ENGLISH FOR ENGINEERS

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An examination of the catalogue of almost any college or school of engineering indicates that the course consists of a successive and progressive line of theoretical subjects. This successive line of theoretical subjects and other correlative ones, when pursued for a term of years, is supposed to furnish a young man with an education which should make him a successful civil, mechanical, electrical, or other specialized engineer.

The point is often raised whether this course of training accomplishes its purpose, or does the great school of experience furnish the necessary training for the really successful engineer. The most natural verdict, viewed from the standpoint of results, is that it is a combination of the two. What can the college or university do to make its share more intensive so that success may be more readily obtained? The cry has been raised that the engineer is not accorded his proper share of recognition in the world. The doctor, lawyer and other professional man seem to have a royal road to recognition compared with that of the engineer. One wonders why. Is it because the engineer's accomplishments are less notable? The primary reason is that modern engineering is a product of the recent century. The older professions have long realized the need of cultural study for the members of their professions. These cultural studies have enabled the older professions to force recognition of their accomplishments.

It is recognized today that the average engineer lacks cultural training. He is really put through a hot-house of engineering training and the result is that the employer of graduate engineers finds something vital lacking in his employee. If he is a careful, patient employer who wishes to realize on what appears a half bad investment, he studies, coaches, pets, molds and reshapes the young man, and after much time, expense and labor, finally reaps the benefit of a good engineer.

As examination of the alumni register of any engineering college reveals rather startling information. Instead of the majority of the graduates following their strict, theoretical training, and becoming engineers in the sense of being inventors, creators, designers of new and novel things, they are instead salesmen of cement, machinery and implements; managers, superintendents and directors of mills, water works, electric light, gas, telephone and kindred public utilities. What are the duties of these directors, managers, superintendents and sales managers?—nothing more than technical business men—a thing unheard of a century ago. In those days the men who went to college studied literature, science and the arts, and prepared for the ministry or literature. The man out of college preached the gospel, wrote literature or became a merchant. Civil engineering consisted of surveying only.

The last century produced the telephone, telegraph, street railway, electric light, gas for heating and illuminating; and with it arose a demand for men who were not only business men,

but who, of necessity, had to be technical men, who could understand the technical problems arising in the business. The ordinary individual who entered these businesses found he had to become a self-made engineer, or through sheer hard work had to secure in the practical school, a technical training.

There is, of course, and always will be a demand for the engineer of the type who creates and invents, but the majority of the graduate engineers finally find their way into positions which are nothing more than technical business men or directors of certain technical work. It is this feature of our life that has caused the wonderful growth and development of the engineering schools and colleges. Unfortunately the large number of the young men who take up these courses do not seem to get the proper conception of what kind of work they will pursue upon graduation. As a rule, they are sent to college on the basis that they will be the type of engineer who creates or invents.

There is something mysterious about engineering because it deals with the science and the forces of Nature, about which the layman understands very little. It is this halo of mystery which tends to bring into this work young men who are unfitted, or who, upon graduation, discover that they are not going to invent and create. Probably for the first few years they suffer some keen disappointment in not following what they felt was the ideal of a chosen profession.

As evidenced by the published alumni registers and the knowledge of the older men in the profession, at least three-fourths of the graduates are technical business men. What then is lacking in the ordinary graduate to better fit him for the profession of a technical business man?

In the early history of public utilities, if the director of a utility was called upon to explain his business to the public, to defend his rates, to defend his method of doing business, he hired a lawyer. Lawyers were acknowledged, and are acknowledged, as the grand mouthpieces of the world; they are the orators; they can talk and convince or at any rate are supposed to. Today any one engaged in engineering work realizes how fallacious is the idea of hiring or engaging a lawyer to represent any public utility in its arguments, or in its dealings with the public or the quasi-judicial bodies known as public service commissions. It takes a man, and a sane business man at that with a technical training to bring home to any public body, or to any commission, just what he is trying to do in his business for the public.

Let us take, for instance, a rate case. He is trying to earn a proper return for his stockholders who have invested their money; he is trying to furnish an adequate service to the public at a reasonable price, within the reach of all; he must of necessity maintain certain depreciation and reserve funds; there are certain factors which create overhead expense in being ready to serve; there are certain expenditures for development work. All these and many other points he must present in a clear, concise manner and his knowledge of them all must be exact if he hopes that his arguments will carry weight. To engage a lawyer to do such work as this would be useless for unless the lawyer had in some way secured a technical knowledge or education of the subject with which he was dealing, his arguments would be weak and unconvincing. Even such a

matter as franchises—the securing of them for public utilities—was formerly considered an exclusive field for lawyers. The request for this right to engage and pursue in a certain business is of an engineering nature. Today it is the engineer who pleads his cause before the city or other body of authorities for this right to do business, because this privilege of doing business invariably involves a rate and return on the money to be invested; and so many other points in the use of streets, alleys, highways and byways, that, though an attorney may assist in seeing that the rights and privileges as drawn up are in proper legal form, the making of the deal is entirely within the province of the engineer.

Another branch of engineering which has developed wonderfully is that of salesmanship. There are of course, salesmen who need no technical knowledge, who deal in commodities that require no technical knowledge, but the salesmen who handle the millions of dollars worth of supplies and machinery that are sold to the various public utilities, are salesmen who must of necessity be technical men.

I recall a few years ago that a small town desired to purchase and place in operation a municipal lighting plant. There were representatives from some of the large electrical manufacturing companies, who desired to sell the town the necessary dynamos, boilers, turbines; men who desired to sell wire, insulators, poles, conduits and other fittings. And I recall how amusing it was to see these men, who were technical graduates and were supposed to know their business, attempt to explain to this body of city councilmen, (which consisted in this case of a dry goods merchant, a hotel proprietor, a liveryman, two clerks in a tin mill, a barber and a street railway conductor) that one man's generators were better than another, because, as one man stated, "Mine are three-phase and the other man's are single-phase; therefore, the town will get more for its money," and arguments of a similar character. The most notable feature of these salesmen, as it impressed me, was that they seemed to be unable to talk; they seemed to be unable to get to their feet and tell these people, (which was as ordinary a body of laymen as you would find in most any town) just how they should go at it to start their municipal plant and put it on its feet.

I think this feature is one that is very much neglected in any school of engineering. A man makes a recitation in English that would probably shame a nine or ten-year-old school boy—just so he answers the instructor's questions—and perhaps he gets a good grade for his answers. A better study of English and then the use of this study of English in the various technical courses will result in overcoming this difficulty. Engineering students should have oratorical societies or debating societies, or they can use their engineering societies for debating engineering questions. I can think of any number of questions which can be put before an engineering society which would bring out in the students, not alone the desire to learn to talk, but the ability to talk well and to argue; and there is no asset more valuable to them than this when they get out into the world. Let the engineers debate a subject—"Shall a franchise be granted to a competing electric light company in—let us say Ann Arbor—for a term of twenty-five years;

on the promise that the new company will sell electric current at two cents per kilowatt?" This would bring out a problem that will train a man to answer any sort of a proposition of a similar character. It would also enable a man to get some confidence in his method of applying for a position. I know that to most any engineer who has been out for a number of years, it cannot help but strike him as tragic to see young men just out of college, or who have been out only a year or so, come in and apply for a position. Men who have put in years in getting an education, step into an office and state they desire a position. I have often asked a man who holds a degree in electrical engineering—"Well, what sort of a position do you desire?" "Oh! I don't know; I am a graduate in electrical engineering," is the usual reply. "Well, we are a large corporation; we employ engineers on construction work; some men like maintenance work; some men get into the auditing department, and some men get into the Commercial or Sales department. Just what would you like? Would you want to start off as general manager, or would you want to take a job where you could learn some phase of the work first?" The men often look at you sheepishly and wonder just who the joke is on; whether it is meant in a spirit of levity, or whether this conference taking place is real. It is real, very much so, and it is sad that a man who steps in to sell his services cannot do so with a well defined plan in view.

It is similar to the salesman who steps in to sell you a piece of apparatus—let us say a vacuum sweeper—and you ask him, "Well, can you pick up lint and pins with this sweeper?" and he says, "I don't know; I suppose so." Or you ask, "In time, if this motor or sweeper becomes clogged with dirt, can you take it out, to clean it, without wrecking the machine?" "Well, I don't know; I will have to ask my boss about it." It is exactly a similar situation with the young man who attempts to sell his services. This man could no more sell anyone the sweeper, though it may have merit and may have been well advertised, than the young man can sell his services, unless he can come in Mr. Prospective Employer's office and state just what he has and what he desires to sell.

Another feature of modern engineering education that must be developed is the ability to write a letter and to make a report properly. I care not where the graduate gets employment, the tendency today is for business to be handled in larger and larger units; and the more this is done, the more business is handled on what is known as a correspondence basis. A man makes a deal or sells some machinery over the telephone; he confirms this by letter. This letter must specifically and in a clear and concise way report the actual transaction.

To take an everyday fact from life, it is humorous sometimes to see an ordinary layman order a part for an automobile. He will write a letter to the factory and say that—"one of the things, or hickeys, or thingabobs that runs from the engine back to the rear end, and has little humps in it, has broken and I want a new one; I cannot find a picture in the catalogue." This letter reaches an engineer in the motor car factory, and he writes back —"In reply to your letter of a certain date, we have your inquiry with reference to a certain part for your car,

number so and so. From the description that you give us, we presume that this is the gear of the left side of your transmission. If you will advise us whether you desire this transmission set on the driving shaft, and whether you also desire the necessary key with it, we shall be pleased to ship it to you." Anyone can well imagine how exasperated the layman will be when he gets this very technical description of what he is supposed to want.

Think of the problems that come up in any technical business in ordering machinery, in ordering supplies; how aggravating it is to get correspondence from supposedly good sales managers and good engineers that fairly drive one crazy to understand. It reminds me so much of the man, who, on the telephone called a feed store, and when the man at the feed store said, "This is Jones' feed store," he proceeded to give his order. "I want ten bushels of oats, two bales of hay and a fifty-pound sack of bran." The feed man said, "Thank you very much for your order, but who is this for?" The man at the other telephone said, 'Why, for a horse, you fool! Do you suppose I want to eat it myself?" A great deal of technical correspondence often develops into correspondence of this nature.

Recently I knew of a case where an order was placed for some doors, and a bright sales manager, who had been furnished with a detailed sketch showing the size of the doors and what they were to be made of, wrote back and wanted to know what the doors were for.

This I feel is the great problem in engineering education; to add to it just these two items of developing in the engineer the ability to talk, so that he can properly place his proposition or his subject before an employer utility body or prospective purchaser; and second, to develop his use of English so that he can write and confirm and describe in pure English, with just enough of his technical knowledge, so that any man anywhere can understand exactly what he is driving at. Any written subject, of course, must always take into consideration the party to whom it is going. If the engineer will develop an ability to talk and write and do so properly, his profession will soon emerge from that of the mysterious and will soon take its rightful place among the other learned professions.