Redefining Scholarship: A Win-Win Proposition for Engineering & Technology

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Abstract

What is scholarship? And what is the difference between research and scholarly activity? Scholarship is defined by Webster as "the methods, discipline, and achievements of a scholar" and as "knowledge resulting from study and research in a field." Given these definitions, it is not surprising that while traditional promotion and tenure criteria include evaluation in the areas of research, teaching and service, the favored path to gaining promotion and tenure at many institutions is the research component of the triumvirate. This paper reviews faculty and administration views on scholarship, tenure and promotion and scholarly work by Diamond, Boyer, Karabell, Miller, Schön, ASCE, ASEE, and others; indeed, most of this paper serves as a review of some of the significant writings in this area in the 1990s. While the authors apologize to those already familiar with the literature, readers unfamiliar with these works should find this background helpful.

Scholarship as redefined by E. L. Boyer is discussed extensively. Boyer broadens the definition of scholarship to embrace the scholarship of teaching. Does Boyer's model of scholarship, as presented in *Scholarship Reconsidered: Priorities of the Professoriate*, represent the correct model for engineering and/or engineering technology? It can be argued that it is this broader definition of scholarship that best serves students, faculty, academe, and society; indeed, scholarship at its highest level involves the process of creative endeavor, integration, application and dissemination. And while we typically think of this process as relating to research, the same process relates to teaching and service as well.

The view of academia held by many of its critics, as well as its apparent failings, evidenced by unacceptable attrition, public discontent, and recently, legislative intrusions attempting to "fix the problem" are presented herein. Also, recognition of the need for not only traditional research and quality teaching, but also public service is addressed.

ASCE's (1998) *Task Force Report on Redefining Scholarly Work* is reviewed. In fact, the ASCE report was released during the time this paper was being developed, causing the authors to reconsider and rewrite portions of this document to parallel the models in the ASCE report.

The authors belief that a broader view of scholarship is in the best interests of academe in general, and engineering and engineering technology in particular, is manifested through the proposal of models to define scholarly work of engineering technology faculty. The authors

draw on the work of Boyer, the ASCE Task Force, and the *Faith of the Engineer* to develop three models for consideration, discussion and deliberation. Models are presented for institutions ranging from Carnegie (1984) classifications for research and doctoral institutions, comprehensive institutions, and community colleges, respectively.

Introduction

What is scholarship? And what is the difference between research and scholarly activity? Are they synonymous? Scholarship is defined by Webster's College Dictionary (1997) as *"the methods, discipline, and achievements of a scholar"* and as *"knowledge resulting from study and research in a field."* Not only is this Webster's formal definition of scholarship, it is the widely-held majority opinion of most of the academy and society. Or is it?

Given Webster's definitions, it is not surprising that while traditional promotion and tenure criteria include evaluation in the areas of research, teaching and service, the favored (and sometimes, only) path to gaining promotion and tenure at many institutions is the research component of the triumvirate.

The view of academia painted by its harshest critics involves the image of a professor, isolated and far removed from undergraduate students, performing research and publishing, adding little value to the education of most undergraduates; meanwhile, teaching assistants (with little or no training in pedagogy) attempt to attend to the mundane chore of teaching. While this is obviously a distorted view, academe's critics point to apparent failings of the system as evidenced by unacceptable attrition, public discontent, and recently, legislative intrusions attempting to "fix the problem." Recent writings in many publications are openly critical of the quality of education currently being delivered. In a recent book entitled *What's College For? The Struggle to Define American Higher Education,* author Zachary Karabell (1998) describes the inconsistencies between higher education's focus and the needs, often unmet, of society.

In a scorching 1998 report, the Boyer Commission on Educating Undergraduates in the Research University criticized the quality of the undergraduate experience in American research universities. The report *Reinventing Undergraduate Education: A Blueprint for America's Research Universities* contained the following critiques:

> *"...Nevertheless, the research universities have too often failed, and continue to fail, their undergraduate populations. Tuition income from undergraduates is one of the major sources of university income, helping to support research programs and graduate education, but the students paying the tuition get, in all too many cases, less than their money's worth..... "*

> *"...Again and again, universities are guilty of an advertising practice they would condemn in the commercial world. Recruitment materials display proudly the world-famous professors, the splendid facilities and the ground-breaking research that goes on within them, but thousands of students graduate without ever seeing the world-famous professors or tasting genuine research..."*

"…Some of their instructors are likely to be badly trained or even untrained teaching assistants who are groping their way toward a teaching technique…"

"…Many students graduate having accumulated whatever number of courses is required, but still lacking a coherent body of knowledge or any inkling as to how one sort of information might relate to others. And all too often they graduate without knowing how to think logically, write clearly, or speak coherently. The university has given them too little that will be of real value beyond a credential that will help them get their first jobs. And with larger and larger numbers of their peers holding the same paper in their hands, even that credential has lost much of its potency…"

"…Baccalaureate students are the second-class citizens who are allowed to pay taxes but are barred from voting, the guests at the banquet who pay their share of the tab but are given leftovers…"

"…In a country and an era fascinated with discovery and expansion, the research mission has overshadowed the earlier collegiate function of training young men to be ministers, lawyers, and gentlemen…"

In order to understand the backdrop for these criticisms, a review of the views held by faculty and administrators might be useful.

Review of Faculty & Administration Priorities

While the Miller survey results presented below are not new, they do provide a reasonable backdrop against which to begin this dialog. Consider the following statistics as discussed by Ernest L. Boyer, late president of the Carnegie Foundation for the Advancement of Teaching, in his 1990 report *Scholarship Reconsidered: Priorities of the Proffesoriate*:

With respect to the balance of importance among research, service and teaching, Miller, et al. (1990) reported that:
- 26 % of chief academic officers at all types of institutions polled indicated a shift away from teaching and service toward research,
- 56 % of chief academic officers at doctoral institutions polled indicated a shift away from teaching and service toward research,
- 34 % of chief academic officers at comprehensive institutions polled indicated a shift away from teaching and service toward research.

With respect to importance of publications, a 1989 Carnegie National Survey of Faculty revealed:
- 56 % of faculty at research institutions believed number of publications was very important for receiving tenure in their department,

- 55 % of faculty at doctoral institutions believed number of publications was very important for receiving tenure in their department,
- 30 % of faculty at comprehensive institutions believed number of publications was very important for receiving tenure in their department,
- 2 % of faculty at community colleges believed number of publications was very important for receiving tenure in their department.

With respect to the importance of student evaluations of teaching, the 1989 Carnegie National Survey of Faculty revealed:
- 10 % of faculty at research institutions believed student evaluations of courses taught was very important for receiving tenure in their department,
- 19 % of faculty at doctoral institutions believed student evaluations of courses taught was very important for receiving tenure in their department,
- 37 % of faculty at comprehensive institutions believed student evaluations of courses taught was very important for receiving tenure in their department,
- 29 % of faculty at community colleges believed student evaluations of courses taught was very important for receiving tenure in their department.

With respect to the importance of peer evaluations of teaching, the 1989 Carnegie National Survey of Faculty revealed:
- 4 % of faculty at research institutions believed colleague and/or administrator observations of teaching was very important for receiving tenure in their department,
- 6 % of faculty at doctoral institutions believed colleague and/or administrator observations of teaching was very important for receiving tenure in their department,
- 20 % of faculty at comprehensive institutions believed colleague and/or administrator observations of teaching was very important for receiving tenure in their department,
- 43 % of faculty at community colleges believed colleague and/or administrator observations of teaching was very important for receiving tenure in their department.

With respect to the importance of academic advisement, the 1989 Carnegie National Survey of Faculty revealed:
- 1 % of faculty at research institutions believed academic advisement was very important for receiving tenure in their department,
- 2 % of faculty at doctoral institutions believed academic advisement was very important for receiving tenure in their department,
- 6 % of faculty at comprehensive institutions believed academic advisement was very important for receiving tenure in their department,
- 6 % of faculty at community colleges believed academic advisement was very important for receiving tenure in their department.

With respect to the importance of service, the 1989 Carnegie National Survey of Faculty revealed:

- 6 % of faculty at research institutions believed service within the scholar's discipline was very important for receiving tenure in their department,
- 8 % of faculty at doctoral institutions believed service within the scholar's discipline was very important for receiving tenure in their department,
- 13 % of faculty at comprehensive institutions believed service within the scholar's discipline was very important for receiving tenure in their department,
- 7 % of faculty at community colleges believed service within the scholar's discipline was very important for receiving tenure in their department,
- 3 % of faculty at research institutions believed service within the university community was very important for receiving tenure in their department,
- 6 % of faculty at doctoral institutions believed service within the university community was very important for receiving tenure in their department,
- 17 % of faculty at comprehensive institutions believed service within the university community was very important for receiving tenure in their department,
- 19 % of faculty at community colleges believed service within the university community was very important for receiving tenure in their department.

It is of particular interest to note that service to community, state, region, nation, etc. were not included in this discussion by the Carnegie Foundation. While generalizations may not always present the actual view, it would appear safe to say that the snapshot captured at the beginning of the nineties portrayed a higher education that placed greater value on traditional research and publication while valuing less teaching, service, and development of the student through active advising by the faculty. The results of this survey should have been a call to action. Has higher education evolved as we approach the end of the decade?

Boyer's Challenge

Boyer (1990) appealed to the academy to rethink it definitions, boundaries, and prejudices with respect to scholarship. Boyer compelled us to think anew of what it means to be a scholar. He did so as much by raising questions as he did by answering them as shown in the following quotation:

> "How can each of the nation's colleges and universities define, with clarity, its own special purpose?...Should expecatations regarding faculty performance vary from one type of institution to another?...Can we, in fact, have a higher education system in this country that includes multiple models of success?...How can the work of the nation's colleges and universities become more intellectually coherent?...Is it possible for scholarship to be defined in ways that give more recognition to interpretive and integrative work?...what is the balance to be struck between teaching and research?...Should some members of the professoriate be thought of primarily as researchers, and others as teachers?...how can the various dimensions of faculty work be more

appropriately evaluated and rewarded?...Can America's colleges and universities, with all the richness of their resources, be of greater service to the nation and the world?...Can we define scholarship in ways that respond more adequately to the urgent new realities both within the academy and beyond?"

Boyer redefined what it means to be a scholar. Scholarship, as redefined by Ernest L. Boyer, is something quite different from the narrowly defined discovery of new knowledge typically associated with research and publication. Sociologist R. Eugene Rice (1991) further described and challenged currently held views and assumptions of scholarship that allied themselves to the rigid model of scientific professionalism favored by proponents of the German university research model.

In fact, one might conjecture that the American system of higher education is viewed by Boyer, Rice and others as the more open, diverse, democratic, and perhaps, even untidy progeny, borne of the interracial marriage of the British and German models of higher education. The European (British) model of the university held as a sanctum for the liberal arts and western culture, while the German model embraces scholarship as pure research for fundamental truth and knowledge. The modern American research university took root and spread from Johns Hopkins University while the British model of higher education lives today in private, liberal arts colleges and universities.

Boyer acknowledges the diversity of missions in American institutions and the "*mosaic*" of faculty "*talent*", and thus, speaks of "*enlarging the perspective*" of what should constitute scholarship. Boyer suggests that a bonafide acknowledgement of the range of faculty talents "*would bring renewed vitality to higher learning and the nation.*" Boyer's expanded paradigm for the four separate, yet overlapping elements of scholarship, which defines the work of the American professoriate, includes:

   a. the scholarship of <u>discovery</u> of new knowledge through research,
   b. the scholarship of <u>integration</u> of knowledge through practice, consulting, and various other interdisciplinary activities,
   c. the scholarship of <u>application</u> of knowledge through professional service, development of discipline specific software tools, and various community outreach activities, and
   d. the scholarship of <u>communication</u> or dissemination of knowledge through teaching.

Boyer significantly broadens the definition of scholarship to embrace the scholarship of teaching, integration and application. He recognizes the significance of service scholarship for both academe and society.

Boyer's scholarship of discovery is what most academics refer to as research. It derives from an investigative journey to develop new understanding and discover new knowledge. This is the tenet of the German research models and the purest form of scholarship. Yet, Boyer suggests that knowledge may not be developed in a linear manner where research is followed by publications, and ultimately, conveyance of knowledge to students. Boyer suggests that the

"arrow of causality, can and frequently does, point in both directions," not only from theory to practice, but vice versa.

Moreover, as researchers develop new meaning, Boyer underscores the need for *"scholars who give meaning to isolated facts, putting them into perspective...making connection across disciplines, placing the specialties in larger context, illuminating data in a revealing way, often educating nonspecialists, too...."* This is the scholarship of integration and occurs frequently at the boundaries of disciplines, thus requiring interdisciplinary viewpoints and interactions.

In defining the scholarship of application of knowledge, Boyer speculates that *"the scholar asks 'How can knowledge be responsibly applied to consequential problems? How can it be helpful to individuals as well as to institutions?'...'Can social problems themselves define an agenda for scholarly investigation?'"* Boyer suggests that scholars should lend their special expertise and knowledge to engagement in service activities that provide an interaction of theory and practice of one's discipline, thus renewing the other.

The scholarship of teaching involves the transmitting of knowledge. According to Boyer, it also involves transforming and extending knowledge as well, and pointed out that Aristotle said *"Teaching is the highest form of understanding."* Excellent teaching embodies an interactive, cognitive, and creative environment. Boyer suggested that this broadened definition of scholarship more adequately recognizes the breadth of the campus mission, as well as, the breadth of talents within the academy. The scholarship of teaching can include study of the methods of teaching with appropriate scholarly publication and dissemination.

While many fine institutions of higher learning submit that the scholarship of teaching is equally important in the work of the faculty, promotion and tenure decisions at many would indicate otherwise. How often is an average teacher with an exceptional research record denied tenure? On the other hand, how many exceptional teachers are denied tenure because their research publications are deemed substandard. Jay Parini lamented that "the lynching season has come again and gone" in a Chronicle of Higher Education opinion in 1995. Parini described the loss of talented colleagues sacrificed during the tenure process because either the scholarship was "somewhat lackluster" or the teaching was "not quite as good as her scholarship." The authors suggest that the former results in non-tenure decisions much more frequently than the latter. Generally, the American university system employs a reward system that recognizes discovery of knowledge leading to peer-reviewed publications as the primary indicator of rigor, and ultimately value in the academy. Meanwhile, outside the culture of higher education, there is recognition of the need for traditional research, quality teaching, and service and outreach activities. And yet, there is no reason that all of these activities cannot prosper in any institution willing to extend beyond traditional views of scholarship.

Promotion and tenure decisions must be based on broad definitions of scholarship that adequately recognize the merits of research, teaching and service. Under the direction of Robert M. Diamond, The Center for Instructional Development at Syracuse University began the arduous task of redefining scholarship in all disciplines in 1989 as part of an attempt to examine the faculty reward system relative to institutional mission. This project, supported by Lilly

Endowment, Inc. and the National Science Foundation, was directed at assessing and redefining scholarship to improve teaching quality, improve quality of graduates, improve quality of curricula and courses, and increase faculty participation in service activities. Numerous professional and scholarly organizations later joined this effort to produce a publication by the American Association of Higher Education in 1995. Among other publications, Diamond (1995) authored *Preparing For Promotion and Tenure Review* which provides guidance for documenting activities to be considered when preparing for an evaluation of an expanded definition of scholarly work. In a previous publication, Diamond, et. al., (1993) identified six criteria by which to judge if an activity is scholarly work, namely:

    a. requires a high level of disciplinary expertise,
    b. is innovative,
    c. can be replicated,
    d. can be documented,
    e. can be peer evaluated, and
    f. has significance.

For comparison, Boyer (1990) had previously identified six criteria by which to judge good scholarship, namely:

    a. knowledge it reflects,
    b. clearly-defined objectives,
    c. appropriate methods,
    d. creative use of resources,
    e. effective communication, and
    f. significant results.

It occurs to the authors of this paper that scholarly activity that merely meets a majority of Boyer's or Diamond's criteria represents a valuable contribution to higher education and society.

Scholarship in Engineering

In an excellent article entitled *The New Scholarship Requires a New Epistemology,* Donald A. Schön (1995) writes *"....educational institutions have epistemologies. They hold conceptions of what counts as legitimate knowledge and how you know what you claim to know. These theories of knowledge ....are built into institutional structures and practices... the research university is an institution built around a particular view of knowledge..."* In a compelling analogy, Schön describes the dilemma facing higher education. He writes:

> *"...the dilemma of rigor or relevance. In the varied topography of professional practice, there is a high, hard ground overlooking a swamp. On the high ground, manageable problems lend themselves to solution through the use of research-based theory and technique. In the swampy lowlands, problems are messy and confusing and incapable of technical solution. The irony of this situation is that the problems of the high ground tend to be relatively unimportant to individuals or to society at large,*

however great their technical interest may be, while in the swamp lie the problems of greatest human concern. The practitioner is confronted with a choice. Shall he remain on the high ground where he can solve relatively unimportant problems according to his standards of rigor, or shall he descend to the swamp of important problems where he cannot be rigorous in any way he knows how to describe?

Nearly all professional practitioners experience a version of the dilemma of rigor or relevance, and they respond to it in one of several ways. Some of them choose the swampy lowland, deliberately immersing themselves in confusing but critically important situations. When they are asked to describe their methods of inquiry, they speak of experience, trial and error, intuition, or muddling through...When physicists or engineers do so, they tend to be troubled by the discrepancy between the technical rigor of the "hard" zones of their practice and the apparent sloppiness of the "soft" ones.

People tend to feel the dilemma of rigor or relevance...they ask themselves, "Am I going to continue to do the thing I was trained for, on which I base my claims to technical rigor and academic respectability? Or am I going to work on the problems-- ill-formed, vague, and messy--that I have discovered to be real around here?""

Are we uncomfortable with the "sloppiness" of the "soft" zones of academic work? Are we unwilling to recognize the value of teaching and service because those areas are more difficult to quantify than research dollars, numbers of supported graduate students, or quantity of published articles? Has the time arrived when we can pay more than lip service to the teaching of undergraduates?

In 1997, the American Society of Civil Engineers (ASCE) appointed a distinguished group of prominent civil engineering leaders to a task force *"to raise fundamental issues for Civil Engineering educators by offering a broader definition and understanding of the professional work of Civil Engineering faculty."* The ASCE Task Force on Redefining Scholarly Work produced a high-quality, insightful, far-reaching report outlining the background for scholarship in the profession, as well as, a model to carry civil engineering forward to the new millennium. The Task Force (1998) concluded in their report *The Scholarship Landscape in Civil Engineering: A Bridge Between Rhetoric and Reality* that a narrow definition of scholarship was impractical due to varied institutional missions. The Task Force indicated *"the need to have a clear awareness of institutional mission, departmental mission and resources; size of the institution; accreditation criteria and professional organizations; collective bargaining status; classification of the institution; disciplinary objectives; new technologies; and research."*

The ASCE Task Force (1998) developed models linking scholarship, teaching, and service and professional development with values of excellence, integrity, leadership, and ethics.   In developing these models, the Task Force stated *"...institutions need to place less emphasis upon sterile definitions and more upon the creation of a means to reward substantive faculty achievements."*

The ASCE Task Force presents a model for change in defining the work of civil engineering faculty. The model consists of three sectors defining faculty work:

a. teaching,
b. scholarship, and
c. service and professional development.

According to the Task Force, this model *"symbolizes movement, action, and dynamism... the mission, resources, and goals of the academic community provide direction and vitality to faculty work.... Excellence, integrity, leadership, and ethics establish the quality of faculty work."*

In their model, the Task Force presents "interfacing spokes" to represent areas to be defined by individual departments based on need. These interfaces, in many cases, might involve an overlap between any two of the three sectors: teaching, scholarship, and service/professional development. The Task Force suggests that the interfaces may represent either transient or sustained activities to meet the changing needs of the profession, legislature, students, and society. The Task Force presents three models for defining faculty work, namely:

a. A rigid model at a Master's I University,
b. A rigid model at a Research I University, and
c. A flexible model at a Research I University.

Summaries of those models are provided in Table 1. There is significant variation in the weights applied to each category. The Task Force provided three models as examples of different models for consideration by institutions.

	Rigid Models		Flexible Model
Major Category	Master's I University	Research I University	Research I University
Teaching	40 %	30 %	30 % to 75 %
Scholarship or Research	30 %	45 %	15 % to 60 %
Service & Professional Development	20 %	15 %	10 %
Total of Discretionary or Overlap	10 %	10 %	45 %

Table 1. Summary of Faculty Work Models for Civil Engineering (after ASCE, 1998)

At a doctoral institution, the weight assigned for scholarship would be, in most instances, higher than at a master's level institution while the service component is weighted more lightly. While the Task Committee did not provide a model for a baccalaureate-only institution, the same logic may be extended, whereby the research component could fall to even lower levels with higher

demands for service and teaching. The flexible model described by the Task Force, in this author's opinion, provides the most insight. Recognizing that a single model cannot be completely encompassing for all institutions (even those of the same type), the flexible model illustrates the potential ranges that might be appropriate for institutions with depending upon the departmental mission and goals.

The Task Force described in four full-page figures what activities might fit into each of the following areas of scholarly activity:

    a. teaching,
    b. scholarship,
    c. service activities, and
    d. professional development activities.

In addition, the Task Force identified what activities might fit into the discretionary or overlapping spokes of the wheel. At the interface of teaching and scholarship, examples of appropriate activities include mentoring students, sponsoring short courses, attending special seminars, and developing contacts and skills needed for future research. At the interface of service and teaching, activities identified were passing the FE and PE exams, continuing education and consulting, conducting outreach programs with high school students, etc. At the interface between scholarship and service/professional development, activities identified included review of journal articles, textbooks, and assisting colleagues with proposals and research.

The Task Force identified changes that need to occur in engineering, noting *"One of the most important areas is leadership development among faculty, students, and the professional community to help our country compete more effectively into the new millennium....leadership is an essential element in teaching, research, and service....Faculty members who have demonstrated leadership should be recognized and rewarded...Leadership in teaching may be evidenced by faculty who (1) pioneer and/or organize a course on leadership, (2) write and publish scholarly papers on leadership education, or (3) become a leader on campus (or in a region or nation or the world) to champion teaching excellence. Leadership in research may be demonstrated when faculty (1) prepare and submit a research proposal on leadership education, and conduct such a research project, (2) organize technical conferences or workshops, or (3) coordinate comprehensive large-scale research programs nationwide or internationally. Faculty who engage in leadership in service may (1) become a national officer of professional and technical societies, (2) chair nationwide or international committees on professional issues, or (3) organize national and international conferences on professional or educational topics."*

The Task Force demonstrated the validity of the wheel model using Bradley University as the first test case. Bradley University instituted the model shown in Figure 1 with the categories of (1) teaching (45 %), (2) scholarship (25 %), and (3) outreach, professional development and service, OPS (15 %). Each interface is worth 5 % to bring the total to 100 %. The report indicated that the faculty in the Department of Civil Engineering and Construction at Bradley

University *"felt that for the first time in their careers they have a fair and equitable policy they can relate to and believe in because it reflects their interests and meets departmental needs."*

Figure 1. New Model for Faculty Assessment in the CEC Department at Bradley University (from ASCE, 1998.)

An Analogous Model for Engineering Technology

Does Boyer's model of scholarship, as presented in *Scholarship Reconsidered: Priorities of the Professoriate*, represent the correct model for engineering and/or engineering technology? Obviously, the ASCE Task Force on Redefining Scholarly Work believes that Boyer has presented the correct framework for a successful model in Civil Engineering. It can be argued that it is this broader definition of scholarship that best serves students, faculty, academe, and society; indeed, scholarship at its highest level involves the process of creative endeavor, integration, application, and dissemination and communication. And while we typically think of this process as relating to research, the same process is applicable to teaching and service.

The Task Force has further provided the appropriate wheels and spokes appropriate to the Civil Engineering educational enterprise. Dare we suggest an analogous model for Engineering Technology? Let's!

What the authors propose is a model for Engineering Technology, guided by the Boyer definition of scholarship, adapted from the ASCE Task Force wheel model for Civil Engineering, and melded from the authors' collective experiences teaching at community and technical colleges, private and public colleges, and public universities.

The primary sections of the wheel will not change, although the authors debated separating outreach and service from professional development, which would have provided four sections to the engineering technology wheel. In the end, the authors retained the three-section wheel model developed by the ASCE Task Force. Engineering technology education occurs at a wide range of institutions, and thus, would necessitate a broad group of models. A generic wheel model, showing suggested weights for respective institutional categories, is presented as Figure 2.

Figure 2. Proposed Model For Engineering Technology Faculty Assessment (adapted after the ASCE Task Force Model for Civil Engineering)

The models presented are for four types of institutions, namely, a community and technical college, a baccalaureate-only institution, a master's I institution, and a research I institution. The Master's I and Research I Universities are grouped together for simplicity and the values assigned to each section of the wheel for the Master's I and Research I are essentially unchanged from the ASCE Task Force flexible model. Obviously, institutions and departmental missions will vary and necessitate modifications to the suggested models. Recognizing these inherent differences in institutions and departmental missions, each of the models presented is a flexible model. The three flexible models defining faculty workload for engineering technology are summarized in Table 2. The authors believe that essentially any department can identify a model that will work for them within the limits of the flexible models presented.

Clearly, these models are not presented to represent the final thinking on faculty work models for engineering technology faculty. Rather, they are presented to serve as a catalyst for subsequent discussions and study on the matter. Without significant discussion or elucidation, the authors present these models for comment, discussion, and perhaps, even criticism. The engineering technology community needs to engage in the same meaningful process as the ASCE Task Force on Redefining Scholarly Work for Civil Engineering. A dialog on this topic should ultimately improve the quality of engineering technology education in this country and serves the best interests of faculty, students, higher education and society.

	Flexible Models		
Major Category	Community & Technical College	Baccalaureate-Only Institution	Master's I or Research I University
Teaching	50 % to 80 %	50 % - 75 %	25 % to 75 %
Scholarship or Research (to include scholarship on teaching)	10 % to 20 %	10 % - 30 %	15 % to 50 %
Outreach, Professional Development, and Service	10 % to 30 %	10% - 30 %	10 % to 20 %
Total of Discretionary or Overlap	30%	30 %	50 %

Table 2. Proposed Faculty Work Models in Engineering Technology.

Summary

Boyer wrote much about the importance of teaching in the scholarship model. In addition, almost a decade ago, Boyer wrote about the service component of the scholarship model:

> "*At no time in our history has the need been greater for connecting the work of the academy to the social and environmental challenges beyond the campus...It seems clear that while research is crucial, we need a renewed commitment to service, too...It's time to recognize the full range of faculty talent and the great diversity of functions higher education must perform.*"

The research, teaching, and service missions of any institution can each be met, and the overall quality of mission enhanced, if institutions are forward thinking, insightful, and openly accepting of a broader definition of scholarship – one that increasingly values (and rewards) teaching and service in the evaluation processes for promotion and tenure. Surely, in many instances, faculty members engaged in the scholarship of teaching, integration, and/or

application add as much value to the academy (and certainly, society) as faculty engaged in pure research.

Many institutions have addressed the need to improve the scholarship of teaching in the nineties. Administrators, with significant engagement of the faculty, need to reassess the value of the four components of scholarship. Furthermore, they must embrace change of the tired, outdated promotion and tenure policies that continue to hamper good teaching and service. These policies are wrongheaded and counterproductive, often resulting in the discharge of very talented faculty. Higher education in general, and engineering and technology in particular, need to cultivate, through effective reward systems, a culture where service and teaching are truly recognized and valued.

The following unambiguous quote from the Faith of the Engineer reminds us of our duty

> *"…Since the Age of Stone, human progress has been conditioned by the genius of my professional forbears…By them have been vitalized and turned to practical account the principles of science and the revelations of technology…I dedicate myself to the dissemination of engineering knowledge, and, especially to the instruction of younger members of my profession…"*

The authors believe that a broader view of scholarship – one that upholds the principles of the Faith of the Engineer and embraces far more than discovery - is essential. Indeed, a view that embraces discovery AND integration, AND application, AND teaching represents the best interests of engineering and engineering technology. The authors believe that this broader view, encompassing discovery, integration, application and dissemination of new knowledge leads not only to improvements in engineering and technology education, but serves as a precursor to an ever-improving quality of life for society in general.

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