

not been witnessed any place else in the world. Even persons who live in those parts of the United States where the states are large and hence are accustomed to traveling great distances, do not realize the size of the United States compared with other countries. It is not an exaggeration to say that if Texas were a lake and France an island, France could be dropped into Texas and there would be room enough to sail out of sight of land on every side. Montana is bigger than the German Empire was before the War.

We have had, then, the combination of several important factors which have made the organization and rapid growth of schools of business a logical consequence. We have made a very fine record in this country in the technical processes of production and in this phase of our industrial development the technical schools played no mean part. But the large business unit brought with it many difficult problems in accounting, organization, administration, finance, personnel problems, and marketing, to mention but a few of the problems created by our success within the realms of production. But what do we gain by being highly efficient in the technical processes of production, if we are inefficient, for example, in such matters as administration, management, financing, appreciation of personnel problems, and marketing?

If the foregoing reasoning is sound, it is no mere temporary fancy that has brought into existence so many schools of business since the year 1900. These new schools must make their contribution toward the solution of many of the problems which the great success of the earlier technical and engineering schools helped to produce. And it may be added that industrial and commercial conditions have become so complex that the future engineering graduates and the graduates of the schools of business ought to know enough about the problems in each other's fields to work intelligently together.

In an attempt to answer the question which has been used as a title for this discussion, it may be helpful to raise a number of other questions.

Is it not generally agreed that engineers ought to have at least the fundamentals of economics and accounting? Surely the investigation which has been carried on by the Society for the Promotion of Engineering Education answers this question concerning economics in the affirmative. Only

eighteen per cent of the engineering colleges have reported that they do not require economics. It is probably true, too, that students elect economics in many engineering colleges which do not require it.

Is it not also true that students who are pursuing courses in business would be benefited by taking a sufficient amount of work in the fundamentals of engineering to enable them to work intelligently with engineers? There has been no survey made on this point. There have been some conferences of economists and engineers on this subject, and while no definite action was taken on the matter, a committee reported, at one of these conferences, the following suggested curricula, which they believed should be given serious consideration for students of both engineering and commerce.

First: that a minimum number of hours in business training, to be determined by the committee, be required in all engineering courses;

Second: that a curriculum providing for a minimum of fifteen to thirty units in business economics be incorporated in all engineering courses and offered on an elective basis;

Third: that a curriculum in commercial or industrial engineering subjects be offered in the School of Commerce with degree to be given in that school;

Fourth: that a five year combined engineering and commercial course be prepared.

One engineer has said that not many years ago the engineer who was called upon to exercise judgment as to the feasibility of undertaking a certain project needed only engineering skill; that he could rely upon his common sense to determine whether it was practicable or advisable. This same authority is of the opinion that no such course is now open to the engineer; that the complexity of the economic and business factors are such that he can no longer discern the vital tendencies with the naked eye as it were. There would appear to be no doubt that the engineer needs both a business microscope and a business telescope to assist him in the elimination of serious errors. This does not mean that he needs to be an expert in the field of economics and business, but it does mean that he should have some perspective of the problems which will arise, so that he will be in a position to know when to call for assistance

from those who have expert knowledge of these two fields.

The same observations can be made with reference to the graduates of schools of business. Surely those who are to have important responsibilities in the business world must have sufficient foundation in some of the subjects which are basic to the engineer's profession to enable them to work intelligently with the engineer.

While no one will dispute the desirability of broadening the vision of the graduates of these two schools, just how are we to accomplish it? It would appear that mental inertia has prevented revision of the curricula, though few will undertake to support an argument to the effect that it should not be done. Our zeal to build up separate colleges has been very strong. Students enter these colleges and after they have been able to obtain a certain number of credit coupons, and accumulate them as the zealous shopper does trading stamps, they are presented at the administration offices of the educational institution and the student receives a diploma. But the question may very well be raised whether he leaves with an education. In too many instances the students' activities have been confined too closely to the water-tight compartment of one college. We appear to believe, that since this is an age of specialization, we ought to carry him as far as we can within a given field.

Even if we assume that this is an age of specialization and that it is, in part at least, the function of higher education to produce specialists, the question may be raised whether we are succeeding. In recent years the definition of a specialist, as one who knows more and more about less and less, is probably fairly close to the truth. A little reflection will show, however, that a true specialist is one who knows his subject from all important angles. This means, then, that the graduate engineer must know something more than the technical side of his profession. Lack of appreciation of the importance of certain fundamental problems of economics and business might mean the complete collapse of some project which, from a purely engineering point of view, was without a flaw.

If the implied reasoning in what has been said is sound, we have reached the point where the border land field between the schools of engineer-

ing and business should be cultivated with the greatest care.

As one interested in business education, I care very little whether a man takes a diploma from a school of business, or from a school of engineering. It is idle to waste our time arguing that the future executives are to come from the new schools of business, or from the old schools of engineering. Anyone who has given any serious study to the industrial and commercial development of the United States within the past generation knows that the future executives will come from both of these schools. But since the world is not so accommodating as to present to these graduates problems which involve only engineering problems, or business problems, nicely segregated and all ready for the laboratory solution, it would seem that the border line fences between these colleges ought to be provided with a series of gates, so that students may pass from one field to the other to such an extent as will enable them to obtain a broad view of the problems of their own field and to leave our universities with an education as well as with a diploma.

Assuming, then, that we should broaden out the offerings for students in both colleges, what problems in curricula reconstruction does such a theory of education present?

Some institutions have attempted to answer this question by setting up certain combination courses of engineering and business to which but four years are devoted in the two fields. These curricula are given such titles as Engineering Administration, Commercial Engineering, etc. The limits of this paper will not permit a discussion of the merits of such curricula. Attention is here directed to what may be done for the student who desires to complete the regular curriculum in, say mechanical or electrical engineering, or one of the regular curricula in business.

It would appear that if we are to give the graduates of such curricula any perspective of the problems which they will confront after graduation, both colleges must curtail the number of advanced specialized courses to make room for some fundamental courses outside the student's major field. This for the great group of undergraduates will be a gain. It is impossible to give to a student through highly specialized courses an adequate substitute for actual experience. Neither the