

WHO SHOULD TEACH IN COLLEGE?

Richard M. Felder  
(felder@eos.ncsu.edu)  
Hoechst Celanese Professor of Chemical Engineering  
North Carolina State University  
Raleigh, NC 27695-7905

Author's Note. The following remarks are an informal synopsis of my paper, "The Myth of the Superhuman Professor," which appeared in the April 1994 issue of the Journal of Engineering Education. For a more detailed presentation of my position and supporting references, I invite you to consult that article.

.....

College teaching is probably the only skilled profession that requires no prior training and provides none on the job: most professors begin and end their careers without as much as five seconds of instruction on how to teach. It is also the only skilled profession that does not use competence in its practice as the primary basis for advancement. Performance in scholarly research--not in teaching--is the main criterion for raises, tenure, and promotion. Moreover, besides being unprepared as teachers, most science and engineering professors have never engaged in the profession for which they are training most of their students: they were trained as academic researchers and academic research is the closest they have ever come to professional practice. The result of all this is a great deal of mediocre, irrelevant, and sometimes catastrophically bad teaching at research universities. There is also some great teaching, but it is the exception rather than the rule, and it is despite the system, not because of it.

Maintaining a high-quality research program--seeking funds, defining and solving problems, and writing and presenting papers--is a full-time job. So is doing first-rate teaching. Just stating concepts is pedagogically useless: to make the concepts comprehensible to most students, the instructor must first establish relevance and motivate interest, then imbed the concepts in webs of alternative expressions and visual representations, and finally provide examples and activities to solidify understanding. Finding a way to do all that for just one concept can take many hours, and a course contains lots of concepts.

Since there are not enough hours in the day to do both research and teaching as well as they can be done, every faculty member has to make compromises in at least one of these pursuits. For most professors, there is no real choice about which one to sacrifice. Professors at research universities who choose to focus their careers on undergraduate teaching routinely experience second-class citizenship and denial of promotion and tenure. To move up the academic ladder they must dedicate themselves to research, doing what it takes to meet minimal local teaching standards and no more.

Any public challenge to the dominance of research in the academic incentive and reward system inevitably generates a spate of rebuttals from professors and academic administrators, who argue that teaching can only be done well by researchers. Surprisingly for research advocates, they offer no evidence to support this argument: the best most of them can do is point to some professors who are good at both activities, which is like claiming that you can only be a world-class organist if you practice medicine in Africa and pointing to Albert Schweitzer to prove it.

In fact, there is no evidence. The alleged inextricable linkage between teaching and research is contradicted by both common sense and a wealth of educational research. The personal attributes that tend to characterize outstanding researchers (e.g. intensity, single-mindedness, objectivity) are quite different from those associated with outstanding teachers (enthusiasm, empathy, clarity of expression). In dozens of studies of the subject, the correlation between good teaching and strong research has been either nonexistent or, in a minority of cases, only slightly positive. (The latter result is not surprising, considering the short academic lifetimes of good teachers who are not strong researchers.) Interestingly, quality of publications as assessed by citation frequency correlates NEGATIVELY with rated teaching effectiveness, implying that the professors whose individual research is good enough to gain widespread recognition tend to be the least effective teachers. Since research recognition is what it takes to succeed in academe, students experience a continuing succession of instructors who have willingly or unwillingly chosen to do a poorer job of teaching than they are capable of doing.

Perhaps the most telling indication of the nature of the research-teaching interaction is provided by Alexander Astin in a landmark study conducted in the late 1980's. Astin accumulated data on faculty members and almost 25,000 students at 309 institutions of higher education. For each institution, he assessed the faculty's research orientation (as measured by research publications, research funding, time spent away from campus on research-related activities, and self-rated importance of engaging in research and being recognized for research achievement) and student orientation (level of interest in students' academic and personal problems, sensitivity to minority issues, accessibility outside office hours, opportunities for student-faculty interaction), correlating each orientation with a variety of measures of student performance and attitudes.

The results are striking but not surprising. Research orientation of the faculty correlates negatively with completion of the bachelor's degree, various other measures of academic performance, and student satisfaction with quality of instruction and the overall college experience. Student orientation of the faculty correlates positively with bachelor's degree completion, overall academic attainment, student satisfaction with quality of instruction, and self-reported growth in preparation for graduate school, writing skills, leadership abilities, general knowledge, and public speaking skills. Research

orientation and student orientation are negatively correlated.

The quantitative results of his study led Astin to reject the assertion that research and teaching are mutually supportive. On the contrary, he concludes that "In certain respects, the two poles of this factor [research vs.

student orientation] reinforce the commonly held notion that, in American higher education, there is a fundamental conflict between research and teaching" and that "Attending a college whose faculty is heavily Research- Oriented increases student dissatisfaction and impacts negatively on most measures of cognitive and affective development. Attending a college that is strongly oriented toward student development shows the opposite pattern of effects."

The question is, how can undergraduate teaching be elevated to its appropriate level of quality and stature at research universities? The answer is not for chancellors and deans to proclaim yet again the supreme importance of undergraduate education, perhaps creating one or two new teaching awards as demonstrations of their sincerity. Such proclamations are hollow as long as professors who do outstanding teaching and insufficient research are denied tenure while those who do outstanding research and mediocre teaching consistently receive it. Neither should we drop most academic research and go back to undergraduate teaching as the primary business of the university. While this solution holds some attraction, it is regressive. Much of the basic research that provides long-range benefits to American society is done at universities, and the future of the society depends on its continuation.

The key to a solution is provided by Ernest Boyer in his splendid monograph, "Scholarship Reconsidered." Boyer observes that the professoriate has four vital functions, or scholarships: discovery (frontier research intended to generate new knowledge), integration (interpreting and applying new knowledge to existing problems, multidisciplinary research), application (applying specialized knowledge to socially consequential problems), and teaching. He argues that while each of these functions is critical to the continued well-being of both academia and society, the present academic incentive and reward system values only the scholarship of discovery. He then proposes establishing an alternative system that makes it possible for professors to concentrate on any of the four functions at different points in their careers.

One possibility for such a system is to establish two broad pathways for faculty advancement: a research pathway and an education pathway. The research pathway would involve activity in fundamental research (discovery) and/or applied research and multidisciplinary studies (integration) and/or socially important research, e.g. in areas such as safety and environmental science and engineering (application). The criteria for advancement on this pathway would be those in effect now at all research institutions. Professors concentrating on research would be expected to exhibit superior research performance, as measured by external grants received,

publications of articles in refereed journals, research monographs, review chapters and books, citations by other authors (an excellent and currently underused criterion), and peer evaluation. They would also be expected to teach graduate and (if they wish to do so) undergraduate courses and to perform at a satisfactory level in their teaching.

The education pathway would be characterized by different expectations and different criteria for advancement. Professors on this pathway would be expected to

1. Develop and utilize innovative teaching methods, problems, projects, experiments, and case studies, and report these developments at meetings and conferences (e.g. annual and regional ASEE meetings) and in publications in the education literature;
2. Write undergraduate textbooks;
3. Implement measures to increase the relevance of the undergraduate curriculum to professional practice;
4. Carry relatively heavy undergraduate teaching loads, including teaching most undergraduate laboratories and (in engineering) design courses;
5. Demonstrate superior teaching performance, as measured by end-of-class student evaluations, retrospective senior and alumni evaluations, and peer evaluations.

Of all full-time faculty slots in a department at a research university, 75-85% should normally be allocated to research-pathway positions and 15-25% to education-pathway positions. The cost of this policy to the department would therefore be minimal. Moreover, as discussed below, the long-range effect of the policy could be an increase in both research productivity and departmental revenues.

Education-pathway positions should be filled by known outstanding teachers or experienced professionals, and ideally by individuals who fall into both categories. New Ph.D.'s with no industrial or teaching experience would as a rule not enter the education pathway directly but would switch to it only after demonstrating their potential to meet the performance criteria listed above. If they have no industrial experience they might be requested to acquire some through industry-based sabbatical leaves or summer internships, either before or after the switch becomes official.

No distinction should exist between the two pathways in benefits, perquisites, or expectations of departmental and university service. Education-pathway professors should have the same opportunities for merit raises, tenure, and promotion to full professor as their research-pathway colleagues enjoy. The sole criterion for faculty recognition and reward should be quality of performance: no professor should ever experience second-class departmental citizenship because of his or her career focus on either education or research.

If this policy were enacted, the quality of undergraduate education would inevitably improve. New and better instructional materials, demonstrations, problems, case studies, and teaching methods would be developed and tested by the education-pathway professors, who could then serve as mentors to other faculty members who wish to improve their teaching. New assistant professors and instructors could co-teach their first one or two courses with education-pathway professors, seeing first-hand what excellent teaching looks like and being exposed to techniques they can later adapt to their own teaching styles. Vital departmental functions for which research credentials are irrelevant, including course and curriculum planning, coordinating undergraduate advising, and undergraduate program administration, would be done expertly by people who want to do them. The courses most closely related to professional practice--the undergraduate laboratory and design courses--would be taught by people with both the background and the enthusiasm to teach them expertly rather than by professors dragooned into teaching them on a rotation system. More importantly, industry-bound undergraduates would gain teachers and advisors who would serve as role models of experience and professionalism.

This system would also have positive effects on a department's research program and funding base. Research-oriented faculty members, with their lighter teaching roles and freedom from unwanted undergraduate administrative and advising responsibilities, would be able to increase their productivity. Between the revenue generated by this increased productivity, grants brought in by the education-pathway faculty for curriculum development and undergraduate laboratory expansion, and funds for endowed education chairs provided by industry (which often has more of a vested interest in high-quality undergraduate education than in graduate research), the school and departments could in the long run experience a financial gain. Moreover, faculty members on the education pathway could devote themselves to undergraduate education, free of the need to dilute their efforts with research for which they have little enthusiasm. The results would include an increase in the average quality of research and a decreased competition for graduate students and laboratory space in every academic department.

This proposal is neither radical nor unprecedented. Several departments at major research universities have named full professors whose careers have been devoted to education, whose presence in those chairs has greatly enriched our profession and the stature of their departments. In my own department, we brought on to our faculty several years ago a man with 30 years of industrial experience, who made it clear that he had no interest in research. It was one of the best things we ever did for ourselves. He has taken over, enthusiastically and expertly, many of the responsibilities from which most of us instinctively recoil, including administering the undergraduate program and transforming and modernizing the undergraduate laboratory. His technical experience has proven to be a rich resource for both his students and his colleagues, and his managerial background and skill have enabled him to do gladly and well

what most of us would do reluctantly and, at best, adequately. He was eventually promoted to full professor, with no dissent on any level, and the sky has not fallen.

In short, the system I propose would ensure that both research and teaching would be done by individuals with the desire to do them and the enthusiasm and skill to excel at them. The quality of the education program, the quality and productivity of the research program, and the morale of the faculty would all increase, and in the steady state departmental revenues would most likely go up. Why not try it? What could we lose?

#### BIBLIOGRAPHY

Astin, A.W., What matters in college. San Francisco, Jossey-Bass, Inc., 1993.

Boyer, E.L., Scholarship reconsidered: Priorities of the professoriate. Princeton, NJ, Carnegie Foundation for the Advancement of Teaching, 1990.

Feldman, K.A., Research productivity and scholarly accomplishment of college teachers as related to their instructional effectiveness: A review and exploration. Research in Higher Education, 26, 227-298 (1987).

Rugarcia, A., "The link between teaching and research: Myth or possibility?" Engineering Education, Jan./Feb. 1991, pp. 20-22.