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THE CULTURAL CONTRIBUTION

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THE increased stress on the cultural subjects that will contribute to the engineer's success should be regarded by all broadminded and forward-looking technical students as an indication of the everwidening scope of the engineer's interests and influence. Yet this very reaction against a highly specialized technical course toward the broadly cultural has its dangers as well as its benefits. These dangers are not inherent in the cultural subjects themselves, but arise from the engineering student's lack of recognition of their real contribution to his profession. Without getting his relationships clearly in mind, the technical student may become too intolerant of the significant and fundamental factors upon which his profession is necessarily based. He may too greatly minimize the importance of the scientific fundamentals which underlie applied science—engineering—and underrate the value and the necessity of the advanced scientific courses in his particular branch of engineering which offer him the opportunity to gain familiarity with some of the broad yet specific aspects. Yet through this slight specialization which the technical student gets in the introduction to special study which the advanced technical courses in laboratory and classroom afford, he acquires knowledge of underlying principles applied to definite problems, and familiarity with approved practice. The resultant power lessens the labor later on when the student in the practice of his profession must adapt his generalization—his theory—to the demands of a particular project.

The engineering student, however, fired by the vision of what his profession can contribute by "adapting the forces of nature to the use and convenience of man, and organizing and directing human activities connected therewith," and swept away by the realization of what he needs in the way of training and background in order that he may take his rightful place in his community and in the nation along with men of other professions, may, almost before he is aware, depart too far from those peculiar and particular studies and thoughts which are at the base of the very qualities that should be his individual contribution to his community and to his nation. For there are certain things which the engineer because of his study and training in applied science, alone can offer.

It stands to reason, of course, that in acquiring the qualities which give the engineer his distinctive characteristics, he should have to waive temporarily the study of some very desirable and valuable lines of thought. Yet just because, for the time being, he must forego training in certain things which men in the other professions seem to possess and profit by is no reason why the engineer should relinquish, slight, discount or disparage training in those technical essentials which are of necessity a vital, natural and inseparable part of the study of engineering. If the

student has the engineering aptitude, he should not repudiate or uproot those interests which are an integral part of his own profession, and by means of which he can best succeed in engineering. Without weakening his technical foundation, he should graft on the strong, flourishing parent stock those qualities and those studies from the other professions which will enrich engineering. Engineering, as one of *the* professions, should not, however, lose its identity or its individuality. The engineer, therefore, who scrutinizes closely the course of training which has been mapped out for him during his stay in college, and who chafes under what he considers its limitations and shortcomings, needs to consider whether he is basing his adverse criticisms on a keen and searching analysis of the strong and the weak points of his future profession, or whether, wearying of some of the necessary routine in the study of any profession, he is superficially judging and drawing hasty inferences because he cannot immediately and definitely see the results of training in the fundamentals of engineering.

English is a case in point. The desirability of more English for the engineer is being stressed on every hand. The engineer, it is said, needs English for his professional success—for practical purposes. He does. But he must not get the idea which sometimes seems to prevail in the minds of some engineering students that increased facility in using English will make him capable of gaining his point at any price. That is, that he can by a study of the methods of presenting ideas slide over the underlying thought, and display to the mind of the reader or listener only the favorable aspects—only those which will aid him in getting his end irrespective of the reliability of the idea. English study should not be for the purpose of exploiting plausible ideas whose ethical values are doubtful. English for the engineer should be a means of aiding him in presenting accurately, honestly and unequivocally his facts, figures and conclusions. Indeed, in the presentation of his thoughts, he should show the same scrupulous honesty that he must show in the design and construction of his bridges, machines, and buildings.

If the engineer makes the study of these inexact sciences, the cultural subjects, another means of testing out his power of analysis and keenness of penetration, he acquires additional skill in getting at basic facts. This skill in accurately determining the basic facts even though they have not been reduced to formula will be of inestimable value to the engineer later on when unanalyzed ideas come to his attention. Always he appreciates the effective presentation of ideas. If a piece of writing is not strictly technical and discusses facts and figures with which his special study has not made him thoroughly familiar, he is likely to be thrown off his guard by neat choice of colorful, figurative words and by a writer's

power over his method of handling his sentences, his stress, his skill in the technique of writing. The technical man, often very naturally, thinks that because an idea is smoothly, and emphatically presented, it ought necessarily to follow that the underlying idea must stand the acid test. Thus, frequently he is the prey for unscrupulous advertisers and promoters with their wildcat investment prospectuses, plausible and seemingly innocent sales letters, impossible self-training schemes, and exaggerated announcements of all kinds of reading matter, professional and cultural. In fact, he is especially vulnerable through the literature on any project if it is attractively presented and plausible.

The engineer, therefore, should not dissociate himself entirely from the strong points of his profession, but should use the methods which he has developed and strengthened through grounding himself thoroughly in engineering fundamentals. With this background of technical training, he goes into the study of broad and enriching cultural subjects, if he but recognizes the fact, with splendid equipment for penetrating beneath the form in which the idea is wrapped to the kernel of truth. The demands of science for accuracy, analysis and judgment have been such that, if he uses his cultural study rightly, he can develop for himself individually standards with which he can later measure, to some extent at least, the relative value of form to subject matter. The engineer must transfer to his cultural subjects the same critical power of analysis and accurate judgment and close thinking that he applies to what he considers his professional ones which deal largely with facts and figures. He must construct the vehicle for his ideas as carefully and as permanently, and demand the same careful and permanent construction in the writing in others as he expects of himself and of others in the making of an engineering structure—a bridge, a machine, a building. Though often not so apparent or certainly not so swift-acting, the results of unreliability and of failure in English are as definite, far-reaching and final, and discredit the builder as seriously and completely as if his bridge had fallen, his boiler exploded, or his building collapsed.

Carrying this idea further into history, economics, political science, it would seem to follow that the result that a technical student ought to expect from cultural courses is the gaining of the fundamentals of individual judgment on the written presentation of an idea—to recognize how exactly it gives the thought and how free it is from ambiguity. In other words, the engineer ought to develop means of making sure that the written presentation does not promote unless it can follow up the promotion with the offer of fair and honest and lasting returns for energy and money invested.

The engineer should not separate his cultural returns from his technical returns and make them war upon each other, but he should harmonize them and make the broader, the cultural, enrich his profession. One learns how to play a game first by following the definite rules that are laid down for anyone who may want to play. In the beginning, he must abide closely by the rules, but after he has mastered the general rules

and gained control over the fundamentals of form, he can make himself superior to the average player by adding those individual qualities to his game that will give the championship. The right training in engineering does not mean the casting aside of all the so-called technical subjects for the cultural ones, but of maintaining the right relationship between the two—keeping the proper sense of proportion and appreciating how the cultural will enrich and deepen the engineering profession by making the men who invest in cultural studies with a clear conception of their individual responsibility better engineers.
