

THE SCHOLARSHIP OF TEACHING

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In his landmark 1990 monograph, *Scholarship Reconsidered*,¹ Ernest Boyer observed that the work of the professoriate involves four different functions: *discovery* (advancement of the frontier of knowledge in a discipline), *integration* (putting research discoveries in broader contexts, making connections across disciplines), *application* (applying the outcomes of discovery and integration to socially consequential problems), and *teaching* (helping students to acquire specified knowledge and develop specified skills and attitudes). Boyer argued that these four activities are equally vital to the academic mission and that the academy should therefore recognize and reward scholarship in each of them equally.

The scholarship of discovery—frontier research—is what most faculty members think of as academic scholarship, and while the scholarship of integration and the scholarship of application may not occupy the same honored position in the faculty incentive and reward system, most professors would at least agree that they exist in principle. It's a different story with the scholarship of teaching. Administrators and faculty members traditionally put teaching and scholarship in non-overlapping categories: some argue that “scholarship of teaching” is a contradiction in terms, and many who concede its theoretical possibility question whether it can be validly assessed.

What is the scholarship of teaching?

According to Boyer, the elements that define teaching as a scholarly activity are mastery of the subject being taught, knowledge of pedagogical methods that have been proven effective at promoting learning and skill development, and commitment to continuing personal growth as an educator. To this list might be added involvement in educational research and development—designing, implementing, assessing, and disseminating innovative instructional methods and materials.

Research in education-related disciplines has a long-established tradition. When done right, it adheres to the same standards of scholarship that characterize good engineering research. These standards have not been routinely observed in engineering education, however, and until relatively recently most of the literature has consisted of variations on “We tried this method and liked it and so did the students.”

This situation has begun to change in the past decade, largely due to the efforts of the National Science Foundation Division of Undergraduate Education and the Engineering Education Coalitions, and a growing percentage of the engineering professoriate is now engaging in serious educational research and development. It is no longer enough to say that everyone liked a method and the students performed well when it was used. The NSF project monitor and the *Journal of Engineering Education* reviewers will inevitably respond with questions like “What learning objectives were you trying to achieve?” “How well were those objectives met?” and “How do you know—what were your assessment measures, your control populations, your statistical analysis procedures, your evaluation criteria?”

How should the scholarship of teaching be assessed?

Boyer proposes making the scholarship of teaching a legitimate basis for awarding tenure and promotion to faculty members who choose to make education a major focus of their careers. (Not all faculty members should be expected to do so.) This proposal—which has predictably encountered considerable skepticism and some outright hostility from administrators and professors—will gain widespread acceptance only if criteria for evaluating the scholarship of teaching are established and generally agreed-upon. I propose that the evaluation should entail answering three questions:

1. *To what extent did the teaching qualify as a scholarly activity?* Answering this question requires evaluating the faculty member's subject knowledge, pedagogical knowledge, commitment to growth as an educator, and involvement in educational research and development.
2. *How effective was the teaching?* How well has the faculty member's teaching motivated students to learn and promoted their acquisition of desired knowledge, skills, and attitudes?
3. *How effective was the educational research and development?* How well were the faculty member's educational innovations designed, implemented, assessed and evaluated, and disseminated? What has been their impact on engineering education?

The data that can be used to answer these questions fall into four categories: *archival data* (lists of courses developed and taught, representative instructional materials and student products, numbers of undergraduate and graduate students advised and faculty colleagues mentored, disciplinary and education-related conferences and workshops attended, education journals subscribed to, articles and books and courseware published); *learning outcomes assessment data* (test results, evaluations of written and oral project reports and other student products, student self-assessments); *subjective evaluations by others* (student end-of-course ratings, retrospective student and alumni ratings, peer ratings, awards and recognition received, reference letters); and *self-assessment data* (statement of teaching philosophy and goals, self-evaluation of progress toward achieving the goals). A subset of these items gathered into a teaching portfolio provides a sound basis for assessing the scholarship of teaching.

Glassick et al.² suggest the following standards for evaluating educational innovations:

- *Clear goals:* Is the basis of the work clearly stated, the questions addressed important, and the objectives realistic and achievable?
- *Adequate preparation:* Does the scholar display an understanding of existing scholarship in the field and the skills needed to assemble the necessary resources and do the work?
- *Appropriate methods:* Were the methods used appropriate for the goals, applied effectively, and suitably modified when necessary?
- *Significant results:* Were the goals achieved? Did the work contribute significantly to the field?
- *Effective presentation:* Was the work presented effectively and with integrity in appropriate forums?
- *Reflective critique:* Does the scholar critically evaluate his or her own work, bringing an appropriate breadth of evidence to the critique and using the critique to improve the quality of future work?

Faculty members doing educational research that meets these standards are clearly contributing to the scholarly mission of the university. They merit advancement up the faculty ladder—tenure, promotion, and merit raises—no less than faculty members who meet institutional standards for disciplinary research.

Table 1 contains a matrix that may be used to custom-design a process for assessing the components of the scholarship of teaching. The more types of assessment data collected for a specific component (column of the matrix), the more reliable, valid, and fair the evaluation of that component. For explanatory notes and literature citations on the different assessment tools, see Reference 3.

How might the scholarship of teaching be included in tenure and promotion decisions?

Many academic institutions have begun to acknowledge the scholarship of teaching as a valid component of tenure and promotion (T/P) applications. An approach being taken by several of these institutions is to allow faculty members to allocate variable percentages of their total effort to teaching, research, and service, with minimum percentages being specified for each area. If more than a certain percentage is allocated to teaching, educational scholarship must be included in the faculty member's activities and a teaching portfolio containing a subset of the items in Table 1 must be included in the T/P dossier. A review committee assigns separate numerical performance ratings each of the three areas and weights the ratings by the specified percentages to calculate a composite rating, which provides the basis for the decision on tenure or promotion.

For ratings of the scholarship of teaching to be reliable and valid, the evaluating department should take the following steps:

- *Formulate and announce an assessment and evaluation plan.* Decide which items listed in Table 1 will be collected in the teaching portfolio, taking into account both institutional guidelines and considerations specific to the department. Choose a system to rate each of the items in the portfolio (e.g., rate each item on a scale from 0 to 10), weighting factors for each item, and weighted scores that serve as criteria for adequate and superior scholarship. Describe the rating system to all departmental faculty members who may wish to include educational scholarship in their credentials and display several examples of excellent portfolios as models.
- *Provide training to portfolio raters.* Give detailed explanations of the evaluation criteria to faculty members who will be serving as raters and provide guided practice on sample portfolios.
- *Collect at least two independent ratings of each portfolio submitted and have the evaluators reconcile their ratings to arrive at a consensus rating.* Incorporate the consensus rating into the overall tenure/promotion dossier evaluation process.

References

1. E. Boyer, *Scholarship Reconsidered: Priorities of the Professoriate*, Carnegie Foundation for the Advancement of Teaching, Princeton, NJ, 1990.
2. C.E. Glassick, M.T. Huber, and G.I. Maeroff, *Scholarship Assessed: Evaluation of the Professoriate*, Jossey-Bass, San Francisco, 1997.
3. R.M. Felder, A. Rugarcia, and J.E. Stice, "The Future of Engineering Education. V. Assessing Teaching Effectiveness and Educational Scholarship," *Chem. Engr. Education*, in press.

Table 1. Assessment of Teaching and Scholarship of Teaching

		Assessment of scholarship of teaching						
		Assessment of teaching				Innovation and Dissemination	Quality of Innovation	
		Subject Knowledge	Pedagogical Knowledge	Commitment to Personal Growth	Teaching Effectiveness	Innovation and Dissemination	Quality of Innovation	
Assessment of scholarship of teaching	Assessment of teaching	Statement of teaching philosophy		X	X			
		List of courses taught and developed, representative instructional materials	X	X			X	
		Representative student products				X		X
		Learning outcomes assessment data				X		X
		End-of-course student ratings for the past 2–3 years				X		X
		Retrospective senior ratings	X	X		X		X
		Alumni ratings	X	X		X		X
		Peer ratings	X	X		X	X	X
		Teaching seminars and conferences attended, books read, journals subscribed to		X	X			
		Faculty colleagues mentored			X			
		Self-evaluation	X	X	X	X	X	X
		External references	X	X	X	X	X	X
		Awards and other recognition				X		X
		Presentations, invited seminars, and workshops on teaching given		X			X	
		Published textbooks and courseware	X	X			X	X
		Published papers and monographs	X	X			X	X
Proposals written and grants awarded		X			X	X		