



"Perhaps effective counseling also might guide back into education the large numbers of able students who at present do not go to college."

# A NEED TO DISCOURAGE

The 1952 Continuing Study concentrates on students who want to become engineers. Most never reach their goal.

By STANLEY K. COFFMAN

**D**URING THE PRESENT SESSION your Congressman will be considering plans to "do something" about American education. The chances are all these plans will involve putting your money into some part of the educational system, as our way of "doing something" most often takes the form of the cure by appropriation.

The pressure will be on him to take some legislative action, and apparently the greatest clamor will be for special and liberal appropriations to that part of our educational system which trains scientists and engineers. The general feeling is that our national insecurity is somehow, at least in part, related to our failure to produce enough scientists and engineers; put our money into this, our production will in-

crease, and we can go back to our TV programs again.

What I want to say here does not deny the need for technically trained personnel. One of the most interesting results of our "1952 Study,"<sup>1</sup> however, bears directly upon this problem and suggests some things we might avoid in our efforts to solve it.

This phase of the study followed the progress of the students who entered the University in the fall of 1952 and who declared then their intent to become engineers. It shows how many graduated and how many failed, but more important it

<sup>1</sup> Conducted by the University Guidance Service, under the supervision of its Director, Dr. Maurice K. Temerlin.

shows some basic why's of both success and failure, and it tells us some things we should and some things we should not do in our efforts to improve our situation.

We have learned, for example, that we should look skeptically at any program that would invest heavily in further propaganda broadsides to encourage an interest in science and engineering. There need be little concern over the numbers of students who show an interest in these fields. In engineering, at least, the difficulty is less in encouraging freshmen to choose this field than it is in *discouraging the large numbers who do not belong in it but who think they do.*

Of the young men who entered the University in the fall of 1952, some 40 percent

indicated that they wished to major in engineering. Of those who entered in the fall of 1956, some 46 percent said they wanted to be engineers. Neither figure includes a respectable number who declared themselves "undecided," wishing to postpone the decision about major until they had experimented with some key courses like math.

If nearly half the men now enrolling want to major in this area, the answer to the demand for more successful training of engineers is not—or not any longer—in a campaign to interest more students in the glamor and opportunities of the engineering profession. We do not need the Madison Avenue approach to the problem.

On the other hand, only about 25 percent of those who come here with the idea of leaving as engineers actually reach this goal. Some, approximately 12 percent, graduate in other areas, but over half drop out of the University, in most cases without going beyond the basic or University College. Although this is actually not much different from the rate of scholastic casualties for the University as a whole, it is especially serious in an area where we are at present concerned about our program.

Obviously we are not going to raise the level of our technical achievement merely by attracting more students without being careful about the quality of the ones we do attract. It is very clear that the students who fail to make it in engineering fail because they cannot handle even the simplest mathematics.

Eighty-three percent of those who did not succeed in the program never even gained admission to the College of Engineering, and the principal reason for this was difficulty with math. Only about 20 percent of this group completed any math course at the University with a grade of "C" or higher; 25 percent of them never completed any math course at all, including Math A, which is elementary algebra and is usually offered as ninth-grade work. On the other hand, about 70 percent of the successful engineers were qualified when they entered the University to begin at the level of math expected of college freshmen by the Engineering faculty.

In this area, then, the basis for predicting success and failure is fairly easy to define. Adequate counselling, based on aptitude tests, could have made plain to those who did not succeed that they were facing almost insuperable odds in trying to become engineers. This is perhaps all it could do under a system where everyone presumably has the right to try and fail. The carnage is already having some effect in

encouraging caution among students, and full-scale professional guidance at early high-school levels or even earlier than this would take care of most of the trouble.

The high schools presently do the best they can, given the financing they receive and the pressures they have to fight—against the social prestige of a college degree and the lure of the dollar, but they need much more, and a part of the legislation to be presented to Congress provides for money to finance guidance in the school systems. This may be on a matching basis and, if it is, what the state gets from the federal government depends on what it is willing to put up from its own resources.

The cost will be considerable, but our present system is costly too. Most of the 55 percent who start in engineering and do not graduate are at the University at least one semester; some are there as long as six. It costs the state about \$600 per year for each student over and above his fees. It does not take many students to turn \$600 into a sum that has to be reckoned with in any realistic appraisal of our educational system.

Again, there is a cost that is much less immediately obvious. The unsuccessful use space and facilities that are not more than adequate for the few who will be successful. They require courses that we do not have time or money to give under the best circumstances in college. They generally slow up a tempo of learning that could be much faster, and they dissipate the energies of the instructional staff as well as their own.

All this neglects the psychological cost

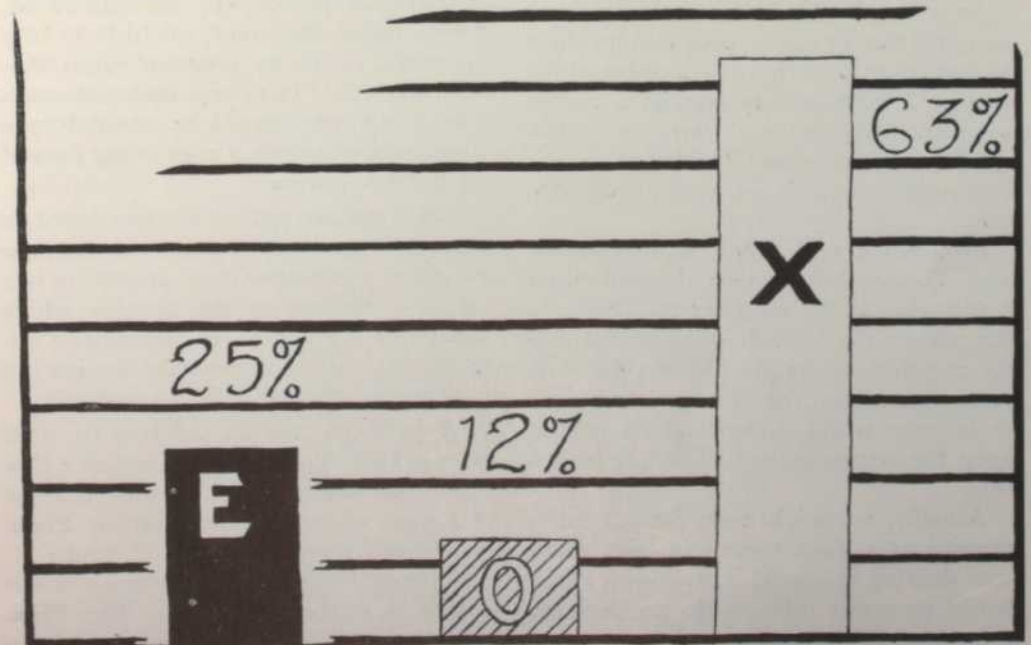
to the individual who fails, the time he has given to what was very likely to be a losing effort, and the possibility that he might have become usefully trained at a lower technical level.

If we began with a plea that the advertising for engineers might well be done a little more thoughtfully, we may close with a plea for support of any plan that will guide students into the areas which best use their talents. Aptitude testing is not infallible, but it is essential to any sort of effective educational system; freedom of choice—if it is to have any meaning—must be exercised by young people who have been given all of the information for making wise choices that we can possibly give them.

Once we know a student is intellectually equipped for engineering or any of the mathematical sciences, then if money is the way to get him there it will be money well invested. This is the practical occasion for investing in him through scholarships and other such assistance.

Perhaps effective counseling might also guide back into education the large numbers of able students who at present do not go to college. Once found, they too might be encouraged through generous scholarships, and another weakness in our educational system would be strengthened. What educational counseling cannot do, of course, is bring about the kind of reversal of values that will make studying, concentrated studying, a respected and important part of the student's high-school "experience." It can, however, give us, by its indirect pressures, a start in this direction.

Of the thousands who come to the University, wanting to graduate with degrees in engineering . . .



. . . 25 percent become engineers, 12 percent get other degrees, 63 percent never receive any degree.