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Design and Research

This title was suggested by the title of an editorial in the November, 1966, issue of the *Journal: Design Versus Research.* This seems to imply some kind of a conflict between these two functions, and with this I would completely disagree. The one complements the other. Research is necessary to develop the new correlations and data which the designers can apply.

The author of the editorial was particularly decrying the possible trend toward the splitting of engineering curricula into research and design degrees. He didn't state whether he was referring to undergraduate curricula or to programs leading to an advanced degree, but I assume the latter as I don't think that anyone is proposing such a division of the undergraduate program. It is my belief that it is both logical and desirable that there should be two paths to advanced degrees.

In the first place, the majority of chemical engineering graduates enter upon work in industry which is much more closely related to design than to research. I am using the word *design* not in the narrow sense that some attach to it, but in the broad sense of applying the existing science plus empirical art, judgment, and economics to the creation of some practical and useful result. This clearly includes what is often referred to as *development* and which is commonly, and to my mind erroneously, coupled with *research* as if the two were about synonymous. Research, whether in pure science or engineering science, is a seeking after more knowledge. In research on engineering science one usually has an application objective in mind (that is about the only thing that differentiates it from research in pure science), but the actual application is left to the development or design engineer.

If the majority of engineering graduates are going to be engaged in the practical application of existing knowledge rather than in the search for new knowledge, it seems logical that they should be given some opportunity to practice this art while in college. If they do not have this experience, they are likely to enter industry with a false idea of what engineering is and an inflated idea of what science alone can accomplish when confronted with a real problem.

In the second place, I think it is well recognized by engineering teachers that their students can be roughly divided into two broad classes: those with a strong interest in theory and application of sophisticated science and those with just as strong an interest in the practical application. Does it make sense to put both these types into the same mold? To me, it makes more sense to have two paths for graduate work and to capitalize on the interests of the two types. Let the man with a strong interest in theory follow a research-oriented program and the other, a more professional type of program oriented around design projects.

To return to my original theme, I would like to go on record favoring design *and* research rather than design *versus* research.

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