

engineering school nor the business school can accomplish this feat. The laboratory of actual business and industry can never be reproduced within the university. If we had it all nicely set up on Monday, it would be out of date by the week end.

The elimination of some of our advanced specialized courses, for undergraduates, then, and the substitution of fundamental courses from the border land field ought to equip our graduates to teach themselves when they face the problems of actual life. If the engineer, for example, has not had a course in accounting, the gap in his intellectual spark plugs will be too wide for the spark to bridge it, and he will therefore be unable to bring about the effective correlation of theory and practice which would be possible if he had had only the elements of accounting.

We sometimes hear engineers say that they do not want engineering students to spend their time on the courses offered by a school of business. They contend that that is a line of study which the engineer can pursue on his own account after graduation. They argue, too, that mental discipline is best obtained through such studies as physics and chemistry, which yield an exact result and give the student something definite for which to strive. There is danger in pressing such reasoning too far. To repeat what has been said, the world is not so obliging as to present problems to the graduate engineer which can be solved in an exact manner. Very frequently problems involve a judgment as to tendencies and while it is not possible to secure a result that has mathematical accuracy, it often means success or failure to have exercised the proper judgment as to the probable tendency or to have been unable to do so.

In addition to the elimination from the undergraduate program of some of our advanced and highly specialized courses, it will be necessary in some instances for each college to offer to the students of the other college courses designed especially for those students. There will be some objection to this on the part of some of our faculties. Some accountants, for example, will say that accounting is accounting, and it is not desirable to have "accounting for engineers." Some members of the engineering faculty will want to insist on the whole list of mathematical prerequisites for certain courses in engineering, whereas a modifi-

cation of the course so as to eliminate, say one-fifth of the course content, which makes it necessary to require a number of mathematical courses as prerequisites, would enable the students in business, who had a reasonable foundation in mathematics, to take the course with much profit. Examination of some of the engineering catalogs shows that what is here suggested is now being provided. The plan ought to be more widely adopted.

The student who is looking forward to a career as a certified public accountant obviously needs more work in the field than does the engineer who wants an understanding in the fundamentals of the subject. It is also true that the student who expects to be an engineer will need much more comprehensive courses in a given field of engineering than will be necessary for the student who expects to be a certified public accountant, or to go into business. It might very well be true, then, that a differentiation could be made in the character of certain undergraduate courses which each group would pursue with advantage to both, and which would provide adequate foundation for advanced courses and graduate work.

When we turn from the undergraduate courses in these schools to the graduate offerings we encounter some difficult problems in attempting to bring about a more effective correlation of graduate study and of projects of research. If proper consideration has been given to the fundamental courses of the undergraduate curricula, it will be possible for students to broaden somewhat the scope of their graduate work. Moreover, there would seem to be some possibilities for correlation of projects of research on the part of our faculties in guiding the work of graduate students. Is it not possible, for example, that certain graduate students in engineering might do well to broaden both the selection of graduate courses and their research so as to include the economic or business side of their specialty?

The investigation of the Society for the Promotion of Engineering Education reveals the fact that engineers believe that their students should receive instruction in economics in two ways. First, by taking courses in economics taught by economists. Second, by having their engineering courses "shot through and through" with economics by their engineering instructors. Is it probable that the

second plan will succeed as it should until a larger number of engineering instructors are better trained in the economics of their fields? The same statement may be made about the teachers in schools of business in lines of work which have a close relationship to the field of engineering. Here, it would appear, arises the need for broadening the training of the graduate students of today if we are to have properly educated faculties in our colleges of tomorrow, or if we are to give them an adequate preparation for a professional or business career.

It will be necessary to make the training of graduate students in both fields to which reference has been made a major educational problem if we are to have any success with such correlation as has been suggested. At the present time a graduate student in engineering, for example, in most instances chooses both his major and his minor in the technical field, and his instruction and the supervision of his graduate study are entirely under a member or members of the engineering faculty.

It would appear, after a man has had four years of technical training in a college of engineering, that it would be more valuable in many instances if he were to give a portion of his time in his graduate study to the economic and business phases of his major interest. To do this effectively, it would be desirable to have joint seminars for such students in which two or three members from the engineering faculty and also from the faculty of the school of business would participate. To this group, a graduate engineer would make his reports throughout the academic year. He would have the benefit of the criticism of men thoroughly familiar with all phases of his investigation. It would offer an excellent opportunity for members of our engineering and schools of business faculties to become better acquainted with certain border land problems and to educate each other.

Men become "fossilized" or "old fogeys" whether they are inside or outside of educational institutions by getting into a rut. As men in our universities reach a mature age, there is a tendency for them to specialize somewhat more in their teaching and study than was the case in their beginning work, and consequently their "mental vision" suffers. They can be aided greatly by "bi-focal lens" in the form of such joint seminars,

which will give them a better vision of their own problems and also a clearer long range view of problems vitally related to their specialties.

An engineer, for example, interested in the technical problems of a given field, will have a tendency to overlook many of the vital economic and business problems involved in that field unless he is in touch with someone who is an expert in those phases of the problems with which he is concerned. It would appear that the joint seminars here proposed would bring the engineers and the economists and instructors in business in touch with one another, so that both groups would profit by the arrangement.

At the present time, no institution, so far as I know, attempts to make definite provision for such joint seminars. If anything of this sort is done, it is arranged by the instructors themselves as an additional burden to their already heavy schedules. If university administrators could see in this an educational problem of first importance, and provide that such joint seminars be a very definite part of one's university duties, it would enable our institutions to turn out graduate students in the two fields who would be much better prepared either to become members of our faculties or to accept places of responsibility in industry and in business. But it may be argued that the number of graduate students is too small in most institutions to make such a plan feasible. It may not be wise for all institutions to attempt such a program. The arrangement in a liberal number, however, would be justified, and would doubtless induce more students in both colleges to pursue graduate work. It is even argued in some quarters that it is not possible to hold the best students—men who are to be leaders—for graduate study; that only the inferior men—probably those interested in teaching—remain. It is not comforting to believe that this process of selection is taking place, but if it is, the plan which is here proposed should by all means be inaugurated in all institutions which are likely to turn out graduate students who in turn will become the instructors.

If we consider for a moment the type of training which the group of students should have who do not intend to engage in educational work, it would seem that such joint seminars, as are here proposed, would be distinctly worth while. In some instances industries and public service corporations