

Revisiting the Urgency for Reform of Faculty Reward Systems to Advance Professional Graduate Education for Engineering Practice and Technology Leadership

**D. R. Depew,¹ G. R. Bertoline,¹ M. J. Dyrenfurth,¹ A. L. McHenry,² E. M. DeLoatch,³
P. Y. Lee,⁴ H. J. Palmer,⁵ J. W. Bardo,⁶ D. D. Dunlap,⁶ S. J. Tricamo,⁷
D. A. Keating,⁸ T. G. Stanford⁸**

**Purdue University¹ / Arizona State University East² / Morgan State University³
California Polytechnic State University⁴ / Rochester Institute of Technology⁵
Western Carolina University⁶ / New Jersey Institute of Technology⁷
University of South Carolina⁸**

Abstract

This is the first of three papers prepared for a special panel session of the National Collaborative Task Force on Engineering Graduate Education Reform that addresses the need for reform of faculty reward systems to advance professional education for creative engineering practice and technology leadership. As the introductory paper for the panel session, this paper revisits the broad urgency for reform of professionally oriented faculty reward systems for engineering practice and technology leadership. It then calls for a new look at professionally oriented tenure and promotion criteria existing within other service oriented professions. Finally, a path forward is suggested in order to begin the development of an emerging template for professionally oriented faculty reward systems in engineering and engineering technology that better supports teaching, professional scholarship and creative engagement in engineering practice for the development and innovation of technology.

1.0 The Urgency for Reform

This paper focuses on issues driving reform of faculty reward systems to advance professional graduate engineering education for creative engineering practice and leadership of technological innovation to enhance U.S. competitiveness. This is in direct response to the urgency of engineering education reform and improvement of faculty reward systems, voiced by Wm. A. Wulf, president of the National Academy of Engineering at the 2002-Main Plenary Address to the American Society of Engineering Education. Since the Grinter Report, scientific research has become a primary condition for tenure and promotion at many of the nation's schools of engineering across the country (Grinter, 1955). In his seminal work, *Scholarship Reconsidered*, Ernest Boyer identified the need to broaden the range and the definition of scholarship beyond the limits of scholarship of research and discovery (Boyer, 1990). This paper introduces the need to implement a comprehensive faculty reward system for those professional-oriented adjunct faculty from industry and for those professional-oriented core faculty within schools of engineering and technology, who are at the leading edge of advancing the practice of engineering through their teaching, industrial engagement, and original professional scholarly work relevant to creative engineering practice and its leadership for technology development. The paper raises fundamental questions that must be answered to design a complementary faculty reward template of creative professional scholarly work, teaching, and engagement for high-caliber engineering professionals

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in parallel to the academic scientific research template, which predominantly exists at schools of engineering and technology across the nation.

2.0 Professionally Oriented Tenure and Promotion Criteria

Boyer calls for broadening the conventional definition of scholarship beyond basic research. He reviews the history of the American university in structure and function and finds the foundations for teaching, service, and research. Boyer traces an evolution in focus from building character through teaching to reshaping society through service and most recently to the academy's growing commitment to basic research. He concludes that much of American higher education "...moved from an emphasis on the student to an emphasis on the professoriate, from emphasis on generalized education to specialized education, and from loyalty to the campus to loyalty to the profession" (p. 13).

Boyer says a new vision of scholarship is required to assure relevance of America's colleges and universities to the realities of contemporary life. He describes four types of scholarship recognizing the diversity of contributions that faculty can make, "...the scholarship of discovery; the scholarship of integration; the scholarship of application; and the scholarship of teaching" (p. 16).

Professional graduate education is an excellent environment for the scholarship of application. Application, according to Boyer, involves the following sorts of questions. "How can knowledge be responsibly applied to consequential problems? How can it be helpful to individuals as well as institutions?" and further "Can social problems themselves define an agenda for scholarly investigation?" He goes on "...the term itself may be misleading if it suggests that knowledge is first 'discovered' and then 'applied.' The process we have in mind is far more dynamic. New intellectual understandings can arise out of the very act of application" (p. 23). This comes as no surprise to those working at a more applied level. It is precisely the richness of understanding from application of ideas to real problems that attracts us to work in engineering and technology. Our colleagues find joy in the scholarship of discovery and we find satisfaction in the insight from application.

Boyer goes on to say "Now is the time, we conclude, to build bridges across the disciplines, and connect the campus to the larger world. Society has a stake in how scholarship is defined" (p. 57). We have a major challenge to show our role in institutions that recognize all the elements of scholarship. This is difficult terrain that requires us to work in the current system but find ways to be successful in an environment that tends to only reward discovery.

3.0 Suggested Tenure and Promotion Criteria

The current reward systems at universities reflect the value system and mission of universities. If the value system of the university changes to emphasize innovation and entrepreneurship then the reward system must change. This does not have to be an either/or strategy. Good teaching and innovative scholarship are linked together. Promoting entrepreneurship and innovation as key elements of the learning process should be a primary goal of engineering and technology education.

It is suggested that Boyer outlined the necessary criteria for promotion and tenure for professionally oriented faculty in engineering and technology. Boyer suggests that this narrowing of standards for measuring academic excellence is in sharp contrast with the expanding mission of the American higher education system, which is now expected to educate the most diverse groups of students in the history of the nation. It is his strong conviction that America's colleges

and universities must carefully redefine their mission and reconsider their meaning of scholarship to remain viable in the new century.

Boyer asks the following question: How can the faculty reward system be modified to best meet the challenges of 1) a diverse student body which desires excellence in teaching, 2) a faculty which is not satisfied with the criteria by which it is being assessed, 3) a system of higher learning whose confusion over goals diminishes the sense of community on its campuses, and 4) a changing world with its social, ethical, and environmental issues. He proposes abandoning the old paradigm of research versus teaching for the following new paradigm: faculty should be engaged in the scholarship of discovery, integration, application, and teaching. By embracing these four general views of scholarship, Boyer is challenging us to enlarge our perspective of the priorities of the professoriate.

The scholarship of application, which is closely related to what we would call "service", must be closely related to one's own field of expertise and relates acquired knowledge to the larger community. Boyer contends that application need not always follow discovery- the act of application can and should initiate new discovery. The scholarship of application, which is closely related to what we would call "service", must be closely related to one's own field of expertise and relates acquired knowledge to the larger community. Boyer contends that application need not always follow discovery- the act of application can and should initiate new discovery. Professional associations and accrediting bodies can legitimize the various forms of scholarship through conferences and accreditation policies, respectively. It is the scholarship of application that most closely aligns with our efforts to find a reward system for faculty engaged in professional graduate education in engineering and technology.

Roughly a decade after Ernest Boyer's 1990 landmark *Scholarship Reconsidered: Priorities of the Professoriate*, most campus promotion and tenure committees continue to examine how to assess the "four separate, yet overlapping functions" that Boyer listed as the scholarships of discovery, integration, application, and teaching. *Scholarship Assessed: Evaluation of the Professoriate* (Glassick, Huber, and Maeroff, 1997) was commissioned the Carnegie Foundation as a follow-up to Boyer's original report to "guide the documentation and evaluation of faculty scholarship." Its author's propose six qualitative standards to assess the *process* of scholarship beyond publications per se: 1) clear goals; 2) adequate preparation; 3) appropriate methods; 4) significant results; 5) effective presentation; and 6) reflective critique.

In *The Disciplines Speak*, Robert Diamond and Bronwyn Adam (2000) affirmed the merit of the process standards noted in *Scholarship Assessed*, and asserted six characteristics that "most disciplines considered as scholarship, professional, or creative" in terms of *products* rather than *process*:

- The activity requires a high level of discipline-related expertise
- The activity breaks new ground or is innovative
- The activity can be replicated or elaborated
- The work and its results can be documented
- The work and its results can be peer reviewed
- The activity has significance or impact

This work provides us with the roadmap we need to develop the specific criteria for a reward system for professional graduate education for engineering and technology.

4.0 Conclusions

Thus, *Scholarship Assessed* and *The Disciplines Speak* began to develop the parameters to assess the quality of the new scholarship proposed in Boyer's *Scholarship Reconsidered*. These parameters can be used as a guideline for reforming the faculty reward system to advance professional graduate education for engineering practice and technology leadership. It is a roadmap for creating a faculty reward system and promotion and tenure process with criteria that are measurable and can be documented for application oriented faculty.

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Biography

DENNIS R. DEPEW is professor and dean of the school of technology, Purdue University.

GARY R. BERTOLINE is professor and associate vice president of information technology, Purdue University.

MICHAEL J. DYRENFURTH is assistant dean of graduate studies of the school of technology, Purdue University.

ALBERT L. MCHENRY is dean of the college of technology and applied sciences at Arizona State University East, and former Chair of the Engineering Technology Council of the American Society of Engineering Education.

EUGENE M. DELOATCH is dean of the school of engineering, Morgan State University, and a past president of ASEE and member of ASEE Board of Directors.

PETER LEE is dean of the college of engineering, California State Polytechnic University.

HARVEY J. PALMER is dean of the Kate Gleason college of engineering, Rochester Institute of Technology.

DUANE D. DUNLAP is professor and department head of engineering technology, Western Carolina University, and Secretary/Treasurer ASEE-Graduate Studies Division

STEPHEN J. TRICAMO is professor of industrial and manufacturing engineering, and former dean of engineering and technology, New Jersey Institute of Technology.

DONALD A. KEATING is associate professor of mechanical engineering, University of South Carolina, and program chair ASEE-Graduate Studies Division.

THOMAS G. STANFORD is assistant professor of chemical engineering, University of South Carolina.

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