



Pre- and Post-Tenure: Perceptions of Requirements and Impediments for Faculty in Civil Engineering, Architectural Engineering, and Construction Disciplines

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Pre and Post Tenure: Perceptions of Requirements and Impediments for Faculty in Civil Engineering, Architectural Engineering, Construction Disciplines

Abstract

The tenure process is a way of life in the majority of US higher education institutions, and faculty in engineering disciplines are no exceptions to this practice. A tenured position is coveted and sought by many aspiring assistant professors. Since the tenure process began in the US in 1915, it has faced both criticism and praise. This paper aims to highlight the variability in perceptions of tenure requirements among assistant professors in civil engineering, architectural engineering, and construction programs, between universities of different research activity intensities and assess their perceptions of impediments towards obtaining tenure. Associate professors in the same programs were also surveyed in order to reflect and report their perceptions of their requirements, and assess the impediments they faced towards their tenure process. The motivation for this research is to surface some of the concerns assistant professors have regarding the tenure process, and to identify if these concerns are also true to tenured faculty. 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. Faculty responses were categorized according to the Carnegie Classification of Institutions of Higher education that classifies institutions according to their research activity. The authors hope that this paper will spark conversations regarding clarity of requirements and concerns about work-life balance for faculty in the tenure-track.

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

Introduction

Since its inception in 1915 [1], tenure has been the goal for many assistant professors at US institutions. Tenure has faced both criticism and praise through the years. Arguments against tenure range from Sowell [2] stating that the tenure process and system has a great “potential for irresponsibility”, Aigner [3] suggesting the process promotes “incompetent teaching and stagnant thinking”, and Varma [1] stating that due to the tenure process faculty prioritize research over teaching. Arguments for tenure include providing freedom to faculty, promoting reasoning, and developing original independent research [1]. Epstein et al. [4] also state that tenure promotes and strengthens public confidence in academic research.

In any case, the tenure process is the current norm in US higher education institutions, and junior faculty traversing this path need to satisfy certain requirements that may or may not prove to be impediments.

Background

Faculty in civil engineering, civil engineering technology, and construction programs have expressed concerns about meeting the vague and increasing expectations for tenure. Previous

investigations showed that some impediments include lack of funding opportunities, high teaching expectation and teaching load, as well as lack of quality students to employ for research and as teaching assistants [5, 6]. Comparison of perceptions of these impediments pre and post tenure among faculty has not been performed.

Requirements for tenure vary between institutions, and even between academic units within the same institution. In addition, guidelines for tenure are often described as vague and emphasize qualitative goals, thus creating confusion among tenure-track (TT) faculty. This vagueness creates additional anxiety for individuals who dedicate numerous hours in research, teaching, and service tasks, as required for their positions [7].

Advice from senior faculty about this process comes in many forms, through mentorship and support, publications, and instructional manuscripts [8-11]. Information provided during mentorship is usually very private, and general guidelines and “how-to” examples are not applicable to faculty in engineering in general, or in civil engineering or construction disciplines in particular. The goal of this investigation is to assess perceptions of the impediments that civil engineering and construction faculty experience, perceived or otherwise, in attaining tenure, and compare these viewpoints between TT and tenured faculty. In addition, a comparison between requirements is presented based on the Carnegie Classification of Institutions categories faculty belong.

Methodology

For this investigation, a survey was developed and distributed in the fall of 2019 to the U.S. population of tenured and TT faculty in civil engineering, construction engineering, construction management, and civil engineering technology programs to gather the various perceptions of tenure requirements and impediments. Faculty from programs accredited by ABET [12] and the American Council for Construction (ACCE) [13] were selected, and in total 440 programs were identified from ABET and 76 from ACCE.

Contact information of those faculty members with the rank of Assistant and Associate Professor was compiled from an internet search of the various department/school websites. The departments/schools were further identified and categorized according to the 2018 Carnegie Classification of Institutions [14] they belong to as follows:

- R1: Doctoral Universities - Very high research activity,
- R2: Doctoral Universities - High research activity,
- D/PU: Doctoral/Professional Universities,
- M1: Master's Colleges and Universities - Larger programs,
- M2: Master's Colleges and Universities - Medium programs,
- M3: Master's Colleges and Universities - Smaller programs, and
- Baccalaureate Colleges: Arts & Science Focus or Engineering Focus.

The survey consisted of questions of identification and differentiation such as demographics, 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, the

percentage of time they dedicate to research/teaching/service/other activities, and state that percentage according to their departmental guidelines for their job description.

Survey participants were asked to state if they were given guidelines of tenure requirements and to provide these guidelines in terms of “Teaching Work Load”, “Teaching Evaluation Metrics”, “Research Dollar Amount”, “Number of Peer Reviewed Journal Articles”, “Participation in Conference Proceedings”, and any other guidelines. If faculty were not given such guidelines, they are asked to state what they thought these requirements were in terms of the above-mentioned measures. If faculty were given specific guidelines they were asked to also state how accurate these guidelines were to their perception of the true expectations for tenure.

All faculty were also asked to state if they thought these guidelines are “Attainable” for faculty members in their discipline and their academic unit, and if their requirements are “Comparable” to faculty in their academic unit but not in their discipline, and “Comparable” to faculty in other departments in their College.

Finally, participants were asked to rate the following potential impediments on their likelihood of influencing the tenure process:

- Teaching load requirements,
- Expectation of peer-reviewed journal publications,
- Service expectations,
- Availability of funds for research in their fields
- Appreciation for area of research by tenure review committee(s)
- Competition within department for funds,
- Availability of Teaching Assistants (TA) to assist with grading,
- Availability of students to employ as researchers,
- Quality of students to employ as researchers,
- Availability of faculty mentoring,
- Quality of faculty mentoring,
- Interdepartmental politics, and
- Managing work-life balance

Results

The responses to the survey were collected using Qualtrics. 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 respond.

A total of 2,317 participants were identified from different U.S. universities/colleges, of which 282 provided valid responses to the survey (12.17% response rate). Responses included participants from 43 states, and the District of Columbia, and represented faculty from 162 different institutions. The distribution of responses per state is shown in Figure 1. One hundred and forty eight (148) of the respondents were Assistant Professors (Tenure-Track), while 120 were tenured faculty members. The distribution of the responses according to institution type and tenure characterization is shown in Table 1.

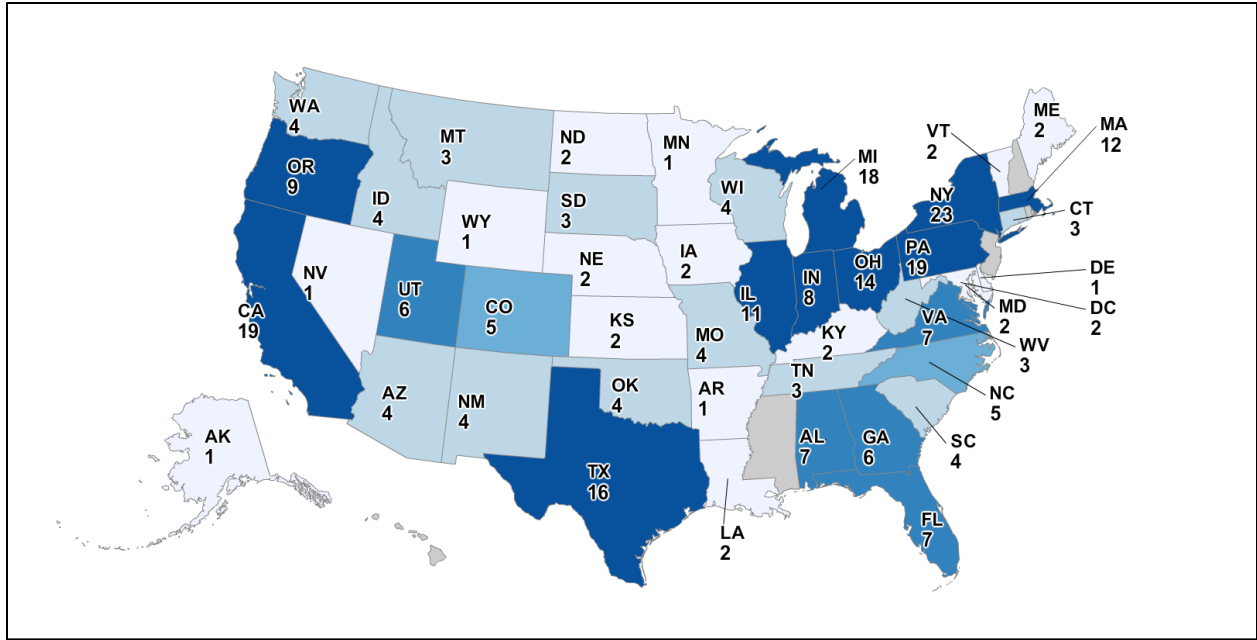


Figure 1: Distribution of Responses

Participants were further classified according to their sub-discipline. A distribution of the various sub-disciplines is shown in Table 2. Participants had the capability to declare more than one discipline from a list of options as well as add a discipline not included. In the “Other Category, participants responded with a range of sub-disciplines that included: Construction Science, Engineering Leadership, Facilities Management, Fluid Mechanics, Infrastructure Systems, Information Technology, Machine Learning, Mechanics, Pavement Engineering, Risk, Systems, Infrastructure Policy, Sensors & Systems, and Sustainability.

Table 1: Distribution of Responses per Institution Category and Tenure

Institution Category	TT	Tenured	Total
R1	93	73	166
R2	30	37	67
D/PU	6	9	15
M1	9	13	22
M2	7	1	8
M3	1	0	1
B	2	1	3
Total	148	134	282

Some faculty were given specific guidelines and requirements to reach tenure, while others stated that they were not. As shown in Table 3, 45.9% of the TT faculty surveyed stated that they were provided guidelines, while 54.1% said they were not. Similarly, 58.6% of the tenured faculty stated that they were provided guidelines, while 41.4% of them said that they were not.

Table 2: Distribution of Sub-disciplines

Sub-discipline	Frequency
Architectural	14
Coastal	9
Construction Engineering	28
Construction Management	38
Environmental	68
Geotechnical	37
Hydraulic/Hydrologic/Water Resources	45
Materials	23
Structural	77
Surveying/Geomatics Engineering	4
Transportation	31
Other	18

In the survey, participants were asked to state what these guidelines were if they were provided, while if they were not, they were asked to state what they were perceived to be. These responses are summarized in the following sections.

Table 3: Provision of Guidelines

Rank	Guidelines	R1	R2	D/PU	M1	M2	M3	B	Sum	% per Rank
TT	Provided	36	15	2	7	6	1	1	68	45.9%
	Not Provided	57	15	4	2	1	0	1	80	54.1%
Tenured	Provided	37	24	7	10	0	0	0	78	58.6%
	Not Provided	36	13	1	3	1	0	1	55	41.4%
	Sum	166	67	14	22	8	1	3	281	

Teaching Expectations

The faculty were asked to identify their teaching expectations as courses taught per year. This information is tabulated in Table 4 and it is sorted according to the type of institution and the faculty rank (TT or tenured). Because of the low number of responses from Masters (M) and Baccalaureate only (B) institutions, their responses were combined with those from D/PU institutions. The numbers in the tables indicate the frequency of the responses. Due to the small number of responses it is difficult to distinguish these trends according to sub-discipline.

As observed, teaching quantity expectations are lower in R1 institutions with the majority of the faculty teaching 1 to 4 classes per year, with some exceptions of faculty teaching more. Faculty from R2 institutions teach on average 3 to 4 courses per year with some exceptions. For faculty

from D/PU, Masters, and Baccalaureate only institutions teaching load is on average 5 to 6 courses per year, with several faculty teaching more than 7 courses per year.

Table 4: Quantity of Teaching

Type	Rank	Quantity of Teaching per Year (% of responses)			
		1-2 courses	3-4 courses	5-6 courses	7+ courses
R1	TT	33 (38.4%)	49 (56.9%)	3 (3.5%)	1 (1.2%)
	Tenured	8 (11.1%)	58 (80.6%)	6 (8.33%)	-
R2	TT	4 (16%)	14 (56%)	4 (16%)	3 (12%)
	Tenured	3 (9.7%)	22 (71.0%)	5 (16.1%)	1 (3.2%)
Other	TT	2 (9.5%)	4 (23.8%)	12 (57.1%)	3 (14.3%)
	Tenured	1 (5.2%)	3 (15.8%)	8 (42.1%)	7 (36.8%)

Research Funding Expectations

Similar to teaching expectations, the faculty responding were asked to quantify their research funding expectations. That information is tabulated in Table 5, and it is sorted, according to the type of institution, faculty rank, and whether guidelines were provided at hiring.

Table 5: Research funding expectations

Type	Rank	Guidelines Provided	Amount of research funding by tenure application				
			<\$500k	> \$500k - \$1mill	> \$1mill - \$1.5 mill	>\$1.5 mill	NA or Unspecified
R1	TT	Yes	1	13	1	-	16
	Tenured		3	12	1	-	16
	TT	No	2	26	2	3	16
	Tenured		2	14	2	1	11
R2	TT	Yes	3	3	-	-	6
	Tenured		7	2	-	-	9
	TT	No	5	5	1	1	4
	Tenured		6	3	-	-	4
Other	TT	Yes	6	-	-	-	6
	Tenured		7	-	-	-	7
	TT	No	3	-	-	-	4
	Tenured		-	-	-	-	5

The majority of the research funding expectations for tenure in R1 institutions, regardless of rank or whether guidelines were provided, falls in the range of \$500k - \$1 million by tenure. The most popular response in that range was \$1 million. There were some exceptions with responses of higher values as well, but 41.5% percent of the R1 participants stated that funding requirements were unspecified or not available.

Some comments from TT faculty suggested that there were no values specified but they should aim for enough funds to support students and research. Others also suggested that they should be aiming for securing funds that equal their start-up funds, or a multiple of that value. Some suggested that their departments or universities informally prefer federal funds, but there was no

“official stance”. Others also suggested that some departments expect a greater value of funding from experimental researchers compared to computational researchers. TT faculty recognize that funding is considered to be important and feel that sometimes it is the item that drives their tenure process:

“Not specified, but is considered to be VERY important, if not most important” - R1 TT

“On paper, we are not allowed to consider funding in the requirements for getting promoted. However, everyone does and so it is unclear where that bar resides.” - R1 TT

Tenured faculty from R1 expressed similar opinions as well, emphasizing the importance of federal grants, and obtaining enough funding to support research students, but their comments also suggest that the dollar value is not set in stone and that quality and type of research is considered when committees make tenure decisions:

“Originally suggested about \$1M was required, although in fact many faculty have been granted tenure with smaller amounts” - R1 tenured

“No hard target. Dean suggests \$1 million, but lower amounts are often acceptable depending on circumstances”- R1 Tenured

For R2 institutions, 21 of the 59 responses stated funding values below \$500k, with \$500k being the most common value. Thirteen of the respondents stated values in the \$500k to \$1 million range, with 1 million dollars being the most frequent response. This suggests that TT faculty at some R2 institutions feel that they need to secure funding in the same ranges as R1 institutions. Also of note is that 23 of the 59 responses (38.9%) stated that funding requirements were unspecified or not available. Comments from TT faculty included statements like: *“6X startup”*, and *“Ambiguous”*. Some participants were verbal about their concerns with the following comments:

“No specific requirements. Recommended that I get at least one large, national-level research grant before I go up for tenure” - R2 TT

“No written amount, but based on others packets 500k is an amount necessary to avoid scrutiny from other faculty during review” - R2 TT

Tenured faculty also expressed similar opinions regarding the vagueness of the amount needed for funding:

“Everything was vague on purpose” - R2 Tenured

“Not a fixed, set amount, but the ability to generate grant monies is a key aspect of getting tenure” - R2 Tenured

For D/PU, Master’s and Baccalaureate institutions the responses were too few to make any general conclusions, but 22 of the 38 participants (57.9%) stated that guidelines for a funding value are nonexistent or undefined. The remaining responses stated value below \$500k, with \$0 being a response for eight of the participants.

Journal Publication Expectations

Faculty were also asked to indicate their journal publication requirements. That information is shown in Table 6, and the information is sorted per institution type, faculty rank, and whether guidelines were provided.

Table 6: Journal Publication expectations

Type	Rank	Guidelines Provided	Number of journal publications by tenure application				
			1-4	5 - 9	10 - 14	15+	NA or Unspecified
R1	TT	Yes	1	4	12	5	10
	Tenured		2	4	12	7	8
	TT	No	1	5	17	18	12
	Tenured		-	3	16	10	3
R2	TT	Yes	-	6	5	-	2
	Tenured		3	4	5	3	2
	TT	No	1	3	7	-	4
	Tenured		2	3	5	-	2
Other	TT	Yes	7	2	1	-	2
	Tenured		6	5	1	-	5
	TT	No	3	2	-	-	2
	Tenured		-	2	-	-	3

Faculty from R1 institutions have a higher publication expectation, with faculty that were not provided guidelines stating a higher value than those who were, whether tenured or not. The most frequent response was between 10 - 14 journal articles by tenure, with 10 being the most popular answer. Thirty-three of the 150 (22%) faculty from R1 institutions stated that the publication number is not specified.

TT faculty provided comments that suggested that publications without their adviser are expected, and publications with students are encouraged. Also high impact journals are more valued. Some faculty expressed that because of the uncertainty, they are forced to estimate the number of publications they need to achieve, and try to achieve more to feel “safe”:

“..minimum somewhere in range of 12-15 (?), safe range would be more like 20-30 (?)”- R1 TT

“... the number seems to bounce around. When I started 3 years ago it was pretty well understood it was 12, but now our Chair is saying 15-16. During annual reviews the comments also seem to attack which Journal articles are placed, so that 2 in "high-quality" journals seems better than 4 in "ok" journals. What is "high-quality"?”- R1 TT

Tenured faculty from R1 institutions also expressed similar viewpoints regarding the vagueness of the instructions, stressed that journal publications with students are important, and articles in “high impact” journals are valued more.

In R2 institutions, the majority of the responses indicate that the journal expectations were between 1 and 2 per year, but comments suggest that they should be aiming for more to feel “safe”:

“I suspect need 10ish pubs to avoid excess scrutiny”- R2 TT

Tenured faculty in R2 institutions expressed similar opinions, and also indicated that the expectations seem to be increasing, and changing during the tenure process:

“... no quantifiable goal, but no matter what I published, department committee feedback was ‘that is not enough’” - R2 Tenured

Attainability of Tenure and Comparability of Tenure Requirements

Faculty that were given guidelines were asked to rate whether these guidelines are a true representation of what is expected of faculty in their department to obtain tenure. Their responses are shown according to the type of university and their rank in Table 7. The majority, 86 of the 129 participants (66.7%), believe that the guidelines they were provided are a true representation of the expected guidelines (“definitely yes” and “probably yes”), while 18 (13.9%) are unsure.

Table 7: Guidelines given are a true representation

Type	Rank	Def. Yes	Prob. Yes	Might/Might not	Prob. Not	Def. Not
R1	TT	7	18	2	3	4
	Tenured	7	9	8	4	4
R2	TT	-	7	2	1	1
	Tenured	7	9	4	1	1
Other	TT	6	7	1	1	-
	Tenured	-	9	1	2	3
Total		27	59	18	12	13

Even though faculty members expressed that the guidelines are a true representation of the expectations, they did voice some concerns. The first item of concern was the difficulty in securing funding from grants. This concern was observed from both R1 and R2 faculty and whether they were tenured or not. Specific concerns that were mentioned is the cyclic nature of funding, the effort it takes to write a successful grant, and the amount of funding that needs to be secured. In some R1 institution faculty expressed that in their discipline it is difficult to secure funding, and that they should not be compared with other disciplines on the funding level. In R2 and D+PU institutions, concerns were expressed on the amount of teaching that was expected, in conjunction with the increased research funding level and quality of research. Some faculty also expressed the opinion that the requirements are a true representation and achievable, but at a cost of working long hours and not having a work-life balance.

Faculty members were asked to state with a “yes” or a “no” if they think these guidelines (provided or perceived) are “Attainable” for faculty members in their discipline and academic unit. 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 8.

Table 8: Attainability and Comparability of Requirements

Type	Rank	Attainable		Comparable within Department		Comparable to other Departments in the College	
		Yes	No	Yes	No	Yes	No
R1	TT	68	4	56	12	38	19
	Tenured	50	4	41	7	29	14
R2	TT	12	4	16	3	11	8
	Tenured	27	3	24	3	18	10
Other	TT	21	1	13	3	11	6
	Tenured	18	1	12	4	12	3
Total		196	17	162	32	119	60

As observed, 196 of the 213 participants (92.0%) of the participants who responded to these questions indicated that the requirements are attainable. Similarly, 162 of the 194 participants (83.5%) indicated that their requirements are comparable within their departments, while 119 of 179 (66.5%) indicated that their requirements are comparable within their college.

Time Dedicated to Teaching and Research

Participating faculty were asked to indicate the amount of time they devote to work activities (research/teaching/service), by looking at their average week and indicating their time in hours. The information is depicted in box plots according to the type of institution and the rank of the faculty members in Figure 2. The blue color indicates responses from tenured faculty and the yellow from TT faculty.

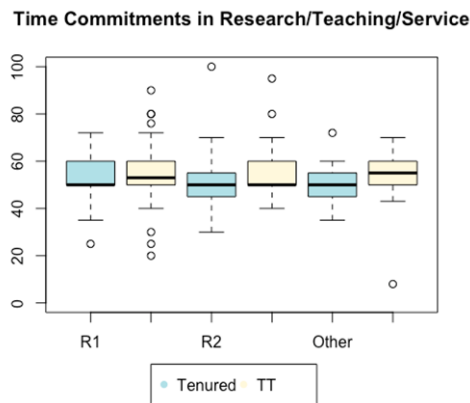


Figure 2: Amount of time dedicated to work activities

The median values for the amount of hours is approximately the same in all types of institutions and all ranks, with about 50 hours per week dedicated to work activities. TT faculty in R1 institutions have a median time of 53 hours, while TT in D/PU, M and B institutions have a median time of 55 hours. This suggests that on average, faculty are committing similar amount of time in work activities in all institution types.

Faculty were also asked to indicate the percentage of their time they commit to research and teaching tasks, and were asked to compare their contractual obligations to their actual time dedicated to them. The results are shown in box plots in Figure 3 for research and in Figure 4 for teaching. Once again, the yellow color indicates responses from TT faculty and the blue for tenured faculty. Responses for all other types of institutions were, once again, combined due to the low response rate from these types of institutions.

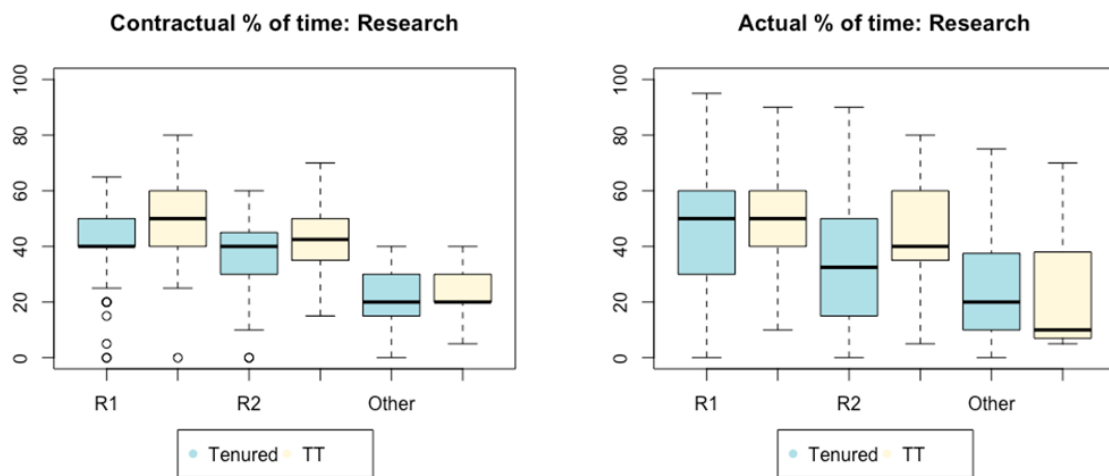


Figure 3: Percentage of faculty time in research

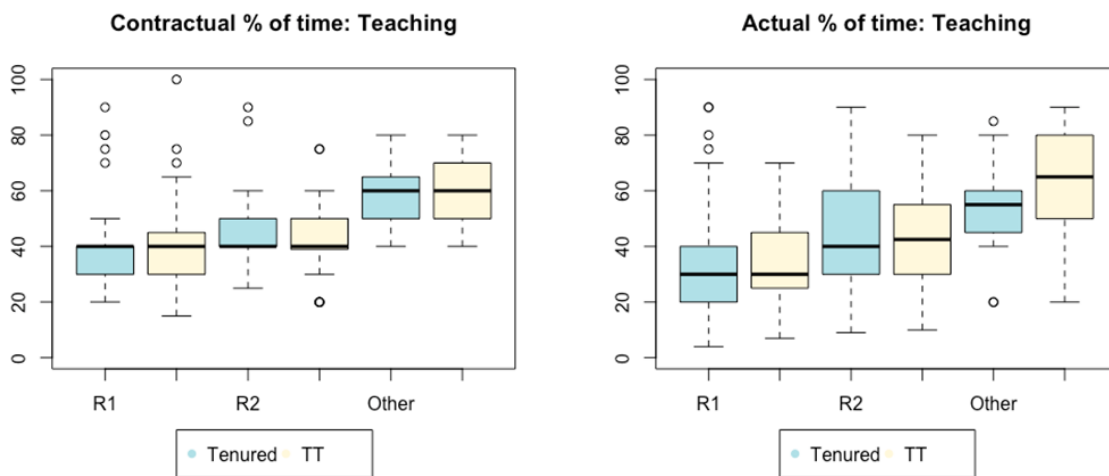


Figure 4: Percentage of faculty time in teaching

The median contractual time for research in R1 institutions for TT faculty is 50% while the equivalent percentage for tenured time is 40%. The median percentage of time TT faculty in R1 institutions that is in reality dedicated to research activities is the same for both TT and tenured faculty at 50%.

For R2 institutions, the median contractual time for research is 42.5% for TT faculty and 40% for tenured. The amount of time R2 faculty dedicate to research activities is 40% for TT and 32.5% for tenured faculty.

Regarding percentage of time dedicated in teaching activities, the values for TT and tenured faculty in R1 institutions is 40%. Their median percentage of time they actually dedicate in teaching activities is also the same for both groups at 30%

For R2 institutions, the median value for the contractual percentage of time in teaching activities for TT and tenured faculty is 40% while the median value for the actual time dedicated is 42.5% for TT faculty and 40% for tenured. What is interesting to note is that in R1 and R2 institutions, the contractual percentage of time is 40% for TT and tenured faculty, but in R2 institutions faculty are required to teach slightly more classes as seen in Table 4.

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, and is separated according to the faculty rank, TT or tenured. For tenured faculty, they were asked to reflect on how these impediments affected their tenure process. Highlighted are the observations where at least 50% of responses were either likely or unlikely to affect faculty tenure process.

For TT faculty, the impediments identified to be negatively influencing their tenure process vary according to the type of institution. At least 50% of TT faculty from both R1 (51.9%) and R2 (53.8%) institutions stated that there is a lack of availability of funds for research in their field. This echoes statements mentioned earlier regarding obtaining funding for research. Of faculty from R2 institutions, 55.6% stated that availability of students to employ as researchers, negatively influences their tenure process, while 59.3% of TT faculty from R1 institutions stated that managing work-life balance negatively influences their tenure process. For tenured faculty, one major impediment that was identified by more than 50% of the faculty in R1 institutions to have negatively affected their tenure process was also “Managing work-life balance”.

Limitations

The survey attempted to capture viewpoints from a national sample of TT and tenured faculty in US institutions. Missing from the sample are responses from faculty that did not achieve tenure and are no longer employed in educational institutions. Contact information for this population is not available and subsequently their stories, and input is necessary to correctly identify all the impediments to the tenure process.

Table 9: Comparison of Impediments

	Likelihood	TT			Tenured		
		R1	R2	D/PU+M+B	R1	R2	D/PU+M+B
My teaching load	Positive	41.0%	50.0%	52.2%	47.5%	51.5%	52.4%
	Neither	27.7%	11.5%	17.4%	32.8%	30.3%	9.5%
	Negative	31.3%	38.5%	30.4%	19.7%	18.2%	38.1%
Expect. of peer-reviewed journal publications	Positive	64.6%	65.4%	47.8%	62.7%	51.5%	52.4%
	Neither	19.0%	23.1%	43.5%	27.1%	33.3%	28.6%
	Negative	16.5%	11.5%	8.7%	10.2%	15.2%	19.0%
My service expectations	Positive	30.9%	44.4%	69.6%	37.7%	36.4%	47.6%
	Neither	34.6%	44.4%	21.7%	44.3%	45.5%	19.0%
	Negative	34.6%	11.1%	8.7%	18.0%	18.2%	33.3%
Availability of funds for research in my field	Positive	35.8%	30.8%	19.0%	31.7%	39.4%	47.6%
	Neither	12.3%	15.4%	38.1%	21.7%	27.3%	28.6%
	Negative	51.9%	53.8%	42.9%	46.7%	33.3%	23.8%
Apprec. for my area of research by review commit.	Positive	42.5%	40.9%	42.9%	39.0%	50.0%	52.4%
	Neither	26.0%	31.8%	47.6%	33.9%	30.0%	23.8%
	Negative	31.5%	27.3%	9.5%	27.1%	20.0%	23.8%
Competition within academic unit for funds	Positive	16.2%	28.0%	10.0%	14.3%	3.2%	20.0%
	Neither	54.1%	40.0%	75.0%	63.3%	77.4%	75.0%
	Negative	29.7%	32.0%	15.0%	22.4%	19.4%	5.0%
Availability of TA for grading	Positive	41.5%	53.8%	47.6%	42.4%	43.8%	15.0%
	Neither	28.0%	23.1%	9.5%	27.1%	43.8%	20.0%
	Negative	30.5%	23.1%	42.9%	30.5%	12.5%	65.0%
Availability of students to employ as researchers.	Positive	51.8%	29.6%	39.1%	43.3%	39.4%	38.1%
	Neither	20.5%	14.8%	13.0%	31.7%	33.3%	23.8%
	Negative	27.7%	55.6%	47.8%	25.0%	27.3%	38.1%
Quality of students to employ as researchers	Positive	48.2%	33.3%	30.4%	45.0%	36.4%	38.1%
	Neither	9.6%	22.2%	26.1%	20.0%	33.3%	19.0%
	Negative	42.2%	44.4%	43.5%	35.0%	30.3%	42.9%
Availability of faculty mentoring	Positive	50.0%	29.6%	69.6%	29.3%	41.9%	42.9%
	Neither	23.2%	29.6%	13.0%	24.1%	29.0%	19.0%
	Negative	26.8%	40.7%	17.4%	46.6%	29.0%	38.1%
Quality of faculty mentoring	Positive	51.9%	37.0%	73.9%	31.0%	46.7%	47.6%
	Neither	21.0%	25.9%	8.7%	22.4%	30.0%	19.0%
	Negative	27.2%	37.0%	17.4%	46.6%	23.3%	33.3%
Interdepartmental politics	Positive	15.6%	25.9%	52.2%	17.2%	26.5%	25.0%
	Neither	37.7%	48.1%	26.1%	36.2%	47.1%	45.0%
	Negative	46.8%	25.9%	21.7%	46.6%	26.5%	30.0%
Managing work-life balance	Positive	16.0%	33.3%	34.8%	16.9%	23.5%	28.6%
	Neither	24.7%	25.9%	21.7%	27.1%	35.3%	47.6%
	Negative	59.3%	40.7%	43.5%	55.9%	41.2%	23.8%

Observations, Conclusions, and Recommendations

The sample was heterogeneous in being recruited from 43 different states and 162 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 be generalized to faculty in other disciplines.

The frequency statistics and aggregate responses from the survey identified some trends, and characteristics about the tenure process, and the activities TT and tenured faculty partake in in their daily lives. On average, faculty work more than 40 hours per week, and by no means have a regular hours. From Figure 2, we can see that TT faculty and tenured faculty alike commit more than 50 hours per week on research, teaching, and service activities, clearly suggesting that there is a problem with balancing work and life obligations. This imbalance is augmented for TT faculty due to the additional stress of the tenure process. The majority of TT and tenured faculty from R1 institutions identified the management of work-life balance to be a concern for tenure, but faculty from other types of institutions also identified this to be an issue at rates of over 40%. Some comments that appeared in the survey include the following:

“... [Tenure is] attainable with either no family commitments or significant support for family commitments (e.g., non-working spouse)....” - R1 TT

*“... [Tenure is attainable] but not easily, and requires more than 50 hr/week”-
R1 - Tenured*

Regarding mentoring during the tenure process (Table 9), half (50%) of the TT faculty from R1 institutions, stated that it positively affects their tenure process. That value was 69.6% for D/PU, M, and B institutions. Surprisingly, only 29.3% tenured R1 faculty stated that availability of mentoring positively affected their tenure process, while 46.6% stated that it negatively affected their process. Availability of faculty mentoring might be lacking for TT R2 faculty since 40.7% stated that it negatively affects their tenure process. Some of the comments regarding mentoring are as follows:

“Mentoring from peers is of utmost importance given the funding competition and limited resources” - R1 Tenured

“If an Assistant Professor is properly guided by tenured faculty and mentored such that research funding is less of a burden, these goals are attainable. However, no such mentoring has been implemented here.” - R2 Tenured

Pressure for funding was seen to be a major concern from R1 and R2 TT faculty; 51.9% and 53.8% respectively stated that it negatively affects their tenure process. That percentage was seen to be at 46.7% and 33.3% for the equivalent tenured faculty. This can be due to 1) unsuccessful faculty who did not achieve tenure not being sampled, or 2) the funding requirements and funding environment has changed since they achieved tenure. At least for the second point, some tenured faculty recognize that there is a change in the environment, with statements as follows:

“[Requirements] are changing as the university is putting more pressure to raise the bar.” - R2 - Tenured

It is clear that TT faculty perceive to have or experience real impediments to their tenure process, causing them anxiety, fear, and exhaustion. To eliminate these experiences, it is important to establish conversations and dialogue between TT faculty and tenured faculty to share experiences and mentorship regarding the process.

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