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The Rise of Technical Writing Instruction in America

ROBERT J. CONNORS

With Bob Connors's death in 2000, Rhetoric and Composition lost one of its most well-respected historians. Bob received his PhD from Ohio State in 1980, and "The Rise of Technical Writing Instruction in America" appeared two years later. Bob's contributions to our understanding of the history of writing instruction were considerable. Most importantly, he established a historiography for the field of composition that became a model for imitation—and an impetus for dispute. My own relationship with Bob Connors and his approach to history is probably representative.

History is shaped by the choices historians make: the sources relied upon, the figures and events emphasized, the cause-and-effect relationships identified and explored. In many ways, the essay that follows, an early work of Bob's, is exemplary. Bob saw history as a grand narrative and historians as writing small chapters of it. Events and movements were characterized as either "breakthroughs" or "retrenchments," progress or obstacles in the way of progress, and his histories were typically filled with heroes and villains—in this case, Samuel Earle ("the philosophical voice of the early technical writing movement"), Sada Harbarger ("a tough-minded and professionally determined assistant professor at Ohio State University"), and Gordon Mills and John Walter (who "determined to try to reinvigorate technical writing instruction by bringing it closer to the businesses and industries that actually used the forms that were taught").

Such "hero worship" and emphasis on narrative progression are natural among historians. We seek to give meaning to our histories by privileging certain people and events and deemphasizing and sometimes even decrying others. Where Bob and I tended to differ in approach was over the kinds of source material we privileged. Bob, by nature an archivist, relied entirely on written records, primarily textbooks. His history of technical writing instruction here is remarkable in its balanced reliance on society proceedings and disciplinary journal articles as well as textbooks. Absent from Bob's history here and elsewhere are data from oral history interviews, memoirs, and other more ethnographic methods. Such data tend to complicate historiography, shifting authority for historical interpretation from the historian to others, often blurring what the historian finds to be clear-cut. Relying primarily on written records allows for more categorical, less ambiguous claims. Such unequivocal conclusions were important in the early eighties. While writing courses had begun to be taught and textbooks to be written in the nineteenth century, little serious empirical and historical research had been done before World War II, and it was only in the late 1970s that much of that research began to emerge and justify

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composition's claim to disciplinarity. This claim was furthered by our ability to reference an established, unambiguous history.

That Bob Connors would choose to write the history of *technical* writing instruction is revealing. Bob believed that knowing the past functioned to help shape the future. Implicit in this 1982 essay are distinctions that would later become crucial to our understanding of technical writing, notably those between being a technical writer and being a technician who writes, and being a technical writing teacher and being a teacher in a technical discipline who teaches writing. The history of technical writing instruction also afforded Bob the opportunity to address concerns over faculty status within English departments. As this essay makes painfully clear, a major obstacle to progress in technical writing instruction—one that handicaps all writing instruction—is the dominance and prejudices of English department literature faculty. Bob, I should note, was not yet tenured in 1982, and he worked in an English department that, like most, consisted almost entirely of literary scholars. He had much to lose if he offended these colleagues. Yet Bob never flinched in addressing the problem of elitism in English departments' attitudes toward technical fields and their failure to respect those who taught technical writing. Bob Connors's courage in this regard provides yet a further model of scholarship, one we should not forget.

R. Gerald Nelms

I. THE EARLY YEARS: 1895–1939

For as long as men have used tools and have needed to communicate with each other about them, technical discourse has existed. Scholarship has traced technical writing of a quite familiar sort back to the Sumerians, and we need come no farther forward in history than the Roman Empire to find technical writing as lucid and sophisticated as any that is done today. The tradition of technical writing is ancient, and, as Michael Connaughton's recent work shows, it can be traced historically. But systematic instruction in the methods of technical writing, though it is a relatively recent development and is thus not difficult to trace, has been the subject of few studies; for all that many technical writing teachers know, their discipline sprang full-blown from the brows of Mills and Walter in 1954. But now that technical writing has been accepted as an important part of the discipline of English and seems in many ways to have come of age, it deserves to know more about its own history and development as part of college curricula. In this article, therefore, I will trace instruction in technical writing from its beginnings in a few schools of engineering, through its lean times, when it was a poor cousin to literary studies in English departments, to its present eminence as a center of vital scholarly and pedagogic activity.

ENGINEERING EDUCATION IN THE NINETEENTH CENTURY

It is only in the last century that technical writing courses have been taught in American colleges. To understand the genesis of these early courses, we must first understand the context from which they grew: the vast changes that took place in all American colleges during the period 1860–1900. Prior to the Civil War, colleges in America had been predominantly religiously based, usually fairly small, and reliant upon a classically descended curriculum. With the passage of the first Morrill Act in 1862, however, the foundations were laid for a revolution in American college study. The two Morrill Acts, in 1862 and 1877, founded and promoted the land-grant agricultural and mechanical colleges that were to make college education available in the later nineteenth century to a hugely increased percentage of the population, colleges that were to broaden and specialize the college curriculum in many ways.

In the last forty years of the nineteenth century, the traditional study of the classics of Greek and Roman philosophy and literature began to be supplemented by studies in mathematics, modern languages and literatures, liberal arts of all sorts, and by an ever-growing field of technical and applied specialties—chief among them engineering. The Civil War was largely responsible for this change in the status of the technical fields. During that conflict as never before, field engineers had been important figures, and with the burgeoning Industrial Revolution, the establishment of A & M colleges, and the growing technical needs of postwar America, the creation of schools and colleges of engineering (usually adjunct to the "arts" college in non-A & M schools) was a natural step. It was within these schools of engineering that the courses we now know as technical writing courses began.

These specialized upper-level courses in writing, however, hardly existed during the nineteenth century, and this rarity is explained by the manner in which engineering schools developed in America. Prior to 1870, the canon of established engineering materials was fairly small, and pre-1870 engineering curricula contained a large percentage of humanities-based courses as a result. Some of this coursework was classical, but much was relatively recent—modern languages, both English and foreign, freshman composition (which was itself a new course, at least in its modern form), and the "philological studies" of the early literary scholars, along with a few science courses, history courses, and varied electives. Before 1870 an engineer graduated with a good bit of knowledge of the "humane subjects." But the engineering discipline was rapidly being awakened by the fantastically rapid industrial development of the Gilded Age, and new engineering materials were not long in appearing in curricula. During the 1870's, courses in the humanities dropped almost completely out of sight in engineering schools. In a retrospective article published in 1932, H. L. Creek and J. H. McKee described what happened:

> The great decline in the amount of time given the humane subjects came between 1870 and 1885, the time at which the largest increase in the number of engineering colleges occurred, when more than one-third of the time given humane subjects disappeared from subject matter [1].

Losing ground most seriously during this period were the foreign and classical languages and literary study [2].

As we might expect, what were left after this rapid takeover of the engineering curriculum by technically based courses were the "old reliables" of language instruction—freshman English courses. Freshman composition requirements were almost universal, and the tacit assumption in engineering schools between 1880 and 1905 or so was that these first-year courses were all the introduction to writing that engineers needed. This period was, understandably, a rather dark time in the history of engineering education, a time when, by the schools' own later admissions, they turned out a large number of otherwise competent engineers who were near-illiterates.

Despite the fact that some freshman composition courses in engineering schools were specialized to the needs of technical students, there seem to have been no courses before 1900 that dealt with the needs of upperclassmen for knowledge of the writing demands of the engineering profession. Although engineering education itself became vastly more sophisticated as the nineteenth century drew to a close, it almost completely ignored the linguistic needs of its students. The Society for the Promotion of Engineering Education (SPEE) was founded in 1894, but it had no members from English departments until after 1905, and in general, engineering schools acted as if their students needed none but technical courses.

It took time, but a wave of reaction to this attitude began to build in the early twentieth century, and after 1903 or so there began to appear in the engineering journals and weeklies an increasingly bitter series of condemnatory articles about the illiteracy of engineering-school graduates. Letters and essays in most important professional organs decried the inability of the new men to write coherent engineering reports or even simple business letters. The *Engineering Record* spoke for many practicing engineers when it charged that "It is impossible, without giving offense to college authorities, to express one's self adequately on the English productions of the engi-

neering students. . . . Most of them can be described only by the word 'wretched.'"[3]

The causes of the problem are not hard to trace. As pioneer technical writing teacher J. Martin Telleen explained in 1908, the standard freshman English course came too early in students' careers, it was too general in scope to be very helpful, it was not practically oriented enough, and there was almost no interdepartmental cooperation between English and engineering faculties [4]. Even as early as 1900 the familiar "two cultures" split had been established in colleges: English teachers saw engineers as soulless technicians, while engineers saw English teachers as dreaming aesthetes, promoting "refinement and culture" to the exclusion of reality [5]. Clearly, though, some cooperation would have to be achieved if the problem that all admitted existed was to be solved, and technical writing courses in their earliest forms were the solution of choice.

SAMUEL EARLE AND EARLY TECHNICAL WRITING THEORY

The period 1900 through 1910 was the gestation period for technical writing courses. Although the surface of college life seemed quiet, at many schools there was furious activity that would soon come to fruition. Beginning around 1899, a number of engineering schools established separate English departments within themselves in order to serve the special needs of engineering students, the most famous of which still extant is the Department of Humanities at the University of Michigan. Initially these inhouse English departments taught only a specialized freshman and sophomore sequence, but they provided a natural climate for upper-level courses in specialized composition.

This activity was not long in producing prototypical technical writing materials. The first notable textbook devoted to technical writing was published in 1908: T. A. Rickard's *A Guide to Technical Writing*. This was a transitional text that dealt mostly with usage, meant more for practicing engineers than for college classes, but it sold well and was adopted at a number of schools. Rickard's 1908 book, though, was merely a precursor to the first genuine technical writing textbook written for use in college courses. The book was called *The Theory and Practice of Technical Writing*, and it was published in 1911 by a man who, more than any other, deserves the title of Father of Technical Writing Instruction: Samuel Chandler Earle of Tufts College.

The Theory and Practice was a genuinely new sort of textbook when it appeared, sharing only a few elements with the general composition texts of the early twentieth century. It grew out of courses in "engineering English" that Earle had been teaching at Tufts since 1904, courses that were perhaps the first recognizable technical writing courses. In addition to being the author of the first real text, Earle came to be the philosophical voice of the early technical writing movement as well. In an important article in 1911, he ably defended specialized composition for engineers, stating that although technical composition requires great specialized skill, "it has commonly been assumed that for such writing a course in general composition is enough." It was not enough, obviously, and Earle went on to describe the reforms he had instituted for engineering students at Tufts. "We have departed," he wrote, "from common practice mainly in three ways: in shaping the work in English more frankly and more completely for engineers; in giving systematic training in technical writing; and in adapting special means for increasing the efficiency of the work." [6]

Just as important as systematic technical writing training for students, in Earle's eyes, was the problem of the cultural split between English and engineering teachers. He condemned the attitude of English teachers that saw engineers as philistines, to be proselytised to about the superior virtues of culture and literature over engineering. In words that might be carved over the doorway of every Technical Writing Division office, Earle wrote in 1911,

> We find, as I believe everyone will who studies the case without prejudice, that for those who have already entered upon what is to be their life work, true culture comes not from turning aside to other interests as higher, but from so conceiving their special work that it will be worthy of a life's devotion [6, p. 35].

Such advice fell, unfortunately, on English department ears that were mostly deaf.

Earle's text is dissimilar to present day technical writing texts, due primarily to the fact that he approached his subject from a "modes of discourse" perspective which has since lost popularity. Technical writing for Earle was "narrative, descriptive, expository, or directive"; he did not cover any technical forms *per se*. *The Theory and Practice* included many examples of engineering writing (and it is important to remember that until the 1950's technical writing and engineering writing were synonymous), advocated only the plain style for engineers, and approached questions of audience in a surprisingly sophisticated way, but the book was a prototype and not a completely successful text. It found a ready audience, but it was superseded by other books in the early twenties.

Samuel C. Earle was a true educational ground breaker. "To him is largely due the present method of teaching English in engineering schools," said the obituary after his tragically early death in 1917 at the age of forty-seven, and though his passing was a loss to the profession he had helped to found, Earle's work gave direction and impetus to the "decade of great awakening" that followed the publication of his textbook [7]. Between 1911 and 1920, the basic elements of technical writing courses as we now teach them were limned out at a number of schools around the country. The early centers of interest in technical writing were established by 1916—Tufts, the University of Cincinnati, Princeton, MIT, the University of Kansas, and Rensselaer Polytechnic Institute, to name the most active.

By 1916 the stream of professional complaints about technical school graduates had become a torrent, and engineering curricula began to change in an attempt to improve the situation. Writing in 1931 (and reflecting the fears and wishes of teachers of that period), J. Raleigh Nelson called the period 1915–1930 a time of "complete reaction" to the non-humanistic training given to engineers during the period 1870–1910. Nelson saw a "unanimous demand for a more liberal and humanistic scheme of education" arise around 1915 [8]. In actuality, the demand was for basic literacy in engineering graduates, but English teachers often put their own interpretation on the dissatisfaction with the older curricula. If engineering schools wanted English instruction, they would have to accept literature along with writing, because the English graduate schools of the time were not producing anything but literary scholars—who wanted work. And thus grew up another problem in understanding between English and engineering faculties.

The essentially literary nature of nearly all available English teachers led throughout the early years of engineering education to real disagreements, both between engineering and English teachers and among English teachers themselves. On the east coast there grew up a movement led by Frank Aydelotte of MIT whose aim was frankly to "humanize the engineering student's character and his aims in life" through literary study. Aydelotte and his followers (who did *not* include Samuel Earle) claimed that the demand that engineering graduates "should be better able to write and speak their mother tongue is really a demand that they have better literary education." [9] Aydelotte's 1917 textbook, *English and Engineering*, was a reader of essays meant to "furnish something of the liberal, humanizing, and broadening element which is more and more felt to be a necessary part of an engineering education." [10]

Opposed to this "broad view of engineering education" (Aydelotte's term) was the "narrow view," which saw the promotion of reading and writing skills alone as the practical and proper goal. This position was most evident in the Midwest and far West, where English courses were taught most often by in-house English departments working more closely with engineering faculty members. The A & M schools and schools of mines that grew up during 1900–1915 were especially uninterested in literary studies. In general, the more established the "arts college" at a school was, the more disagreement over the content of engineering English courses there would be.

During this period there were generally three sorts of English courses available for engineering students: the required freshman composition course, a sophomore literature sequence that was sometimes required, and the junior- or senior-level courses in "exposition for engineers" that were the prototypes of today's technical writing. This entire three-pronged sequence, however, was plagued from the beginning by certain problems. The most serious

were the lack of interest in learning to write or read literature on the part of students, the quality and experience of many English teachers assigned to technical writing courses, and the lack of cooperation between English and engineering faculty members. Lack of student interest in English courses was in part a result of the way such courses tended to be taught. They were typically assigned to young and inexperienced faculty members who often looked down on engineering students as mere technicians and patronized them while preaching a gospel of literary sweetness and light. Engineering professors did not help either, often referring to English courses disparagingly as unrealistic and less worthy than technical courses. As an editorial in the *Engineering Record* stated in 1917, "Students usually regard the (English) courses as necessary evil." [11, p. 291]

The fact that technical writing courses were seen by English departments as second-rate and often staffed with younger faculty members or departmental fringe people meant that there was no glory and no real chance for professional advancement in technical writing. Thus the quality of technical writing courses was often low in the early days as departments rotated unwilling and uninterested teachers through them. Because of this second-class status given to engineering English, relations between English and engineering teachers ebbed. Engineering faculties had little patience with the stance of moral superiority assumed by many English teachers or with the idea that students must be "humanized" through English literature. In fact, when the English Committee of the SPEE conducted a survey in 1918, they found that although English as "training in thinking," "guarantee against illiteracy," and "a tool for use in technical work" got support from 72 percent of engineering faculty members, the idea of English courses as "a cultural and recreational escape from the monotonous literalism of vocational study" (the English Committee's wording, not mine) was supported by only 5 percent [12]. Clearly the engineering faculty and the English faculty had different agendas.

THE FORMATION OF A DISCIPLINE

Despite the peripatetic wrangling over literature vs. vocationalism, the interest in technical writing grew apace. Prior to 1912, there had only been two English teachers in the SPEE, but seven more joined in that year. The English Committee had been formed by 1914 (chaired until his death by Samuel Earle), and by 1918 there were sixteen English teachers as SPEE members [13]. The Mann Report on Engineering Curricula in 1918 recommended more time spent on English, and by 1920, 64 percent of all engineering schools required some sort of technical writing course for their students [14]. As J. Raleigh Nelson, whose technical writing course at Michigan began in 1914, suggests, it was during this period, 1915–1920, when the engineering-only hardliners threw up their hands and integrated English into the curriculum [8, p. 495].

As the twenties opened, technical writing was beginning to become self-aware. The amount of time devoted to it increased, new courses were proposed on both the freshman and upperclass levels, and new textbooks began to appear that were aimed specifically at the technical-writing student. T. A. Rickard published a new textbook in 1920, this one meant specifically for classroom use, but like his first text in 1908, Rickard's *Technical Writing* of 1920 was essentially concerned with good usage rather than with technical formats. A much more important step forward came in 1923, with the publication of the first "modern" technical writing textbook. It was called *English for Engineers,* and was the work of a tough-minded and professionally determined assistant professor at Ohio State University named Sada A. Harbarger. (The author was referred to in the book only as "S. A. Harbarger," perhaps because the publisher felt that many readers might resent a woman claiming to be able to teach technical writing.)

English for Engineers is the first textbook that is organized according to the "technical forms"—reports and letters—that still remain the basis for most textbook organization today. Chapters included treatments of many sorts of letters as well as explanations, abstracts, summaries, book reviews, editorials, articles, reports, and papers at meetings. But although this "forms" approach now seems natural to us, it was not immediately recognized as the best. Textbook organization by forms caught on slowly throughout the twenties, and Harbarger's text was not initially as popular as Rickard's non-forms text (though it out-

lasted Rickard by a decade, being reprinted last in 1943). Harbarger was extremely active in the SPEE, and her views of the profession as well as her textbook were to be influential in shaping technical writing instruction.

The mid-twenties saw two new developments in the profession, one of them practical and the other philosophical. The practical development was the introduction of technical writing texts that were concerned only with the writing of technical reports. Ralph Fitting's *Report Writing* of 1924 and the immensely popular and influential *Preparation of Scientific and Technical Papers* of Sam F. Trelease and Emma S. Yule (which lasted from 1925 to 1951) found immediate audiences in technical writing classrooms and their narrow-focus formal approach was to influence a whole generation of technical writers. Texts following Fitting and Trelease treated many different sorts of reports—preliminary, investigative, field work, recommendation, etc.—but seldom dealt with other technical writing tasks. They might be considered the apotheosis of the technical-forms approach to textbooks.

The philosophical development of the mid-twenties involved the rise of a younger group of technical writing teachers who defined themselves primarily as teachers of technical writing rather than as teachers of literature. The number of writing teachers grew slowly, of course—in 1926, J. Raleigh Nelson complained that "the little company of enthusiasts who have pioneered in this field the past twenty years do not see their ranks filling with recruits as rapidly as they might wish"—but some of the younger technical writing teachers, seeing the doors of conventional literary departments closing to them, began to downplay the call for more literature for engineering students that had been part and parcel of the English lament for years [15]. Bradley and Merwin Roe Stoughton made in 1924 the shocking statement that "the habit of creative literary imagination is a detriment to an engineer . . . Literary activity . . . is not desirable training for engineering students and does not help them present engineering data in brief and attractive form. . . ." [16]

This was still a minority position in the twenties, though; at that time most English teachers were fighting together to accomplish goals on a broad front. And there was evidence that these goals were being accomplished. A 1924 SPEE survey (the organization loved surveys) found that it was no longer necessary to urge the importance of English for engineers; the uproar over illiteracy since 1910 had done its work well. The survey also found that English requirements at engineering schools had doubled since 1914 and that more colleges were instituting technical writing courses each year [17]. There was no question that by 1924 English was an important part of engineering education once again.

EXPANSION AND DEPRESSION

Changes continued within the discipline throughout the late twenties as new textbooks appeared, both traditional "usage" texts like Clyde Park's *English Applied in Technical Writing*, which enjoyed modest sales until the mid-forties, and the increasingly popular "technical forms" texts, the best-known of which was *Report Writing* by Carl Gaum and Harold Graves, which lasted well into the fifties. Technical writing courses of the period were gradually refining themselves, taking on the characteristics and beginning to teach some of the forms that we still use today. Most technical writing courses of the late twenties stuck to a few relatively rigid forms, though, and a contemporary description of an average course called it an "intensive study of the logical organization and effective presentation requirements of technical articles, reports, and business letters." [18]

This was a time of experimentation, as J. Raleigh Nelson was to say later, but the experimentation was conducted in an ever more secure atmosphere as English teachers realized how much they were needed. Another SPEE survey, in 1930, showed that of 1300 engineers and teachers, 95 percent approved requirements in English composition, 75 percent approved speech requirements and 45 percent approved literature requirements [8, p. 496]. (This interest in speech, incidentally, was largely due to the vast influence of Dale Carnegie's books on *Public Speaking and Influencing Business Men* which were published in the late twenties. This first entrepreneur of self-improvement on a grand scale created a huge demand for speech courses in all technical fields. But that is another essay [19].)

Despite this acceptance, the early thirties were not a happy time for engineering English teachers. The Depression had hit engineering schools hard, and the professional publications of the time reflect a pervasive discontent, a feeling of compromise. Despite the demand for technical writing, most English teachers who made a specialty of it were still underpaid and little recognized in their own departments. Interest in composition teaching caused teachers to "lose caste" among their departmental peers and was seen as "professional suicide" by younger teachers [20]. Engineering teachers still did not give English teachers the cooperation they felt was necessary, and engineering students often seemed to have little respect for the sorts of teachers being turned out by graduate schools in English. It was said in the thirties that many English teachers "appear to their critics as not of a sufficiently masculine type or of enough experience in the world outside their books to command the respect of engineering students" and they were called "effeminate" by some students. (One student was quoted in 1938 as calling his teacher "a budding pinko." [21])

But in spite of these problems and discontents, in spite of the Depression, technical writing courses continued to fill. More sections were taught each year and new textbooks began to pour off presses at an ever-faster rate. (Would-be authors soon realized that the success ratio for technical writing texts was the highest for any type of composition text.) The most popular texts throughout the thirties were W. O. Sypherd and Sharon Brown's *The Engineer's Manual of English,* primarily a technical-forms text, and Thomas Agg and Walter Foster's *The Preparation of Engineering Reports,* which was a narrowly formal approach to report writing that practically led the reader step-by-step through writing a report.

There appeared in 1938 a study which showed the degree to which technical writing had come of age: a dissertation, later turned into a published report, called *A Study of Courses in Technical Writing,* by Alvin M. Fountain. Fountain's exhaustive survey-and-interview study showed that of 117 engineering schools in America, seventy-six schools offered ninety-three different technical writing courses in 1937 [22]. Fountain's study is an important diachronic slice of history, the only one extant; it covers the content of technical writing courses during the mid-thirties, the textbooks that were most popular, and the methods used by teachers of technical writing. The most important information in Fountain's study—and this is corroborated by the textbooks of the period—is that he shows how a technical-forms approach of a rigid and mechanical sort had become all but absolute by the late thirties. Fountain's study also indicated the range of forms taught at the time. Essentially, every technical writing course Fountain examined covered the report form; it seems to have been a sine qua non in such courses after 1935. Thirty of the ninety-three courses studied used "Reports" in their course titles, and more than one-third of the courses devoted the majority of the course time to report-writing. Fifty-one of the ninety-three courses also covered business letters of different sorts, usually of a technical nature, and only thirty-seven of the ninety-three reviewed fundamentals of usage—which was the hallmark of the fading older form of the upper-level technical-English course. In addition, thirty-three of the courses worked on technical articles, and oral presentations were important in many as well [22, pp. 83–98].

Fountain's report shows clearly that technical writing was a thriving industry in 1938, having produced its own authors, experts, and directors. The courses were more advanced and taught more forms. The study also showed, however, that little progress had been made on the professional front for teachers of technical writing. Conditions were still poor for many; there was still little chance for advancement, and the majority of technical writing courses was still staffed by instructors and assistant professors. At the same time the understanding gap between engineering and English teachers was widened, and by 1939 an important bastion of interdepartmental understanding was on the way out: a survey showed that of the more than two dozen departments of English that had once existed within engineering schools, only five remained [20, p. 412].

The dissatisfaction in the journal articles grew more shrill. Graduate schools still turned out nothing but literary scholars, and only the less talented of them gravitated to engineering English. After all the

fruitless complaining of the past, little seemed likely to be done. In fact, technical writing pioneer W. O. Sypherd noted in a retrospective article in 1939 that "the prevailing notes are of uncertainty, discontent, and vague longing." Sypherd complained bitterly that literature courses were too few and too little to matter, that freshman courses were ineffective, and that lack of writing in other engineering courses, bad student attitudes, and no interdepartmental cooperation had brought engineering English to a critical pass. "I see little hope for any marked improvement," Sypherd concluded, "unless some radical upheaval should come to pass." [23]

That was in 1939, and a "radical upheaval" was certainly on the way. The first five years of the new decade brought activities that would result in a complete restructuring of engineering education and the beginnings of the final transformation of technical writing courses into the courses we still teach today. The World War, of course, was the greatest single factor in these changes, creating a new technological imperative that swept all before it, but back in the U. S. other forces were at work that would also transform the postwar engineering scene.

II. A DISCIPLINE COMES OF AGE: 1940–1980

DEVELOPMENTS DURING WORLD WAR II

On the surface, World War II brought the engineering English industry, at least as it appeared in journal articles, to an almost dead stop. In my research for this article, I found a huge hiatus in the production of articles of technical writing during the period 1940–1946—it is almost as if the concept of "engineering English" had dropped off the face of the earth. This journal silence, though, is not to be construed as meaning that the teaching of technical writing slowed or stopped during the war. It did not. Business in both technical schools and arts colleges went on much as usual despite lower enrollments. Technical writing courses continued to fill and new textbooks appeared, as did revisions of older books. (Notable texts of the period were J. Raleigh Nelson's *Writing the Technical Report* in 1940 and new editions of Gaum and Graves in 1942 and Sypherd and Brown in 1943.) Sada Harbarger passed away in 1942 and was duly eulogized by the English Committee over which she had tyrannized for so long. In most ways, technical writing continued along a by now well trodden path.

Despite the lack of journal articles, English teachers were not unoccupied during this period. They were responsible, in fact, for two wartime SPEE reports that, although they had no immediate effect, were to change the course of post war engineering education in America. These were the reports of the SPEE Committee on the Aims and Scope of Engineering Curricula, produced in 1940 and 1944. The committee was chaired and directed by H. P. Hammond, and the works of his committee came to be known as the Hammond Reports. Both reports dealt with the same questions, and taken together they had an important effect.

The Hammond Report of 1940 brought together many of the fears and complaints that English teachers had been voicing throughout the previous decade in a new and powerful form. It condemned the narrow vocationalism of the engineering curriculum and put a stress on a proposed platform of "science, of humanities, and of social relationships rather than on the practical techniques of particular occupations or industries." [24] To this obviously Dewey-influenced pronouncement, the Report added a charge recommending "the parallel development of the scientific-technological and the humanistic-social sequences." These two "stems," as they became known, were at the heart of both Hammond Reports. There were, of course, already extant humanities requirements at most schools, but the Hammond Committee wanted more, and a second Hammond Report was issued in 1944, this one suggesting a complete four-year program that required 20 percent or more of the student's time to be devoted to humanistic-stem courses—mostly literature, economics, history, and social studies. There was controversy about these reports during the late forties, but during the experimental period in education after the war the conception of the humanistic stem won out gradually, and by the early fifties the arm-twisting propaganda of the humanistic-stem proponents had achieved final victory.

What is interesting about this minor struggle in the history of engineering education is the fact that neither freshman composition nor technical writing courses were claimed or championed by either side. The engineering professor who saw no pressing need for curricular changes viewed composition courses as service adjuncts to his activities, not important to fight for, and the humanistic-stem supporters did not see writing courses as humanistic enough to be included under their rubric. As Paul Fatout said in a 1948 article on the growth of the humanistic stem, ". . . composition is not considered a legitimate offshoot of the humanistic stem." [24, pp. 715–716] There seemed to be no niche for technical writing in the controversy.

THE POSTWAR TECHNICAL WRITING BOOM

In spite of the lack of champions, technical writing courses continued and even expanded, especially after the end of the war. Part of this expansion was due, of course, to the thousands of new students attending college on the GI Bill, but the striking growth of technical writing was also in part a result of the nature of WW II, the first truly technological war. During six years, necessity had mothered thousands of frightful and complex machines, and the need for technical communication had never been greater. (In 1939, British officers were ordered to prepare for the war by sharpening their swords—an eloquent example of how much technology had changed the world by the time of Nagasaki six years later.) Technical writers were in great demand during the war, for each new airplane, gun, bomb, and machine needed a manual written for it, and the centrality of the lucid explicator of technology was obvious as never before. As Jay R. Gould wrote later:

> WW II is an important date for the technical writing profession. . . . Reports had to be written for the men and the women who were inventing the machines and the electronic systems . . . much more importance was given to the technical writer, a man or woman who spent all of his time in communicating. . . . The need was so urgent that technical writers entered the profession from many sources [25].

For the first time, technical writing was more than an adjunct function of some other activity—it was a job in itself.

After the end of the war, technical writing finally became a genuine profession as wartime technologies were translated into peacetime uses. The giant technological corporations—General Electric, Westinghouse, GM—opened separate departments of technical writing after finding that it was no longer cost-effective to pay engineers both to design and write. The technical writing and editing profession became more aware of itself during these years, but in spite of these changes few colleges offered technical writing majors or structural changes in technical writing courses. Schools seemed to ignore the changing conditions of the field, and when the journals began to print technical writing articles again after war's end, the articles had subtly changed focus. Now they dealt with tasks and techniques within the teaching of technical writing rather than being concerned with the status and conditions of the teaching. It was during this time that the first "modern" technical writing articles were written and published, but what the profession gained in techniques it lost in self-awareness.

The postwar era was a demanding time for teachers of technical writing; the demand for their courses rose dramatically as the colleges were deluged with returning veterans after 1945. This was, as Alvin Fountain put it in a retrospective article, "the frantic era of the GI Bill, the quonset hut, the barracks classroom, and the tar paper apartment, infested by returning veterans armed with wives and children, a bunch of common sense, and a serious purpose." [26] Teachers tried to cope as best they could with this population explosion in their classrooms.

This period brought more complexity as well as more students to technical writing, and the late forties saw further expansion of the number of forms taught in typical courses. Initially, of course, the report had been central to courses in technical writing; only gradually had business letters been added, and before the war the technical article became a fairly common form as well. By 1951, however, these simple and basic forms had been heavily supplemented and diversified. A report of common forms taught in

that year indicated that at least six different report forms were widely taught, and correspondence forms often proliferated until more than ten letter types were taught [27]. As might be expected, manual-writing also became a popular skill to learn in post-war writing courses. This was partially a result of the military influence of the war, but it was also due to the increasing number of technically-based consumer products America was turning out.

A NEW PROFESSIONALISM

The decade of the 1950's saw technical writing "grow up," assuming the essential form we know it in today. The profession of technical and scientific writing grew and matured during this period with the foundation of the Society of Technical Writers and the establishment in 1958 of the influential *Transactions on Engineering Writing and Speech* (now *Transactions on Professional Communication*) of the Institute of Electrical and Electronics Engineers. During the fifties the importance of the profession of technical writing became apparent to industry, and colleges gave more serious consideration to turning out trained technical writers. The programs at MIT, the University of Michigan, and at Rensselaer Polytechnic Institute assumed during this decade the leading place they still have, and in 1958 RPI established the first master's degree in technical and scientific writing in the United States.

On most campuses the problems that had always plagued technical writing programs continued as usual, but in spite of them there was a continuing refinement and sophistication to the courses being offered [27, p. 176]. Around the mid-fifties the humanistic-stem requirements that had been so heavily cried up during the immediate postwar era began to be replaced with technical writing requirements at some schools; this was largely the result of pressure from the engineering faculty and the continuing complaint of industry that new graduates still could not write well [28, 29]. By 1957, nearly all colleges offered a technical writing course, and 64 percent of engineering schools made such a course a requirement during the junior or senior year [30]. The courses that were being required were often more carefully planned than technical writing courses had been in the past, and experimental methods of teaching became much more common during this period. The most successful experiments of the fifties were probably the cooperative courses that were team-taught by English and engineering teachers [31].

Textbooks throughout the fifties were still largely derivative of one another, but several stand out as being particularly popular and important. Joseph N. Ulman, Jr., and Jay R. Gould's *Technical Reporting* of 1952 was a conservative textbook that concentrated on the report [32], but its completeness has made it popular for over twenty years. Ulman and Gould represented a clear bridge to the traditional textbooks of the thirties, and many of the texts of the fifties followed its conservative lead. In 1954, however, there appeared a textbook which was not only extremely popular in its own time but which is arguably the single most important postwar technical writing text: Gordon Mills and John Walter's *Technical Writing* [33]. Mills and Walter had begun working together in the late forties, and they determined to try to reinvigorate technical writing instruction by bringing it closer to the businesses and industries that actually used the forms that were taught. Mills and Walter conducted a survey of over 300 actual technical writing situations in industry, and from this survey came a number of changes in the approach that informed their textbook.

As Walter explained in 1973, two of the most important assumptions that he and Mills had gleaned from their survey had been these:

1. A rhetorical approach rather than the rigid "types of reports" approach that most texts used was best. Most reports are made up of several common processes: definition, description, explanation of process, etc.
2. The only good criterion for technical writing is "does it work?" This indicates that in technical writing as well as in other rhetorical forms, the writer-reader relationship is most important [34].

Technical Writing reflected these assumptions and went on to be the most popular and paradigmatic text of the fifties, pointing the way to a new rhetorical approach to technical writing that was to revivify what

had been in danger of becoming a sterile and mechanical course [35].[1]

Mills and Walter were not alone in their concern with creating a sense of reader-writer relationship in technical writing instruction. A growing awareness that audience considerations had long been scanted in technical writing was one of the important developments of the 1950's. In a prescient article in the *Journal of Chemical Education* in 1951, James W. Souther mentioned this new awareness:

> . . . more and more, writers in industry are becoming aware of their readers' interests. They are placing conclusions, summaries, and recommendations at the beginning of the report because the administrators are most interested in such material. . . . The more widespread use of such devices as statements of purpose and background . . . is ample proof of the writer's growing awareness of the reader [36].

J. H. Wilson blasted college technical writing courses in 1955 for their traditional dismissal of audience considerations in the much discussed article Our Colleges Can Teach Writing—If They Are Made To [37].[2] And in 1959, Joseph Racker presented his influential concept of writing to audiences with different levels of technical expertise in his essay Selecting and Writing to the Proper Level [39].

Another important change that the fifties and the early sixties saw was the expansion of technical writing into fields other than engineering. Other applied sciences had long existed at many colleges, but only during this period did departments of agriculture, architecture, chemistry, pharmacy, even home economics begin to send their students in any numbers to technical writing. The course began to gain campus-wide recognition as a useful, no-nonsense addition to the curriculum of any serious student. Textbooks soon reflected this broadening of audience; Theodore Sherman's *Modern Technical Writing* of 1955 claimed that it was "appropriate to a wide range of subjects so that any technical writer, regardless of his field of specialization, will find the help that he needs." [40][3] At this time, too, we find the first published mention of technical writing courses built around a single long project with a series of check-in assignments preceding the long report, a course arrangement that was to become widely popular in the sixties and seventies [41]. Courses began to consider graphic presentations as well as verbal ones, due mainly to the effect of the Iowa State technical writing course, which provided a successful model [42].

BREAKTHROUGHS AND PROBLEMS

By 1959, new textbooks were appearing in such profusion that even to list them would take too much space. Many technical writing texts from the late fifties are still in print (since the mortality rate for technical writing textbooks is still much lower than that for any other sort of composition text), and as the fifties drew to a close, more and more texts began to copy the rhetorical approach of Mills and Walter and the general-coverage approach of Sherman. But in spite of these successful new texts and the experimental advances, technical writing still had problems. Although technical writing had by this time a long and honorable history and was obviously in English departments to stay, it got as little welcome from literary departments in 1959 as it had in 1929. Still considered a low-level service course, technical writing was still assigned to graduate students and instructors.

After Sputnik was launched in 1957, an alarmed America began a war of technology with Russia that was to last into the early seventies, and as the sixties opened there was a serious shortage of technical writers in industry. Most English majors still saw technical writing as hack work and most engineers could do better if they remained specialized; as a result, industries engaged in bidding wars for those few technical writers extant. The Society of Technical Writers grew quickly and went through several name changes, emerging as today's thriving and influential Society for Technical Communication. As a group, technical writers advanced greatly in both pay and prestige during this period [43].

On college campuses, however, things were not so smooth. The 1960's were a time of disturbance and change for technical writing instruction as for so many other elements in American culture. Technical writing courses were struggling to define themselves; technical writing teachers were wrangling over what their jobs should entail; technical writing students

were getting objectively more intelligent but were fewer and fewer in number as the decade proceeded. It was a confused time for American colleges and for technical writing instruction, but it was a period that prepared the ground for the great leap forward that was to come in the seventies.

A sort of critical self-examination and desire to define technical writing itself was an important element of the intellectual effort of technical writing teachers during the early and mid-sixties. As early as 1954, Mills and Walter had stated in the preface of their text that "nobody had ever seriously explored the concept of technical writing with the purpose of trying to say exactly what technical writing is." [33, p. vii] In the sixties, that investigation was taken up by a number of teachers. Robert Hays investigated the linguistic nature of technical writing in 1961 in a widely reprinted essay entitled What Is Technical Writing? [44]. W. Earl Britton, in an article in *College Composition and Communication* in 1965, wrote what is probably the most comprehensive early definition of technical writing, defining it by subject matter, linguistic nature, thought processes involved, and purpose. Britton's conclusion was that technical writing is defined more than anything else by "the effort of the author to convey one meaning and only one meaning in what he says." [45]

This interest in the ultimate nature of technical writing was matched in the sixties by an awakening interest in the process of teaching it and the methods available for doing so. The first steps in the direction of empirical research into technical writing and the teaching of it were made during this period; for the first time, researchers were gathering and analyzing facts about technical writing in a scientific manner, obtaining results and conclusions that could not be dismissed as mere opinion. Several important early experiments were Harry E. Hand's 1964 study of the relative seriousness of different sorts of errors in technical writing papers and Richard M. Davis' massive investigation of the efforts of variables in the writing of a technical description in 1967 [46, 47].

In the midst of this growing professionalism and increasing self-consciousness, however, technical writing courses were still beset by the same old problems that had always dogged them. The ascent of literary studies throughout the sixties meant that the age-old battle raged on between those who wished to teach technical students to write and those who wished to teach them to read and appreciate great literature. Through the sixties many technical writing teachers continued to be graduate students and lower-level faculty members who had been dragooned into technical writing and whose primary interests remained literary studies. This split between interests and assignments came out strongly at a CCCC workshop on technical writing instruction in the early sixties, which was reported (rather ironically) thus:

> That this (technical writing course) is frequently thought of as a "service course" was recognized. Several expressed strong disapproval of the attitude, and stronger disapproval of admitting it. A few spoke in defense of the designation. Most confessed that the fact was inescapable, though the name was nauseous. . . .
>
> Some piously professed to see an encouraging resurgence of interest in and demand for the humanities. These strains, sweet to CCCC professional ears, played softly for the duration of the Workshop. . . . The Workshop believed, in the main, that recommended reading should be largely literary rather than scientific and technical.

The cosecretary of the workshop summed up her colleagues' responses this way:

> I sense that the Workshop members believe that technical writing must be about scientific matters in which they have no training and less interest. They see themselves doing grease monkey work on physics papers for spelling errors and would die first. . . . My minority opinion is that there is such a thing as technical presentation and reading and writing about literature doesn't teach it [48].

That was indeed a minority opinion in 1961, and although it came to be more widely held over the following ten years, literary studies continued to be the main interest of most technical writing teachers well into the seventies.

In terms of course content, the sixties were not a time of major change; the content and form of the reports and other forms traditionally taught continued to evolve as it always had, but only one new and impor-

tant form emerged as a result of the expansion of the field of technical writing that the fifties had brought: the proposal. During the late fifties and early sixties, it was estimated that industry spent in excess of one billion dollars per year on the writing of proposals, and the importance of this new form soon became obvious to the writers of technical writing texts [49]. The first textbook to seriously treat this form was published in 1962: Seigfried Mandel and David L. Caldwell's *Proposal and Inquiry Writing*. The book was popular and influential, prompting a reviewer to note that "At long last another relatively new and lustily growing American industry is beginning to have its folklore committed to writing . . . the 'technical-proposal generation' industry." [50] The proposal as a technical form quickly spread to all texts, partially because of the influence of Mandel and Caldwell, but also due to the influence of the second edition of Mills and Walter, which featured the proposal.

RETRENCHMENT AND A NEW SENSE OF IDENTITY

As the sixties drew to a close, and well into the early seventies, there was a serious drop in the number of undergraduate students enrolled in engineering programs. In fall 1968 there were over 239,000 undergraduate engineering students, but by fall 1973 this number had fallen to fewer than 187,000—and this in a time of skyrocketing general enrollments [51]. Enrollments in technical writing classes shrank accordingly, with the result that fewer unwilling conscripts were forced to teach the course. Still, though, many technical writing teachers were merely time-servers as the seventies opened. In a well known experiment in 1970, Juanita Williams Dudley complained about the character of many technical writing classes in tones that are by now familiar: "Frequently the technical writing conscript regards his assignment as a humiliating, dehumanizing hairshirt that must be endured until advanced degrees and seniority confer upon him enough power to bargain for courses in literary criticism and creative writing." [52]

But a new day was dawning for technical writing instruction. Due in part to declining enrollments in courses, a solid core of committed technical writing professionals was forming by the late sixties, a growing number of teachers who considered technical communication their primary area of interest and expertise. In 1970 the *Journal of Technical Writing and Communication* was started, a journal which quickly became the most respected organ in the field of technical writing instruction. The journal reflected an ever-increasing sense of pride and self-consciousness on the parts of many experienced technical writing teachers who had served faithfully through the "lean years." Tools became more sophisticated; in 1971 Stello Jordan and his associates published a two-volume *Handbook of Technical Writing Practices* that was called "the most complete and sophisticated technical writing guide ever published . . . a true and important picture of the many-sided profession of technical writing, and an impressive, diversified explanation of why and how technical information is communicated." [53] In 1973 the Association of Teachers of Technical Writing was formed, and their journal, *The Technical Writing Teacher*, began publication in that year. Though early issues were somewhat crude, the journal underwent marked improvement throughout the decade and now ranks only behind *JTWC* in the opinions of many technical writing teachers.

Finally, in 1974, technical enrollments began once again to rise, and by the late seventies they were going up at a rate of more than 10 percent per year at a time when general college enrollments were static. As the demand for courses in technical communication grew during the seventies, the demand for literature courses fell. Soon many chairmen of English departments became uncomfortably aware that the only thing supporting their sparsely populated Milton courses was the credit generated by the quondam poor relation, the Technical Writing Division. The Modern Language Association, which had for over fifty years refused to recognize technical writing as a legitimate function of English scholars caved in during the midseventies and gave technical writing belated recognition in 1976, when the first technical writing panel was presented at an MLA convention.

This demand was partially due to one thing that had not changed: the need for technical communications specialists in industry. A survey during the late seventies showed that over 50 percent of an engineer's time was spent dealing with writing, and over 85 percent of professional engineers polled said that a technical writing course should be required of all technical students [54]. More and more departments,

some of them only quasitechnical, began to require a technical writing course for their students as the good reputation of these courses became more widely known. As John Walter put it in 1977,

> The widespread emphasis on technical writing (coming primarily from students, I think) has led to considerable growth in the number of schools offering courses in technical writing and to increased enrollment in those schools which have offered the course for years. . . . We've come a long way, and more and more departments are compelled to recognize that technical writing is a legitimate concern of conscientious teachers, and one which must be rewarded when teachers do a good job [55].

Technical writing teachers were not always rewarded by their departments, but many found freedom and credit in the 1970's that had previously only been dreamt of. Their courses were crowded, and students had never been so eager to learn. Teachers of technical communication began to be tenured and promoted on the basis of their skills and publications within the field, a situation that had been rare prior to the seventies. Many found lucrative sidelines in consulting for industry, and such consulting nearly always rebounded to enrich the technical writing classroom with new insights into the contemporary world of industry. Each *MLA Job List* brought news of more and more tenure-track positions specializing in technical writing. Professionally, it was a satisfying decade.

Textbooks during the seventies grew ever more sophisticated and began to appear in versions aimed at two-year as well as four-year colleges. Old favorites such as Mills and Walter and Houp and Pearsall continued to sell well, but they were supplemented by a new sort of more rhetorically based text, exemplified by Andrews and Blickle's *Technical Writing: Principles and Forms* and Lannon's *Technical Writing*. Perhaps the most influential—though not the most popular—text of the decade was Mathes and Stevenson's *Designing Technical Reports,* with its elegant audience-analysis procedure and its determined investigation into the purposes behind technical writing. A technical writing handbook appeared in the late seventies, giving teachers and students easy access to technical terms. It can truly be said that the seventies brought technical writing instruction to a state of efficiency and productive professionalism it had never known before.[4]

As the 1980's open, technical writing is not without problems, but its prospects have never been brighter. There are still arguments being made that the technical writing course should be taken out of the hands of English teachers, but these arguments are as old as technical writing instruction itself and will likely prove no more effectual now than they were in 1920 [56].[5] Technical writing scholarship is thriving, and there is a healthy tone of innovation and skepticism in the essays found in today's technical writing journals; the received wisdom is being tested against new situations and needs as never before, and the field is more vital than ever because of it. It now seems likely that technical communication will be an acceptable field of study for English graduate degrees in many schools by the end of the decade. The field has generated its own patriarchs and scholars, and some English departments have already begun to trade heavily on their technical-writing fame. There is finally evidence that many colleges see and appreciate the dedication of their technical writing staffs, and the technical writing division is no longer the repository of callow youths and second-raters that it once tended to be. In general the prospect is excellent for both teachers and students of technical writing. We have come a long way from 1939, when teaching technical writing was called "professional suicide," and, we can say with pride, an even longer way from 1915, when technical students' papers could be "described only by the word 'wretched.'" It has been a long road, but one well worth the traveling.

NOTES

1. See for instance the complaints in Morris Freedman's Technical Writing Anyone? [35].
2. The problem was also addressed in John I. Mattill's Writing as Communication: The Engineer Must Learn How to Reach His Constituents [38].
3. Much earlier, Sada Harbarger had tried with some Ohio

State colleagues to expand the potential audience of technical writing texts with a 1938 textbook, *English for Students in Applied Sciences*. The profession was clearly not ready for it at the time. It bombed.

4. Special thanks to Fabian Gudas and Barbara Sims of Louisiana State University for sharing with me their experiences of teaching technical writing during the period 1945–1980.
5. This argument was most recently resurrected in J. C. Mathes, D. W. Stevenson, and P. Klaver, Technical Writing: The Engineering Educator's Responsibility [56]. It brought, predictably, a rash of responses from English teachers and no action at all from engineering teachers.

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