

Tenure: Perceptions of Requirements and Impediments for Civil Engineering & Construction Disciplines

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Abstract

The academic tenure process began in the US in 1915, and since then, the concept has been both criticized and praised. Arguments for tenure include freedom of teaching/research, and economic security, while critics comment on faculty underperformance and emphasis of research over teaching. Yet, a tenured position is coveted and sought by many aspiring assistant professors in the US education system, and that includes faculty from civil engineering and construction disciplines.

This paper aims to display the variability in perceptions of tenure requirements among assistant professors in civil and construction programs between universities of different research activities, and identify their perceived impediments towards obtaining tenure. The motivation for this research is to bring to surface some of the concerns assistant professors have relating to the tenure process.

Faculty from ACCE and ABET accredited programs in tenure-track positions were identified through an online search, and were provided with an online survey to complete. In total, 1052 faculty were identified, and 193 participants responded (18.3%) from 115 institutions and 45 states. Initial results show that, faculty employed in “Highest” (R1) and “Higher” (R2) research activity universities, perceive that their research requirements are similar, while faculty in R2 universities have higher teaching requirements.

The authors hope that this paper would spark conversations regarding clarity of requirements, and concerns about work-life balance.

Key words: Tenure, Civil Engineering, Construction, Impediments, Perceptions, Faculty

Introduction

Tenure is a coveted goal for almost all assistant professors in US higher educational institutions. A group of professors from John's Hopkins first introduced the tenure process in 1915, when they formed the American Association of University Professors [1], after observing the dismissal of economist Edward Ross by Mrs. Leland Stanford from Stanford University, who did not like his views on immigrant labor and railroad monopolies. The AAUP was organized to ensure academic freedom for faculty members, which at the time was considered an innovative concept [2]. Tenure is often misunderstood as a job-guarantee for life, but it is not the case, since it does not provide protection from dismissal, but it is a measure of protection from colleagues, and any special problems that arise in an academic democracy [3].

The tenure process throughout the years has faced both criticism and praise, with scholars arguing for or against the tenure process and concept. Sowell [4] called the current tenure process and system as having a great potential for irresponsibility, while Aigner [5] argued that tenure has the capability to promote incompetent teaching and stagnant thinking. It has also been argued that tenure allows faculty to prioritize research over teaching [1].

Arguments for tenure have been expressed as well, such as tenure provides freedom to faculty, promoting reasoning, as well as research that is original and independent [1]. It has also been argued that tenure promotes and strengthens the public's confidence in academic research [6].

No matter what the arguments are for or against tenure, the current reality of academic life includes the need for junior faculty to go through the tenure process, which in their minds has some impediments, as well as requirements (perceived or prescribed) that need to be achieved.

Background

Faculty in engineering have expressed concerns regarding the ability to meet the increasing and vague expectations for tenure. Many of these conversations happen in the sidelines at conferences, and specific examples in literature indicating the impediments to tenure are rare. Specific concerns, real or perceived, include and are not limited to, lack of funding opportunities, focus on applied research, difficulties in publishing results, high teaching expectation and teaching load [7].

The requirements for tenure vary among institutions, and can vary from year to year within the same institution. Furthermore, vague guidelines that emphasize quality over quantity exist in faculty handbooks that create confusion among tenure-track faculty, as to what is "good enough", and in some cases creating additional anxiety for hard working individuals [8]. In any case all universities require that faculty perform tasks in teaching, scholarship, and service, where the first two are the areas that have the most impact to tenure.

Senior faculty and administrators have produced publications for junior faculty that outline a successful path to tenure [9 - 13] (, Williams et. al 1997), but this information represents general guidelines that sometimes is not applicable to faculty in engineering in general, and in civil engineering, or construction disciplines in particular. The goal of this investigation is to identify the impediments that civil engineering, and construction faculty identify, perceived or otherwise,

in attaining tenure in US universities. In addition, a comparison between requirements is presented, based on the Carnegie Classification of the schools these faculty belong.

Methodology

The survey took place in the fall of 2016, and the results were combined with the responses of a previous survey that was performed the previous year [7]. The reason, for combining the survey results were:

- The survey questions were kept the same,
- The first survey sampled Construction Engineering, Construction Management, and Civil Engineering Technology Faculty, disciplines that in many schools are within the School/Department of Civil Engineering, or within the same College Unit as Civil Engineering.

Faculty that responded to the 2015 survey were not sampled in 2016. For the 2016 survey, recently tenured and tenure-track civil engineering and construction faculty were surveyed to gather the various perceptions of tenure requirements and impediments. Civil engineering and construction faculty were defined as the faculty that are part of civil engineering, construction management, construction engineering, and civil engineering technology that are accredited by the Accreditation Board of Engineering and Technology (ABET) and the American Council for Construction Education (ACCE). Contact information of these faculty members with the rank of Assistant Professor was compiled from internet search of the various department websites. In total, programs from 364 different departments/schools were identified to be accredited by ABET, and programs from 76 departments/schools were identified to be accredited by ACCE.

The departments/schools were further identified and categorized according to the 2016 Carnegie Classification of Institutions they belonged as follows:

- Doctoral Universities: Highest Research Activity (R1),
- Doctoral Universities: High Research Activity (R2),
- Doctoral Universities: Moderate Research Activity,
- Master's Colleges and Universities: Larger Programs,
- Master's Colleges and Universities: Medium Programs,
- Master's Colleges and Universities: Small Programs, and
- Baccalaureate Colleges: Arts & Science Focus or Engineering Focus.

The survey consisted of questions of identification and differentiation such as, name of institution faculty is serving, their title, and time in current position. The survey participants were also asked to identify if they were tenured or in tenure-track positions. To distinguish between research and teaching intensive positions, the participants were asked to characterize their current positions in terms of percentage of time committed to "Research", "Teaching", "Service", and "Other".

Some faculty have been given specific guidelines and requirements to earn tenure. Survey participants were asked to respond if they had such information, and provide these guidelines in

terms of “Teaching Performance Requirements”, “Research Dollar Amount”, “Number of Proposal Submissions”, “Number of Peer Reviewed Journal Articles”, “Participation in Conference Proceedings”, and any other guidelines.

Participants that were not provided specific guidelines were asked to state what they think these requirements were in the same categories. Both groups were then asked to state with a “yes” or “no” if they think these guidelines are “Attainable” for faculty members in Civil Engineering, Construction Engineering, Construction Management or Civil Engineering Technology Programs. Finally, participants were asked to rate the following impediments on their likelihood of influencing the tenure process:

- Teaching load requirements,
- Peer reviewed journal requirements,
- Service requirements,
- Lack of appreciation of applied research by tenure review committees,
- Competition within department for funds,
- Availability/quality of students to employ for research, and
- Interdepartmental politics.

Results

The responses to the survey were collected using Survey Share, an online survey service to which UNC Charlotte subscribes. Participants were emailed a link to the survey along with an explanation of the purpose of the survey. After approximately two weeks, a reminder was sent to the participants who did not response. A total of 1052 participants were identified from different U.S. universities/colleges, of which 193 completed the survey, 44 of which (22.8%) originated from the 2015 investigation of construction faculty. The response rate was 18.3%, and included participants from 45 states and 115 institutions. The response rate according to the size of institution, is shown in detail in Table 1. The distribution of responses per state is shown in Figure 1. One hundred and seventy five of the responders were Assistant Professors, while 18 were newly promoted Associate Professors.

Table 1: Breakdown of responses according to size of institution

Type of Institution	Population Size	Sample Size (responses)	Response Rate (%)
4 year	34	3	8.8
MS Small	7	2	28.6
MS Medium	42	8	19.0
MS Large	107	22	20.6
PhD Moderate	83	16	19.3
PhD Higher	254	49	19.3
PhD Highest	525	93	17.7
Total	1052	193	18.3

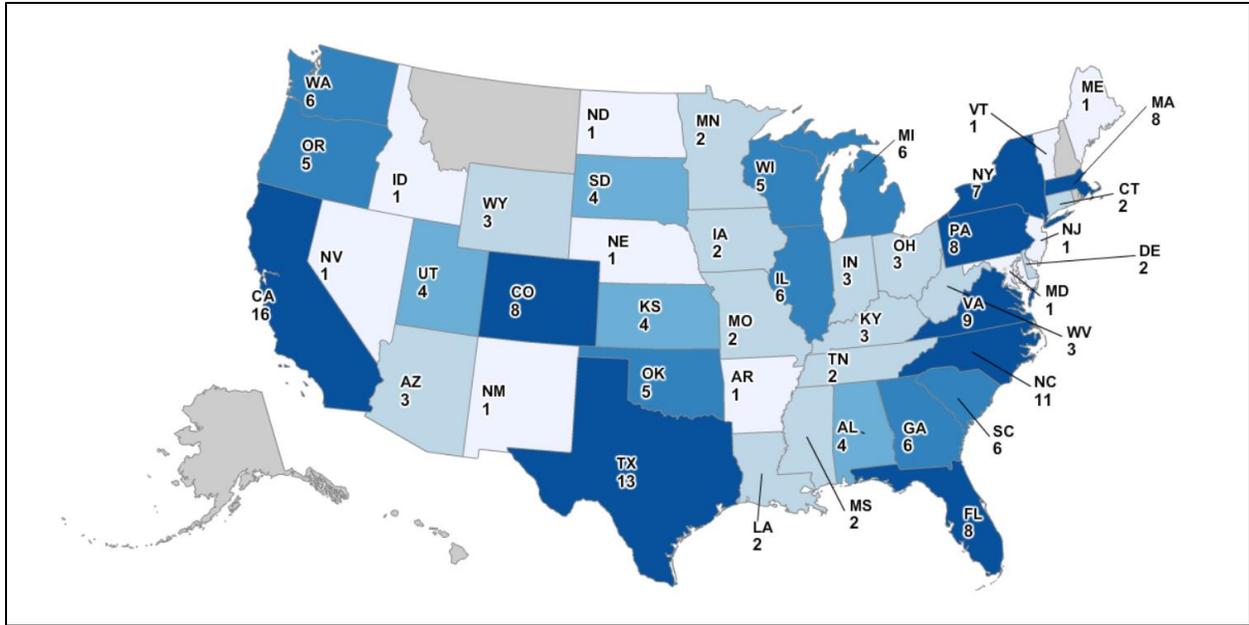


Figure 1: Distribution of Responses

Participants were further classified according to their discipline within Civil Engineering, Construction, and Civil Engineering Technology. The different categories include “Architectural Engineering”, “Coastal Engineering”, “Construction Engineering / Construction Management”, “Environmental Engineering”, “Geotechnical Engineering”, “Materials Engineering”, “Structural Engineering”, “Surveying Engineering / Geomatics Engineering”, “Transportation Engineering”, “Hydraulic Engineering / Hydrologic Engineering / Water Resources”, and “Other”. A distribution of the various disciplines is shown in Table 2. Participants had the capability to declare more than one discipline.

Table 2: Distribution of Disciplines

Discipline	Frequency
Architectural Engineering	5
Coastal Engineering	2
Construction Engineering / Construction Management	59
Environmental Engineering	41
Geotechnical Engineering	25
Materials Engineering	17
Structural Engineering	39
Surveying Engineering / Geomatics Engineering	5
Transportation Engineering	19
Hydraulic Engineering / Hydrologic Engineering / Water Resources	22

Some faculty were given specific guidelines and requirements to reach tenure, and 94 (48.7%) stated that they were given guidelines, while 99 (51.3%) said they did not, and each group responded concerning what these guidelines were for the former group, and what they perceive these guidelines are for the latter. These responses are summarized below:

Teaching Expectations

The faculty were also asked to identify how their teaching expectations look like. This information is tabulated in Table 3 and it is sorted according to the type of institution. Because of the low number of responses from MS institutions, their responses were combined. The numbers in parenthesis indicate the number of responses. Because of the small number of responses it is difficult to distinguish these trends according to discipline.

Table 3: Teaching expectations

Institution Type	Quantity of teaching
PhD Highest	2 – 3 courses per year (18) with some exceptions that teach more (4)
PhD Higher	3 – 4 courses per year (19) with some exceptions that teach more (2)
PhD Moderate	4 – 6 courses per year (2)
MS	4 – 6 courses per year (6)

As observed teaching quantity expectations are lower in PhD Highest institutions with the majority of the faculty teaching 2 to 3 classes per year, with some exceptions. Faculty from PhD Higher institutions teach on average 3 to 4 courses per year, and faculty from PhD Moderate and MS institution that number is 4 to 6 courses per year.

Research Expectations

Similar to teaching expectations, the faculty responding were asked to quantify their research funding expectations. That information is tabulated in Table 4, and it is sorted, once again, according to the type of institution. Because of the small number of responses only information from PhD Highest and PhD Higher Institutions is shown.

Table 4: Research funding expectations

Institution Type	Amount of research funding by tenure application			
	<\$500k	> \$500k - \$1mill	> \$1mill - \$1.5 mill	>\$1.5 mill
PhD Highest	7	13	21	3
PhD Higher	9	12	2	0

As observed, faculty from PhD highest institutions perceive that they are expected to earn funding between 1million to 1,5 million by tenure, while the majority of the responses from faculty in PhD Higher institutions perceive that they are expected to earn funding ranging from \$500k to \$1million.

Journal Publication Expectations

Faculty were also asked to indicate their journal publication requirements. That information is shown in Table 5, for PhD institutions and the information is sorted per institution type.

As observed, on average, faculty from PhD Highest institutions are expected to publish slightly more than faculty from other types of institution, with the most responded value being numbers

of publications by tenure application of greater than 15. The most common response for PhD Higher institutions was 10 – 14 journal publications by tenure application.

Table 5: Journal Publication expectations

Institution Type	Number of journal publications by tenure application			
	1-4	5 - 9	10 - 14	15+
PhD Highest	5	6	21	24
PhD Higher	2	9	20	6
PhD Moderate	3	4	3	1

Attainability of Tenure and Comparability of Tenure Requirements

Both groups were then asked to state with a “yes” or “no” if they think these guidelines are “Attainable” for faculty members in Civil Engineering and Construction Engineering, Construction Management or Civil Technology Programs. They were also asked to respond if they thought the requirements, perceived or otherwise, were comparable to other members of the faculty but not within their discipline, and comparable to other faculty within their college. These responses are summarized in Table 6.

Table 6: Attainability and Comparability of Requirements

Guidelines Provided	Attainable		Comparable within Department		Comparable to other Departments in the College	
	Yes	No	Yes	No	Yes	No
Yes	77	17	71	23	42	14
No	88	9	79	18	68	30

Table 7: Attainability of Tenure per type of Institution (with combined MS institutions)

Type of Institution	Provided Guidelines	Tenure Requirements Attainable	
		Yes	No
PhD Highest	Yes	36	11
	No	41	5
PhD Higher	Yes	21	4
	No	22	2
PhD Moderate	Yes	6	1
	No	8	0
MS All	Yes	14	1
	No	14	2
4-Year	Yes	0	0
	No	3	0

Surprisingly, the proportion of faculty that received guidelines and thought that the requirements are attainable is significantly lower than the proportion of faculty that did not receive guidelines and thought that the requirements are attainable (p-value=0.0380). Specifically, the odds of perceiving that the requirements are attainable for faculty that received guidelines are estimated to be 0.1953 times to 1.0990 times as large as the odds of perceiving that the requirements are attainable for the other group that did not receive guidelines (95% confidence interval).

However, there is no significant difference between the proportion of faculty that received and did not receive guidelines and believe that the requirements are comparable within the department and with other departments in the college.

Looking at the attainability of tenure according to the type of institution, the results are tabulated in Table 7. After accounting for the type of institution, there is no significant difference between the proportion of faculty that received and did not receive guidelines and believe that the requirements are attainable.

Time Spent Teaching and Research

Regarding Time spent conducting research and teaching, there was a clear disparity between PhD Institutions. Table 8 shows the quartiles and median values for the amount of time spent in Teaching and Research. The box plots of this information is shown in Figure 2.

Table 8: Percentage of Time Spent in Research & Teaching

	PhD Highest		PhD Higher		PhD Moderate	
	Research	Teaching	Research	Teaching	Research	Teaching
Minimum %	20	15	20	10	10	35
Q1 %	40	30	35	30	23.75	40
Median %	50	40	50	40	30	50
Q3 %	60	40	50	50	40	60
Maximum %	80	75	80	70	60	80

As observed the median value of the research time and teaching time is the same for faculty in PhD Highest and PhD Higher Institutions, suggesting that there are similarities between the amount of time spent in research and teaching in both types of institutions. What is important to note though is that, on average, faculty from PhD Higher institutions teach two or more courses per year than faculty from PhD Highest institutions.

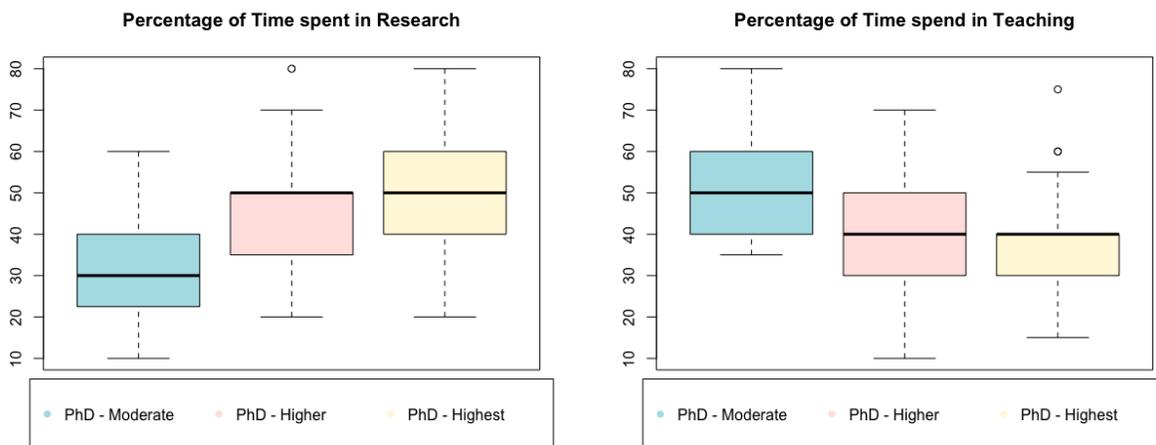


Figure 2: Percentage of Faculty Time Spent in Research (left) and Teaching (right)

Impediments

When asked on the impediments to tenure, faculty members rated the likelihood of these impediments affecting their tenure process. That information is shown in Table 9. Highlighted are the observations where at least 50% of responses were either likely or unlikely to affect faculty tenure process. As observed, at least half of the faculty members from MS institutions and PhD Moderate institutions, rated that Teaching and Journal Publication requirements were likely to affect their tenure process. Similarly, faculty members from PhD Highest and PhD Higher institutions, reported that service requirements were unlikely to affect their tenure requirements, but at least 50% of faculty members from MS institutions rated that service requirements would. Regarding lack of appreciation of applied research from funding agencies, only a majority from PhD Higher and PhD Moderate institutions indicated that as an impediment. What is surprising is that the majority of faculty from all types of institutions stated that the quality and availability of students is an impediment to their tenure process. Lack of mentoring seemed to be of greater concern with faculty from PhD Higher and MS institutions. Finally interdepartmental politics seemed to be of greater concern for faculty from PhD Moderate institutions.

Table 9: Comparison of Impediments

	Likelihood	PhD Highest	PhD Higher	PhD Moderate	MS
Teaching Load Requirements	Extr. Unlikely / Unlikely	31 (34.1%)	18 (37.5%)	2 (12.5%)	5 (15.6%)
	Neutral	20 (22.0%)	7 (14.6%)	5 (31.3%)	2 (6.3%)
	Likely / Extr. Likely	40 (44.0%)	23 (47.9%)	9 (56.3%)	25 (78.1%)
Journal Publication Requirements	Extr. Unlikely / Unlikely	28 (30.8%)	16 (33.3%)	3 (18.8%)	5 (15.6%)
	Neutral	22 (24.2%)	14 (29.2%)	5 (31.3%)	8 (25.0%)
	Likely / Extr. Likely	41 (45.1%)	18 (37.5%)	8 (50.0%)	19 (59.4%)
Service Requirements	Extr. Unlikely / Unlikely	48 (52.7%)	26 (54.2%)	6 (37.5%)	13 (40.6%)
	Neutral	22 (24.2%)	11 (22.9%)	3 (18.8%)	3 (9.4%)
	Likely / Extr. Likely	21 (23.1%)	11 (22.9%)	7 (43.8%)	16 (50.0%)
Appr. of Applied Research by Fund. Agencies	Extr. Unlikely / Unlikely	27 (29.7%)	12 (25.0%)	1 (6.3%)	8 (25.0%)
	Neutral	24 (26.4%)	12 (25.0%)	4 (25.0%)	11 (34.4%)
	Likely / Extr. Likely	40 (44.0%)	24 (50.0%)	11 (68.8%)	13 (40.6%)
Comp. within department for funds	Extr. Unlikely / Unlikely	37 (40.7%)	18 (37.5%)	4 (25.0%)	13 (40.6%)
	Neutral	28 (30.8%)	12 (25.0%)	5 (31.3%)	7 (21.9%)
	Likely / Extr. Likely	26 (28.6%)	18 (37.5%)	7 (43.8%)	12 (37.5%)
Availability / Quality of Students	Extr. Unlikely / Unlikely	12 (13.2%)	4 (8.3%)	2 (12.5%)	7 (21.9%)
	Neutral	13 (14.3%)	5 (10.4%)	0 (0.0%)	7 (21.9%)
	Likely / Extr. Likely	66 (72.5%)	39 (81.3%)	14 (87.5%)	18 (56.3%)
Lack of Mentoring for Faculty	Extr. Unlikely / Unlikely	28 (30.8%)	16 (33.3%)	3 (18.8%)	6 (18.8%)
	Neutral	23 (25.3%)	3 (6.3%)	6 (37.5%)	10 (31.3%)
	Likely / Extr. Likely	40 (44.0%)	29 (60.4%)	7 (43.8%)	16 (50%)
Interdepartmental Politics	Extr. Unlikely / Unlikely	26 (28.6%)	16 (33.3%)	3 (18.8%)	12 (37.5%)
	Neutral	27 (29.7%)	14 (29.2%)	5 (31.3%)	7 (21.9%)
	Likely / Extr. Likely	38 (41.8%)	18 (37.5%)	8 (50.0%)	13 (40.6%)

Faculty were also asked to identify any other impediments and that information is shown in Table 10. Due to the low number of responses, comments from MS universities were all placed

in one category. The numbers in parenthesis indicate the numbers these responses appeared in the comments. As observed, the majority of the responses were from PhD Highest institutions. There does seem to be a theme in the responses, where faculty see lack of support to be a major obstacle to achieving tenure. That lack of support can be from the issue of balancing work expectation and family commitments, but also from lack of institutional support that include lack of support for parental leave, lack of mentorship, and as well as from issues stemming from interdepartmental politics.

Lack of funding was also an issue, especially for PhD institutions. Some of the comments from the faculty, suggested that the current funding environment is different from previous years, with less funding available from Federal and State agencies, and current tenure expectations do not reflect this reduction in funding. The existence of biases is also a factor, and that was identified from faculty in PhD Highest and Higher institutions, as well as from faculty in MS institutions.

Table 10: Summary of responses regarding other impediments

PhD Highest	<p><u>Lack of support:</u> Work-life Balance (7), Support for parental leave (3), Lack of Mentoring-Mentorship gap (5), Interdepartmental Politics/Ego/Politics (3), Multiple new courses (1), High Turnover in department leadership (1)</p> <p><u>Lack of funding:</u> Limited external funds (6), expectations not adapting to funding environment (2), Funding agencies preferring seasoned faculty (1), lack of funding in primary research area (1)</p> <p><u>Biases:</u> Gender/Foreign Faculty (6)</p> <p><u>Vague/Increasing Expectations:</u> (4)</p> <p><u>High work load:</u> (3)</p> <p><u>Timeliness for funding and publications:</u> (3)</p>
PhD Higher	<p><u>Lack of Support:</u> Resources at University (3), Collaboration with other faculty (2), Work-Life balance (2)</p> <p><u>Biases:</u> (2)</p> <p><u>Lack of Funding:</u> (5)</p> <p><u>Vague/Increasing Expectations:</u> (2)</p>
PhD Moderate	<p>Work-Life balance (1)</p> <p>High Teaching Load (1)</p> <p>Multiple new courses (1)</p> <p>High Service requirements (1)</p> <p>Lack of facilities (1)</p>
MS	<p><u>Lack of Resources:</u> PhD students (1), Small start-up (1), Limited facilities (1),</p> <p><u>Work Load:</u> Grading/Teaching Service (2)</p> <p>Upper administration politics (1)</p> <p>Racism/biases (1)</p> <p>Licensure requirements (1)</p> <p>Lack of appreciation of past work experience (1)</p>

Observations, Conclusions, and Recommendations

The sample was clearly heterogeneous in being recruited from 45 different states and 115 institutions, and therefore, our findings may be generalized to faculty for Civil Engineering, Construction and Civil Engineering Technology across the U.S. However, the findings presented in this paper should not generalize to faculty at other disciplines.

It is clear that faculty perceive several impediments in their tenure process, a major one being the lack of support, as observed in Table 10. Lack of support was not specific to one item in particular, since faculty identified a variety of issues that would be considered support. Issues like work-life balance, and parental leave, have been identified by other researchers [10, 11], yet it seems to be still an issue by the number of faculty that identified this as an impediment. In addition support and mentoring for issues regarding biases and treatment of certain faculty populations is necessary [14].

Conversations regarding work-life balance need to be taking place between administrators and junior faculty, in order to address junior faculty concerns and to assist them in the tenure process. This support can be in the form of mentoring, that would address time management and work expectations. In addition, assistant could be in the form of coordinating teaching requirements in the form of reduced new course preparations in the first few years. Department administrators as well as senior faculty should be aware that life exists outside the academic environment, even for junior faculty. To assists in this aspect, it is important for junior faculty to become aware of the tenure expectations and the process to tenure and to make a plan to separate work from personal life [10]. Becoming aware of the expectations is key, since vagueness in what is expected can be detrimental to a faculty members psyche.

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