Google, where a query on the word *technology* can bring a billion hits? Could it have been a strategic way for ABET to stake a claim on *technology* for the 21st century? – If so, maybe those who made up the Committee of Twenty-One were titans after all.

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