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Consulting and Industrial Experiences as Related to Promotion and Tenure of Engineering Technology Faculty

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Abstract

To successfully achieve the goal of tenure, a well thought out professional development plan is essential. For engineering technology (ET) faculty, the requirements of the ET tenure process may be well suited for utilizing consulting and industrial experiences as a portion of the professional development plan. Engineering technology programs are different from engineering programs in that they teach the use of current technology to solve engineering problems facing industry. Accreditation requirements for ET programs prescribe that faculty have a minimum amount of industrial experience prior to beginning their teaching career. In addition, ET faculty can maintain currency is through industrial experience and consulting. Industrial experience and consulting can provide opportunities for professional development, if the faculty member properly documents these experiences in the technical literature. Consulting and industrial experiences can present opportunities for professional publishing in the form of case histories presented in conference proceedings and journal articles of a practical nature. Documenting how consulting and industrial experiences were incorporated into the curriculum also presents opportunities for pedagogical publications. In addition, applied research opportunities may result from experience in industry. This paper explores how ET faculty can utilize consulting and industrial experiences as part of their professional development plan for promotion and tenure.

I. Introduction

Promotion and tenure of engineering technology (ET) faculty requires evaluation of an individual's proficiency in teaching, scholarship and service. The importance of each of these may vary from one institution to another. For a new ET faculty member, understanding what is expected at their institution in these three areas is important for putting together a strong plan leading to promotion and tenure.

An important difference between engineering and engineering technology programs regarding the use of consulting and industrial experiences as part of a promotion and tenure plan is worth noting. In ***engineering*** programs, consulting and industrial experiences have not been considered the most advantageous use of a faculty member's time, relative to achieving promotion and tenure. In ***engineering technology***, prior industrial experience is necessary for appointment.[1] At many institutions, consulting experiences are considered a significant part of professional development and ET faculty are encouraged to consult.[2] These industrial experiences can provide ET faculty the means to achieve proficiency in teaching and scholarship activities, as required for promotion and tenure.

II. Influence of Consulting and Industrial Experiences on Teaching

Consulting and industrial experiences improve teaching through implementation into the curriculum. Through consulting and industrial experiences, ET faculty maintain currency in their field of expertise.[3] Implementing these experiences into the curriculum helps keep the curriculum current, as well.[1,3] Exposing students to new technologies improves their career opportunities and employability.[4]

In addition to maintaining technical competencies, consulting experiences provide other benefits relative to teaching. Consulting and industrial experience provide a greater awareness of industry's need for new engineering graduates. These needs include communication and teaming skills needed for success,[5] as well as exposure to the ethical and professional issues facing practicing engineers.[6] Including these in the curriculum is required by ABET[1] and improves the educational experience of ET students.

In certain academic areas, such as civil engineering technology, local consulting experiences are especially useful. Familiarity with local geology, building codes, and environmental regulations is a direct result of local consulting experiences.[5] These experiences can be incorporated into the curriculum through course discussions and assignments. Local consulting also provides contacts for student job placement after graduation and ideas for field trips.[3]

Students appreciate the presence of licensed professional engineers in the classroom and indicate practical experience and faculty consulting enhances their educational experience.[7] As a result of actually practicing engineering, faculty gain increased confidence and credibility in the classroom.[3] This can result in improved teaching and potentially improved teaching evaluations. Overall, when consulting and industrial experiences are properly incorporated into the curriculum, improved teaching generally results.

III. Scholarship for Engineering Technology Faculty

For most new faculty members, the influence of consulting and industrial experiences on improved teaching is fairly well understood. Scholarship, however, can have varying definitions and how consulting and industrial experiences influence scholarship may not be understood or appreciated.

The definition of scholarship in the American higher education system has traditionally been research-centered, leading to the development of new knowledge. Recent proposals have attempted to redefine scholarship in higher education,[8] civil engineering education[9] and ET education.[10] Boyer[8] reconsidered the definition of scholarship and presented a broadened model of scholarship for the American higher education system. He noted that diversity in faculty talent requires an expansion of what is considered scholarship. Boyer[8] observed four elements of scholarship in the American system of higher education. In addition to the scholarship of discovery, in which research leads to new knowledge, Boyer[8] also identified three other areas where scholarship can be attained: scholarship through integration of knowledge, scholarship through application of knowledge, and scholarship associated with transmitting knowledge through teaching.

ASCE[9] considered Boyer's broader definition of scholarship in a more discipline specific way for civil engineering faculty. The ASCE Task Force on Redefining Scholarly Work considered the definition of scholarship for civil engineering faculty at different types of institutions, according to their Carnegie Foundation[11] classification. They noted that three of the major issues related to defining the scholarly activities of civil engineering faculty include the mission of the institution, departmental goals and available resources. They surveyed fourteen institutions to assess the relative breakdown of teaching, scholarship and service requirements necessary to achieve tenure at different types of institutions. They presented two rigid models for defining faculty work at Master's I and Research I Universities. A third model presented a flexible model for a Research I University. Each model proposed appropriate percentages of teaching, service and scholarship at the different types of institutions and included an allowance or discretionary area between teaching, service and scholarship, to account for differences between institutions.

In another proposal,[10] the recommendations of Boyer[8] and ASCE[9] were modified and applied to the distribution of faculty work in engineering technology. The result was a flexible model for assessment of work of engineering technology faculty for promotion and tenure. In this model,[10] emphasis was placed on teaching as the primary work of engineering technology faculty. Scholarship and service activities are also included, but to lesser extents in the model. Zones of interface or overlap between teaching, scholarship and service are also provided to account for institutional differences. The model proposes ranges for assessing teaching, scholarship and service activities for engineering technology programs at three different types of institutions:[10] Community and Technical Colleges (C&TC), Baccalaureate-only institutions (BS Only), and Masters and Doctoral granting institutions (MS & PhD).

Table 1 presents the proposed model for ET faculty assessment.[10]

Table 1. Proposed Model of Percent Effort for Engineering Technology Faculty Assessment[10]

Type of Institution	Teaching	Scholarship	Service
C&TC	50 – 80 %	10 – 20 %	10 – 30 %
BS Only	50 – 75 %	10 – 30 %	10 – 30 %
MS & PhD	25 – 75 %	15 – 50 %	10 – 20 %

The proposed redefinition of scholarship[8] to include more that just traditional research activities supports the scholarly activities of ET faculty pursuing the mission of engineering technology to teach the current practice of engineering. Scholarship through integration and application of engineering knowledge and scholarship through transferring knowledge through teaching are achievable goals for ET faculty at non-research institutions. If properly planned, consulting and industrial experiences can provide a source from which some of the requirements for scholarship can be achieved.

IV. Influence of Consulting and Industrial Experiences on Scholarship

Surveys[2,12] indicate that consulting and industrial experiences have a positive influence on professional development of engineering and engineering technology faculty. Engineering and engineering technology programs have distinct differences between their promotion and tenure requirements. Both engineering and engineering technology programs consider sustained creative activity very important for promotion and tenure.[12] However, engineering and engineering technology have different ways of defining sustained creative activity. In engineering technology, papers or presentations given at technical or instructional conferences and applied research activities are considered important for promotion and tenure at most institutions.[12] In engineering, promotion and tenure often depends on publication of refereed journal articles resulting from research activities. Although referred journal articles resulting from research are good for promotion and tenure of ET faculty, they are not essential.[12] It is difficult for ET faculty to pursue traditional research, as well as applied research, due to the lack of graduate students and available research equipment.[13] Because traditional research activities are not easily pursued by ET faculty, traditional research historically has not been a major contributor to professional development in ET programs. Survey respondents indicated that refereed journal articles resulting from traditional research were not present in many successful tenure cases within engineering technology.[12]

Engineering technology faculty often achieve scholarship through pedagogical and engineering practice-based publications. With proper planning, consulting and industrial experiences can serve as part of the faculty member's professional development. Scholarly publications often result from industrial partnership activities.[14] Consulting engineering case histories or applications and monitoring of existing or developing technologies are often worth documenting in conference proceedings and state-of-the-art publications that cater to practicing engineers and technologists.

In addition to conference proceedings, some peer reviewed journals encourage case histories and papers of a practical nature. In civil engineering, several peer reviewed journals,[15,16,17] including one that has been traditionally research-oriented,[15] are now encouraging papers of a practical nature. Submission of practice-oriented papers and case histories is strongly encouraged by ASCE's Journal of Geotechnical and Geoenvironmental Engineering.[15]

Scholarly publications prepared by ET faculty do not necessarily need to be presented in research journals. Publications reaching practitioners in one's discipline may be an appropriate venue for presenting scholarly work for ET faculty.[18] The Geo-Institute of ASCE[19] found that the majority of its members are not served well by ASCE's current publications. They conducted a survey and found that the small percentage of members that subscribe to the *Journal of Geotechnical and*

Geoenvironmental Enginnering find it too theoretical and prefer more practical papers, such as case histories, and documentation of implementation and performance of new and emerging technologies. In addition to encouraging submission of more practice-based papers to the *Journal*, they also have created a practice-oriented publication, *Geo Strata*, to be sent to all members.[19]

In addition, incorporating industrial and consulting experiences into the curriculum, presents opportunities for scholarship.[12,21] ET faculty can present scholarly work through papers of a pedagogical nature documenting how technical aspects of engineering practice are incorporated into the curriculum.[21] Other scholarly publications can result by documenting how professional practice issues facing industry and the profession are incorporated in the curriculum.[5]

Lipscomb[20] offers faculty several suggestions for using consulting and industrial experiences to provide scholarship opportunities necessary for attaining promotion and tenure.

- Publications resulting from consulting must present something useful and new,
- Such publications require expertise in a specific topic,
- New faculty must develop an area of expertise within their consulting, and
- Choosing the right area of expertise is critical and should be well planned.

In choosing an area of expertise that provides opportunities for scholarly publications, faculty should look to new and emerging technologies where significant interest exists in industry.[20]

Limitations exist, however, on using consulting experiences as a means of professional development. New faculty should fully understand their institution's position on professional publications resulting from consulting experiences.[5] Consulting and industrial experiences are often documented in practice-based publications such as conference proceedings. These types of publications will not carry the same weight as peer-reviewed journal articles when considering promotion and tenure at research institutions. Therefore, relying too much on consulting related publications is not recommended for faculty at institutions where significant research expectations exist.[5] However, for engineering technology faculty, publications resulting from consulting experiences can be a meaningful part of an individual's professional development program.[5]

V. Conclusions and Recommendations

Engineering technology faculty and other engineering educators can reap numerous benefits through consulting experiences. Engineering knowledge can be kept current[3] through regular consulting experiences. Emerging technologies can be implemented into the curriculum. Consulting experiences provide practical experience in the practice of engineering making classroom instruction more effective.[3] This can result in improved teaching evaluations.[5] Through consulting experiences, faculty can also incorporate the non-engineering aspects of the consulting engineering profession into the curriculum[5] and provide students with an understanding of these issues, consistent with ABET[1] criteria.

To fully utilize consulting and industrial experiences toward promotion and tenure requirements, scholarly publications are necessary. Without producing scholarly publications, consulting may only help maintain currency in one's field and provide extra income. Faculty should be aware of what areas show potential growth in their field and strive to develop consulting expertise in one of these areas.[20] Developing expertise in an emerging field will provide easier opportunities to produce scholarly publications of interest to the engineering community.[20]

In many instances, engineering educators can take advantage of professional development opportunities resulting from their consulting experiences. Scholarly publications related to educational methods, applied research, and case history documentation are possible for faculty who realize the potential of consulting experiences and seek the appropriate audience.
With proper planing, engineering technology educators can use consulting experiences to improve the education of future engineering technologists, while attaining their own career goals, as well.

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