Letters

Blend of Teaching and Research

Among the recommendations reported by Bryce Nelson from the joint student-faculty consultations at Stony Brook on change in universities is one that is superficially logical, but potentially disastrous to the vitality of higher education in the country (1 Nov., p. 545). This is the suggestion that Stony Brook create two separate faculties, one for teaching and one for research. Given the sympathy of students and parents for the former, and the interest of industry and government in the latter, it was inevitable that someone would make the suggestion somewhere.

It is likely that the suggestion will be repeated and amplified many times in the future. Why? Because its adoption would ease the administrative tension that has to go with the association of teaching and research, ease the intrapersonal conflicts that pester individuals trying to balance their efforts in teaching and research, and create the illusion of greater effectiveness in both teaching and research. One can hear the arguments in favor: students would apparently gain dedicated teachers, and other brilliant but less expressive men would devote full time to exciting research. If universities were factories, if men and women and ideas were products, the notion of separating educational and research specialists could perhaps be defended. However, in universities, we cannot sacrifice the heart of matters for the sake of supposed efficiency and smooth operation.

I believe that those of us involved in university teaching and research should resist strenuously any effort to make a systematic separation of teaching and research. We should take every opportunity to speak publicly against such a change, no matter who suggests it. I have no quarrel with selective and individual separation of the two activities. Each of us strikes a different balance between teaching and research. Many of us, indeed, change that balance from time to time as years pass. Some of us devote some years exclusively to teaching, and others spend periods of time at research alone. My quarrel is with the thought that the academy for education and the institute for research should be separate in a university. We have academies where no research is done. We have institutes where no teaching is done. Both have valid purposes. The blend of the two is the unique purpose and strength of a university.

The facets of that strength should be emphasized. The similarity between interpreting the significance of research to colleagues and transmitting insight to students ought to be noted. The role that our own research plays in helping us to know what to try to communicate to students must not be overlooked. To me, the idea that one group must only teach while another group only learns is an absurd division among professors whose aim is to help others reach toward intellectual frontiers. If any line of thought is so sterile or so settled that the teacher needs no active experience in current research, it probably need not be pursued in a university. If any research is so pointless or so specialized that the results can give no insight to young scholars, it probably need not be done in a university.

Let us not forget that the man who helps develop new concepts is a man who understands them early, hence can tell others about them; in a university, we cannot afford the passage of a decade or a generation before our students can learn directly of new concepts. Let us not forget, either, that the man who tries to communicate an integrated structure of knowledge to young scholars is commonly a man who asks significant questions and seeks true insight through his own research.

To sort professors into teachers and researchers would largely dissolve the mutual support of teaching and research in universities. It is the blend of these activities in the lives of single individuals that is crucial to the existence of universities.

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Automobile Engines: Pollution and Power

Fay and Keck's letter (4 Oct.) sums up the present situation on atmospheric pollutants from automotive engines quite well, but I must take exception to the notion they convey that there is something mysterious about the factors contributing to contaminants in engine exhaust. Admittedly the chemical kinetics and intermediate reaction products of hydrocarbon combustion in piston engines are not well understood, but the principal design and operating factors that contribute to incomplete combustion, as well as the presence of lead, lead scavengers, and lubricant decomposition products, are known.

It turns out that almost everything that was done over the past 40 years to improve engine performance, such as increasing the power-volume ratio, raising the compression ratio, extending the valve overlap, increasing the crankshaft speed, and improving the resistance of engine parts to high combustion temperatures, has also contributed to contamination. Yet, I believe that we would be unwilling to compromise the present performance, reliability, and speed flexibility of the automotive engine to reduce the atmospheric pollutants issuing from the engine's exhaust. Despite the numerous gadgets proposed to cope with the problem, about the only thing that would really do the trick without penalizing performance is to go back to much larger engines with lower compression ratios and deliberately design them to run at about one-half present peak mean effective pressures and crankshaft speeds. Of course, this solution would currently be as unacceptable on economic grounds as the automotive diesel refined to eliminate its characteristic noise and roughness during acceleration.

About 20 years ago some of the then latest turbosupercharged aircraft piston engines utilizing internal cooling, direct injection, and dual valve timing (such as in the Lycoming 7755) as a function of load had the sophistication required to offset the degrading effects of high compression ratios and high piston speeds on incomplete combustion, but the amounts of tetraethyl lead to suppress knock and sodium di-bromide used in the fuel to get rid of the metallic lead deposits in the combustion space made the exhaust efflux lethal. The problem in those days was to build an engine that would operate reliably in the Berlin airlift rather than keep the