

Strengthening the Master's Degree

An unhappy trend in engineering education in postwar years has been the downgrading of the master's degree. At one time this degree represented a significant advance over the bachelor's, but in recent years it has usually been awarded for the satisfactory completion of only one year of advanced course work. All too often it is nothing more than a consolation prize for those who fail the doctorate examinations.

The knowledge "explosion" quite rightly requires that more emphasis be put on graduate work. There is no doubt that the advances made in our own and allied fields must be covered in graduate study, since clearly there is inadequate time to do so in the undergraduate years. In our field the great progress made in transport processes, kinetics, thermodynamics, optimization, and separation theory should be covered in considerable depth. In related fields one may mention the use of computers for advanced problems, quantum chemistry, solid state physics, and information theory as often, although not in all cases, worthy of attention. The growth in all these subjects is such that competence can only be acquired through intensive study.

The response of the universities to this challenge has been only a greatly increased outpouring of Ph.D.'s, and this is not an answer to the problem. The Ph.D. is a research degree,* and time spent on research in a limited project in one's own field is time unavailable for broader study. Presumably, a reasonable number of students will always be greatly interested in research; the Ph.D. is ideally suited to them and will continue to be of considerable importance. It is that other group of students who wish to expand their knowledge and skills and who are not interested in research who are being neglected at present. Industry has a great demand for men so trained, a demand rather larger, as judged from conversations with industrialists, than for the Ph.D.'s.

Therefore we should be concentrating more on enhancing the prestige of the master's degree. It should require two years of course work, although a short project to advance individual development would be in order. Perhaps a new name would help; a doctorate in a named field such as *Doctor of History* has been proposed for those who do not do research and who intend to teach history on the undergraduate rather than the graduate level.† The problem is certainly not confined to our field. A great impetus would be better pay for graduates with this sort of degree. Since government supports only research with an open hand, the difficulties of obtaining financial assistance must be faced.

In engineering it should be noted also that this enhanced master's degree could be adapted, when suitable, to a greater emphasis on design, which has been the concern of many thoughtful engineering educators. Certainly this extremely important part of engineering receives all too little emphasis in many current Ph.D. programs. But probably this expedient should be only a stopgap; the advanced study of engineering design would warrant the expenditure of as much time as the Ph.D. requires.

In any case, there is a real inadequacy in most of our present graduate programs—one that is urgently in need of attention.

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* Contrary to the A.S.E.E. report "Goals of Engineering Education," the degree cannot easily be "recognized" as something else.

† E. Walter, "The Immutable Ph.D.," *Saturday Rev.*, p. 62, (Jan. 15, 1966).