FINAL REPORT: A CATALYST TO ADVANCE THE PARTICIPATION AND ADVANCEMENT OF WOMEN IN ACADEMIC STEM CAREERS AT MIDDLE TENNESSEE STATE UNIVERSITY
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EXECUTIVE SUMMARY

INTRODUCTION

Women have made significant gains in educational and workplace achievements over the past 50 years. However, women's progress in science, technology, engineering, and math (STEM) fields has been slower and uneven. More men than women enter these majors in college, and pursue careers as scientists and engineers (Nelson; NSF). Women are underrepresented in STEM disciplines but especially so when examining higher ranking and leadership positions (Nelson; NSF). Research shows that this under representation is not related to women's abilities in these fields but is related to continued gender bias (Corbett and Hill 2015, Williams and Dempsey 2014). This report details evidence on the various factors that contribute to gender inequities for STEM faculty at Middle Tennessee State University (MTSU). Our findings are organized into sections related to overall job satisfaction, hiring, the tenure and promotion process, and climate. We include specific recommendations for improving women STEM faculty representation, retention and promotion as well as action items for addressing these recommendations.

MTSU was awarded an NSF ADVANCE grant (HRD-1409638) to collect data on the recruitment, retention and promotion of women STEM faculty. The purpose of this study was to develop a clear understanding about the climate for women STEM faculty on our campus. Our goal was to identify and understand barriers which hinder the advancement of women STEM faculty through the tenure and promotion process and into academic leadership positions. Our data collection consisted of administering a comprehensive online campus climate survey and then conducting focus groups. Our aim was to better understand the issues, barriers, and climate that women STEM faculty at MTSU encounter.

DATA COLLECTION: CAMPUS CLIMATE SURVEY AND FOCUS GROUPS

We conducted an online campus climate survey, open to all tenure and tenure-track MTSU faculty, in November 2014-January 2015. The survey was designed by the PIs in consultation with the Center for Organizational and Human Resource Effectiveness (COHRE), an internal advisory board, and an external advisory board. Our climate survey covered a variety of topics including resource allocation, compensation, tenure and promotion, climate, and work-life balance in great detail. See Appendix 1 for the survey. The survey data were used to identify topics for focus groups. We recorded 541 responses from the online survey, which is approximately 56% of full-time faculty employed at MTSU in Fall 2014.

Following preliminary analysis of survey data, we developed a focus group protocol using the primary issues that arose from this analysis. We conducted two focus groups with women STEM faculty in May and June of 2015 with a total of 16 faculty members participating: seven Professors, five Associate Professors, and four Assistant Professors. The focus group meetings with targeted women STEM faculty enabled us to better understand the concerns, issues, practices, and experiences of these faculty members.

FINDINGS

Survey findings indicate that salaries are a source of overall dissatisfaction. Women are less likely to indicate that they had considered leaving MTSU in general and significantly less likely to indicate they would leave MTSU for a comparable salary at a comparable institution. Both men and women report being reasonably satisfied with the hiring process, with men being slightly more satisfied than women. Negotiation rates were similar for men and women; however, men indicated that they are dissatisfied with the outcome of negotiations across most issues when compared to women.

Regarding resource allocation, there were two broad themes: satisfaction with resource availability and the perception of fairness in the allocation of resources. Men and women did not differ significantly in their evaluation of the availability of resources, but when considering fairness in the allocation of resources, women were much less likely to perceive that resources are allocated fairly.

Promotion and tenure processes are perceived to be inconsistently applied. Focus group participants noted that the guidelines related to tenure and promotion need more clarity. Additionally, women voiced concerns about fairness and transparency in tenure and promotion decisions at the college committee level.

Climate survey results indicate that most respondents evaluate the climate at MTSU positively. However, service responsibilities are a primary area of concern for women STEM faculty. There is widespread agreement that service is not considered with equal weight for promotion, and that women feel that they often do a larger share of this work than their male colleagues. Further, women faculty cited climate issues regarding exclusion from informal networks, and lack of women in leadership (broadly defined).

Work-family connections continue to be a central factor in understanding the experiences of women in STEM fields. Survey results show that men and women estimate relatively similar levels of responsibility for childcare, yet women are much more likely than men to report adverse career effects resulting from children. When responding to generic questions about work-life balance, men and women report similar outcomes. Yet, women are significantly more likely than men to report adverse professional consequences as a result of having children.

Within each findings section, we recommend actions for improving retention and promotion of women STEM faculty at MTSU.

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Introduction

Women have made significant gains in educational and workplace achievements over the past 50 years. However, women's progress in science, technology, engineering, and math (STEM) fields has been slower and uneven. More men than women enter these majors in college, and pursue careers as scientists and engineers (Nelson; NSF). Women are underrepresented in STEM disciplines but especially so when examining higher ranking and leadership positions (Nelson; NSF). Research shows that this under representation is not related to women's abilities in these fields but is related to continued gender bias (Corbett and Hill 2015, Williams and Dempsey. 2014). This report details evidence of the various factors that contribute to gender inequities for STEM faculty at Middle Tennessee State University (MTSU). We include specific recommendations for improving women STEM faculty representation, retention and promotion.

Notably, the State of Tennessee mandated a reorganization of higher education in 2016 (Focus on College and University Success or FOCUS), which has now resulted in MTSU (and five other universities) moving from a state governing board to local boards. As a result, all university policies are being reviewed. Some of the recommendations below may be addressed as part of the transition.

Purpose

MTSU was awarded an NSF ADVANCE grant (HRD-1409638) to collect data on the recruitment, retention, and promotion of women STEM faculty. The purpose of this study was to develop a clear understanding about the climate for women STEM faculty on our campus. Our goal was to identify and understand barriers which hinder the advancement of women STEM faculty through the tenure and promotion process and into academic leadership positions. Data collection consisted of administering a comprehensive, online campus climate survey and conducting focus groups. Our aim was to better understand the issues, barriers, and climate that women STEM faculty at MTSU encounter.

Overview of STEM Faculty: Hiring, Salary, and Tenure and Promotion

We gathered summary data on the 2014-2015 cohort of STEM faculty in order to establish a benchmark for future analyses of STEM faculty composition by gender. The results presented in Figures 1-6 and Table 1 demonstrate that MTSU fits the national pattern with respect to the demographics of women in STEM. Additionally, these data enable us to track changes in composition overtime that result from policies implemented or changed due to this grant.

Changes in Hiring by Gender over Time

As is quite clear from Figures 1 and 2 below, the percentage pattern for STEM faculty hires reversed between 2013-2014 and 2014-2015. Importantly though, Figure 2 demonstrates that the increased hiring of women was driven almost exclusively by hiring of women into contingent faculty positions (lecturers).

Figure 1: STEM Faculty Hires by Gender in 2014-15

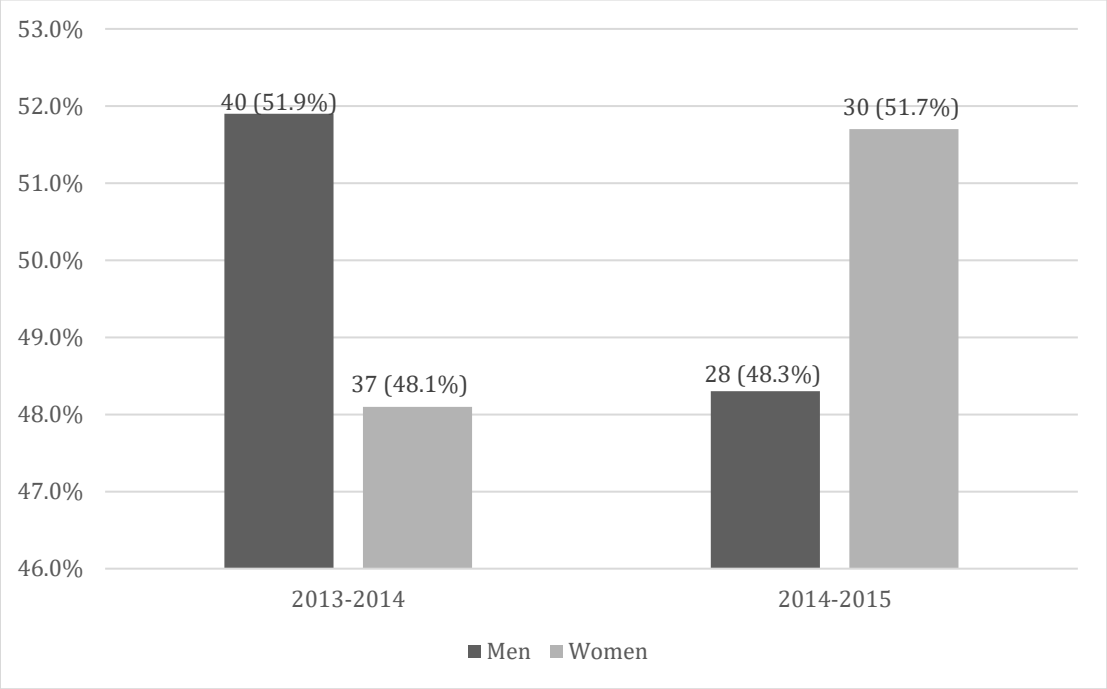
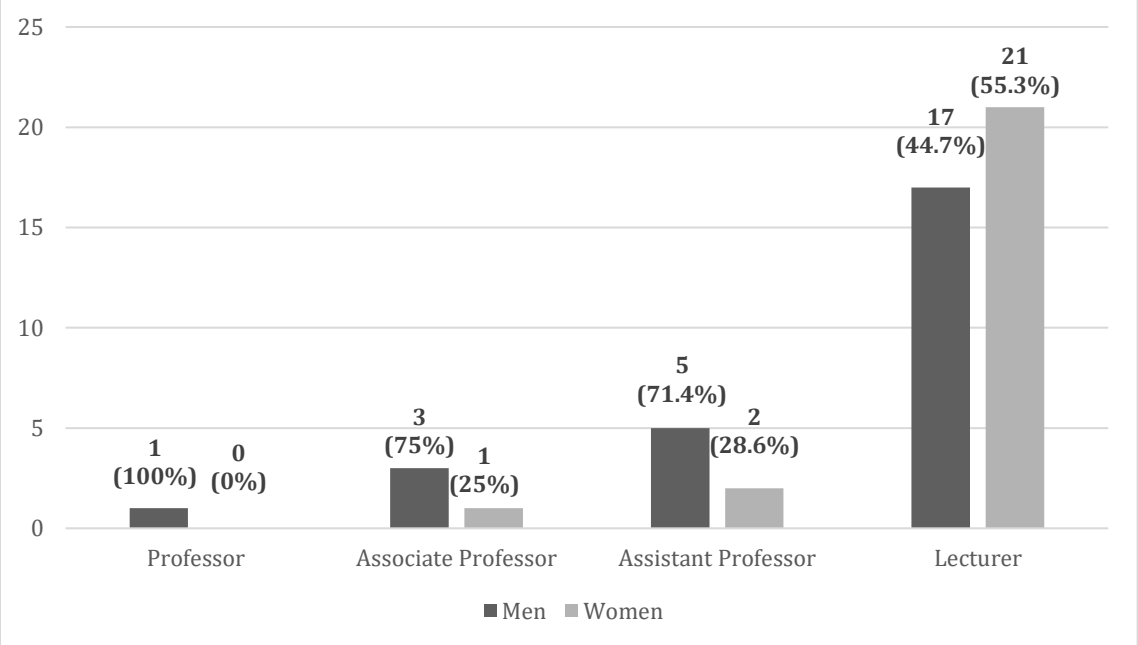
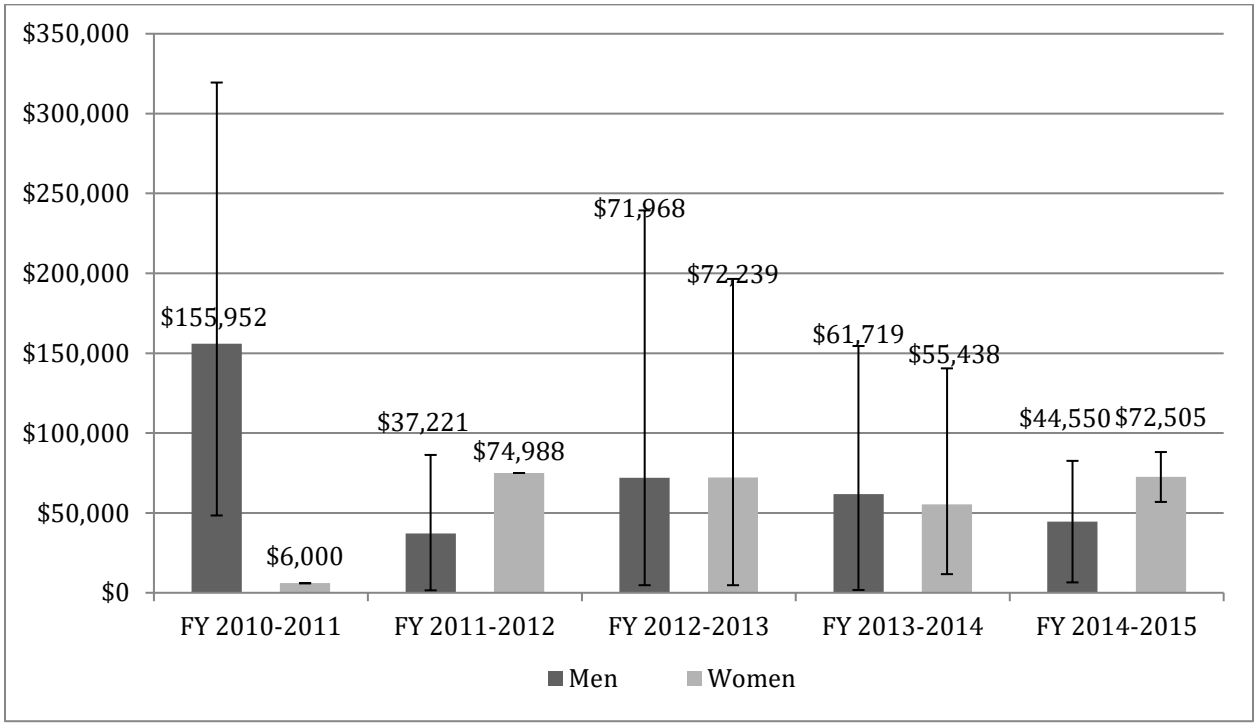


Figure 2: 2014-15 STEM Faculty Hires by Gender & Rank



As is the case in most STEM fields, start-up packages for new faculty for labs, research support and/or equipment are significant and important. The good news for MTSU as demonstrated in Figure 3, is that start-up packages for women increased from 2010-2011 to 2014-2015. Additionally, despite quite disparate ranges in these funds, it appears that start-up packages for new women hires are more closely aligned with those of men.

Figure 3: Mean and Range of Start-Up Funds for STEM Positions by Gender



Analysis of STEM Faculty Salary at MTSU 2013-14

In 2013-2014 there were 262 faculty in STEM at MTSU; 80 women and 182 men. Figures 4 and 5, along with Table 1, present general salary information by gender for STEM. Except for the two outliers (administrators returning to faculty and a new chair hire) the pattern shows what we have come to understand as typical across many universities; as annual salaries go up, the percentages for women receiving those salaries goes down. Of course, this is a reflection of women being over-represented in the lower ranks.

Figure 4: STEM Faculty Annual Salary Overview, 2013-2014

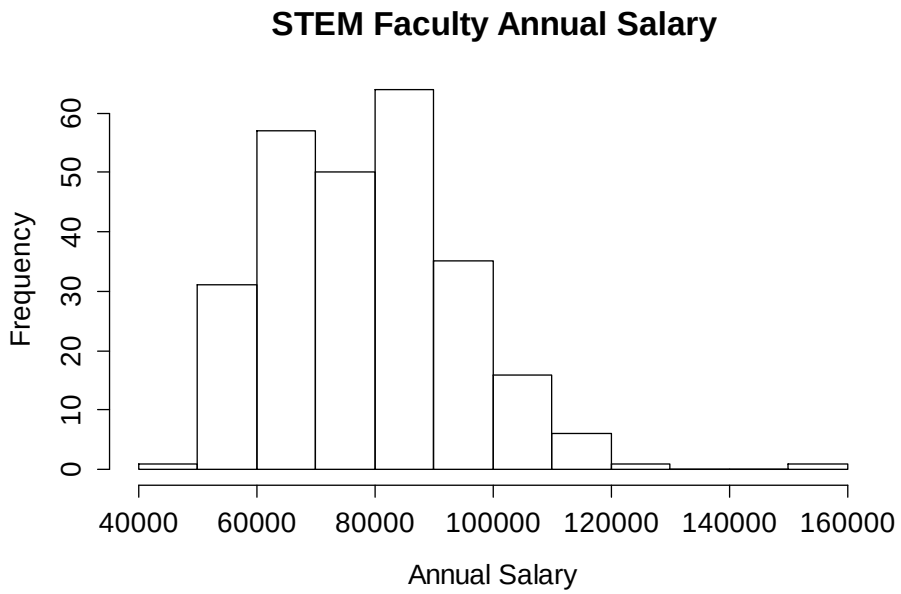


Figure 5: STEM Faculty Salary by Gender, 2013-2014

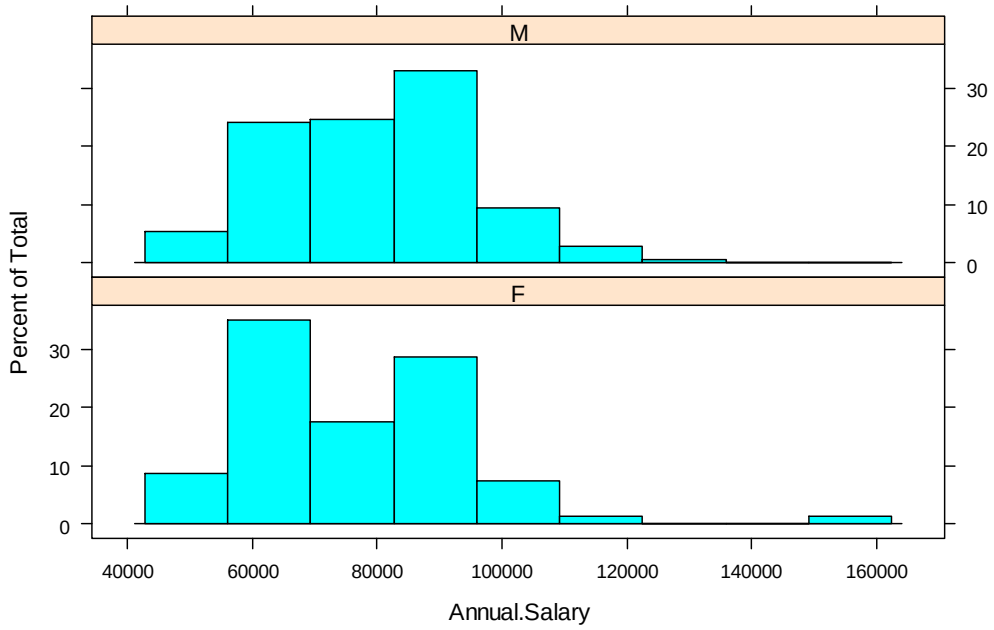


Table 1: STEM Faculty Salary by Gender, 2013-14

Gender	Minimum	Maximum	Standard deviation	Mean	Count
Women	$47,197.5	$157,972.3	$17,948.39	$76,993.36	80
Men	$50,100.0	$124,409.0	$15,304.80	$79,926.32	182

Tenure and Promotion Outcomes

As is clear from Figures 6 and 7, although women were promoted to Associate Professor at the same number as men, they still lagged in both promotion to Professor and the achievement of tenure. In fact, the pattern remained the same that twice as many men were tenured than women in both 2013-2014 and 2014-2015.

Figure 6: 2014-2015 STEM Faculty Promotion by Gender and Proposed Rank

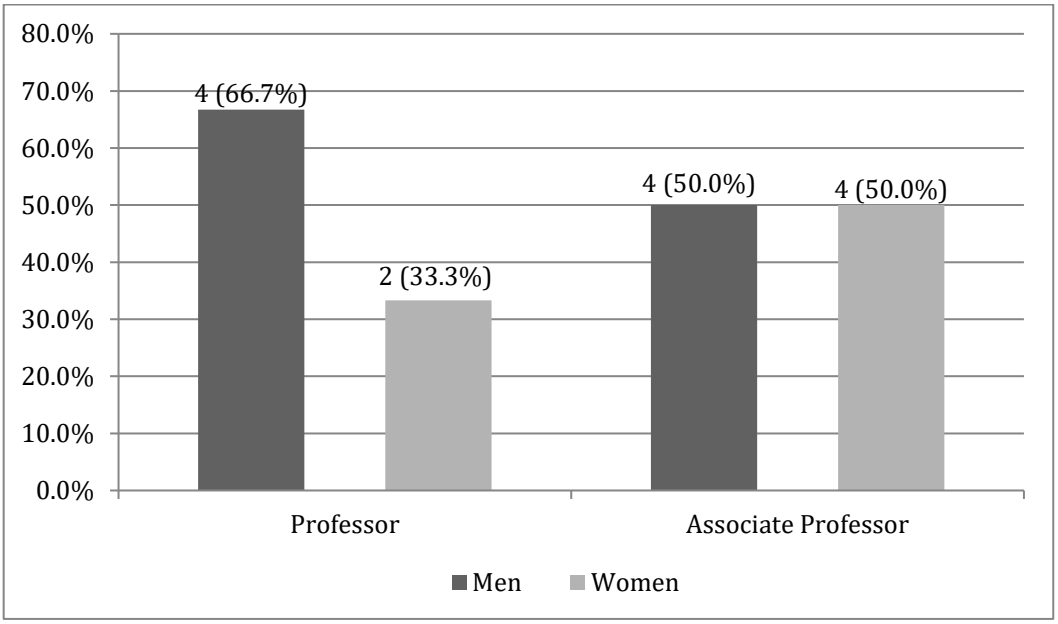
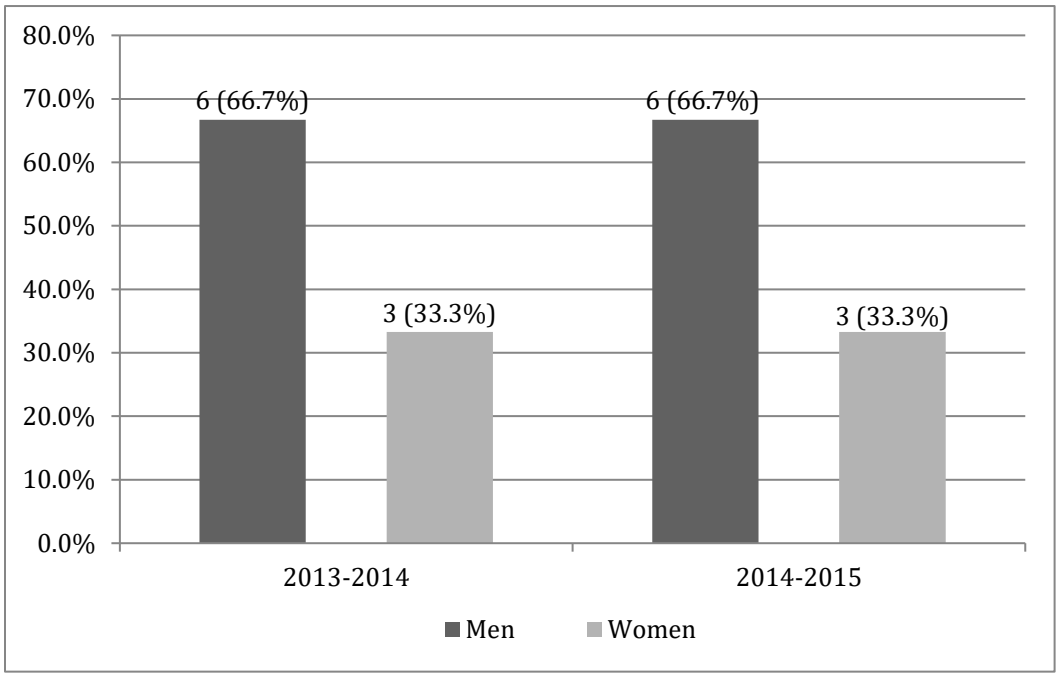


Figure 7: STEM Faculty Tenured by Gender



Data Collection: Campus Climate Survey

The survey was designed by the PIs in consultation with the Center for Organizational and Human Resource Effectiveness (COHRE), an internal advisory board, and an external advisory board. Our climate survey (See Appendix 1) covered a variety of topics including resource allocation, compensation, tenure and promotion, climate, and work-life balance in great detail. The survey data were used to identify topics for focus groups, which are discussed in more detail in a later section.

The 2014-2015 Campus Climate Survey was conducted at Middle Tennessee State University from November 21, 2014, through January 31, 2015. The survey was administered online using SurveyMonkey, with the link distributed to *all* full-time faculty initially on November 21 and subsequently in reminder emails. The survey closed on January 31, 2015.

The survey contained 65 questions; but several questions contained multiple parts, resulting in over 200 potential variables per respondent. Data were collected in Excel and exported to STATA for analysis.

Survey Response Rate

We recorded 541 responses, of which 18 were eliminated due to ineligibility (part time or non-faculty status), leaving a sample of 523, or 56% of fulltime faculty employed by MTSU in Fall 2014.

STEM Response Rate. Table 2 lists the response rate in STEM disciplines by rank and gender. The rate ranges from 17% in Computer Science to 65% in Economics and Finance with an overall STEM response rate of 46% of tenured and tenure-eligible faculty. The distribution by gender in the sample and population overall is identical (70% men and 30% women). There are more men in Professor positions and women in Assistant and Associate Professor positions.

Table 2: Distribution and Response Rate of Tenured or Tenure-track STEM Faculty at MTSU by Gender and Rank, 2014-2015[1]

Department	Professor		Associate Professor		Assistant Professor		All Ranks		Survey Response Rate
	Men	Women	Men	Women	Men	Women	Men	Women	All
Aerospace	2 (2)	1 (1)	5 (1)	2 (1)	3 (2)	0	10 (5)	3 (2)	**54%**
% in rank	67	33	71	29	100	0	77	23	
Agribusiness & Agriscience	4 (4)	1 (1)	3 (1)	1 (0)	1 (0)	0	8	2	**60%**
% in rank	80	20	75	25	100	0	80	20	
Biology	20 (9)	4 (3)	4 (2)	4 (2)	5 (3)	3 (0)	29	11	**48%**
% in rank	83	17	50	50	62.5	37.5	72.5	27.5	
Chemistry	9 (6)	6 (3)	8 (4)	1 (1)	2 (2)	1 (1)	19	8	**63%**
% in rank	60	40	89	11	67	33	70	30	
Computer Science	3 (0)	5 (0)	1 (0)	0	2 (2)	1 (0)	6	6	**17%**
% in rank	37.5	62.5	100	0	67	33	50	50	
Concrete Industry Management	0	1 (1)	3 (0)	0	1 (0)	0	4	1	**20%**
% in rank	0	100	100	0	100	0	80	20	
Economics & Finance	8 (6)	2 (1)	8 (4)	0	4 (3)	1 (1)	20	3	**65%**
% in rank	80	20	100	0	80	20	87	13	
Engineering Tech.	8 (6)	0	4 (1)	2 (1)	2 (0)	1 (0)	14	3	**47%**
% in rank	100	0	67	33	67	33	82	18	
Geosciences	4 (0)	0	1 (1)	2 (1)	2 (1)	1 (1)	7	3	**40%**
% in rank	100	0	33	67	67	33	70	30	
Mathematical Sciences	10 (3)	7 (4)	6 (0)	5 (2)	3 (1)	3 (2)	19	15	**35%**
% in rank	59	41	55	45	50	50	56	44	
Physics & Astronomy	5 (3)	1 (1)	2 (1)	0	1 (0)	1 (0)	8	2	**50%**
% in rank	83	17	100	0	50	50	80	20	
Political Science	9 (4)	0	3 (0)	1 (0)	0	2 (0)	12	3	**27%**
% in rank	100	0	75	25	0	100	80	20	
Psychology	14 (8)	9 (4)	8 (2)	3 (1)	2 (0)	2 (1)	24	14	**42%**
% in rank	61	39	73	27	50	50	63	37	
Sociology & Anthropology	8 (3)	2 (1)	2 (1)	5 (3)	1 (2)[2]	0	11	7	**56%**
% in rank	80	20	29	71	100	0	61	39	
Total	104 (54)	39 (20)	58 (18)	26 (12)	29 (16)	16 (6)	191 (88)	81 (38)	**46%**
% in rank (% responses)	73 (73)	27 (27)	69 (60)	31 (40)	64 (73)	36 (27)	70 (70)	30 (30)	

[1] Table 2 lists the number of faculty in each STEM department by gender and rank and the number of survey responses by department by gender and rank in parentheses.
[2] Gender and rank are self-reported. Sociology & Anthropology has no women assistant professors.

The sample distribution by rank varies minimally from the population, as shown in Table 3 below. Untenured faculty make up 16.5% of the population and 17.6% of the sample.

Table 3: Population versus Sample Distribution by Rank, STEM Disciplines

	% of Population	% of Sample	% Difference
Professor	52.5	58.7	6.2
Associate Professor	30.8	23.8	-7.0
Assistant Professor	16.5	17.4	0.9

Professors are over-represented by 6% and associate professors are underrepresented by 7%, which means the sample without tenure is nearly identical to the population. Because the primary variable of interest (gender) is represented in the sample at the same rate as the population and the variation by rank is minimal, weights were not employed in the analysis below.

Data Collection: Focus Groups

Following preliminary analysis of survey data, we developed a focus group protocol using the primary issues that arose from this analysis. Focus group meetings are a form of qualitative research that relies on group interaction to produce data and information (Hollander 2004). For our purposes, focus group meetings with targeted women STEM faculty enabled us to better understand the concerns, issues, practices, and experiences of these faculty members. Focus groups were a way to collect nuanced data from multiple faculty members in an efficient manner. The interaction aspect of the focus groups allowed us to gain a deeper understanding of participants' experiences, ideas, and motivations. Additionally, collecting data in this way made it possible for us to hear a variety of experiences and perspectives that can add context to our survey findings.

In May and June of 2015, we conducted two focus groups with women STEM faculty with the following composition: (1) seven faculty members total; three Professors, three Associate Professors, one Assistant Professor, (2) nine faculty members total; four Professors, two Associate Professors, three Assistant Professors.

The focus groups lasted approximately two hours and were held on the MTSU campus. Complete focus group discussions were recorded and transcribed. General focus group questions covered topics that emerged from the online survey results coupled with literature. The same protocol was used for both focus groups, so that virtually identical questions were asked.

Focus Group Sample Selection

The online survey asked for volunteers who would be interested and willing to participate in focus groups. We started with this list, including only tenure and tenure-track women STEM faculty. In addition, we requested suggestions of faculty from our IAB, STEM department chairs, and ADVANCE leadership team members. Those who volunteered were

contacted and invited to participate in focus groups. Thematic findings from the focus groups are incorporated with survey themes below.

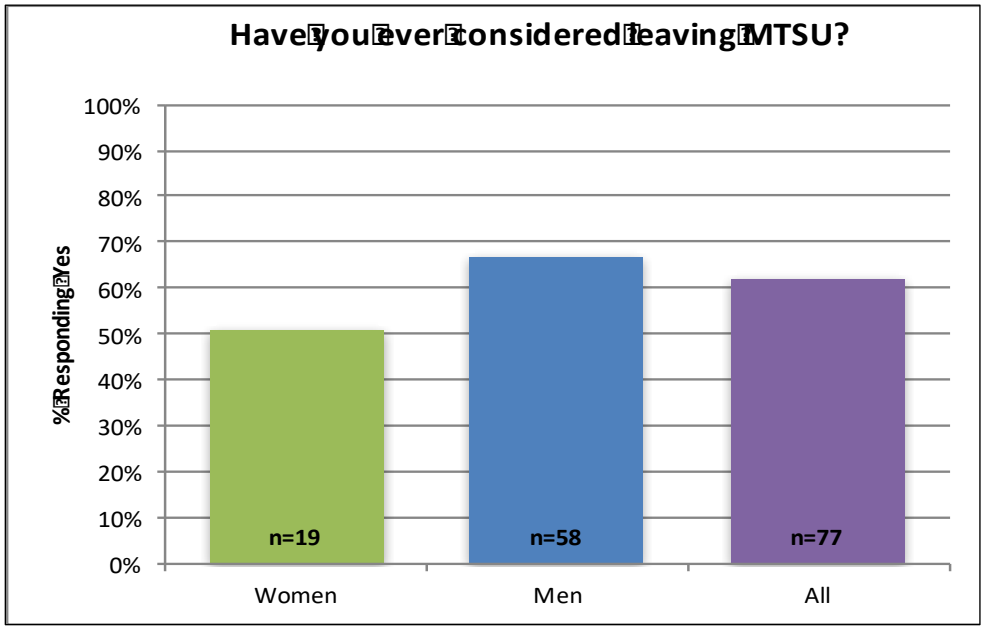
Results: Key Findings from the Survey and Focus Groups

The discussion below incorporates findings from the survey, and the focus groups. Due to the concentration of the grant on women STEM faculty, we report findings for respondents from STEM departments only unless otherwise noted. Findings are presented by theme based on the organization of the survey (a copy of the survey can be found in Appendix 1)

Overall Job Satisfaction and Salary

Two measures of overall job satisfaction were included in the survey. Respondents were asked first whether they would recommend employment at MTSU to a colleague. Sixty-five percent said they would and 10% said they would not. However, when asked directly about their own experience, 36% of respondents indicate they would leave MTSU for a comparable salary at a comparable institution. As illustrated in Figure 8, 62% indicate they had considered leaving MTSU, and 53% of that group indicate salary as a contributing factor. Forty-three percent cite climate as a motivation to consider leaving MTSU. Only 21% indicate they would leave academia for a comparable salary.

Figure 8: Overall Satisfaction (STEM Faculty)



Women were less likely to indicate that they had considered leaving MTSU (p=.11); and the women who had considered leaving were less likely than men to cite salary or climate as a factor, but the difference was not statistically significant. Additionally, women were less likely to indicate that they would leave MTSU for a comparable salary at a comparable institution (24% versus 41%, p<=.10). It is possible that women are more place bound than

men as women in general are less likely to be willing to move for career reasons (Behr and Schneider 2015; Mclean 2012) or more sensitive to changes in residence (Glass et al. 2013).

Several open-ended questions were included in the survey with respect to general or overall satisfaction. Salary, facilities, and teaching load were mentioned frequently as was a general dissatisfaction with "the Administration." In some cases, respondents were intentional in indicating specific levels of the administrative structure they found discouraging or problematic, ranging from department chairs to the state governing board.

Given that approximately two-thirds of the respondents have considered leaving MTSU and more than half cite salary as a reason, it is reasonable to assume that faculty are unsatisfied with the compensation structure at MTSU[3].

Additionally, over one-third of the respondents indicate a willingness to consider leaving MTSU for a comparable salary at a comparable institution, suggesting there is room for improvement in job satisfaction for faculty. Open-ended comments from STEM and non-STEM faculty elicited frustration with salaries and constant tightening of resources, and the negative impact on the university and faculty. Comments from the survey include:

> *I am concerned about the future of MTSU and public higher education in Tennessee in general… My workload and stress level at MTSU has been much higher than anticipated and much higher than at my previous institution.*
>
> *Salaries are not competitive. Teaching loads are too high for research active faculty.*
>
> *I would love to stay at MTSU, but salary and the support for research are problematic …I am disappointed in MTSU's non-competitive salaries…I enjoy my job and my colleagues, but I don't feel that I am fairly compensated for my efforts. Money is not everything, but it's important. I don't necessarily want to leave, but I continue to search for jobs. If a better offer with a similar departmental climate came along, or if the climate of my current department changed substantially, I don't feel obligated to stay at MTSU. I would leave.*

Recommendation 1

Because salary inequity appears to be a significant concern for faculty, we recommend a comprehensive salary study and serious lobbying effort to obtain the funds to make market adjustments. The Office of the Provost completed a peer-institution salary study in 2015, but due to the failure of the State to allocate funding for salary increases in higher education, the university addressed only those faculty whose salary fell below the

[3] Because the focus of the grant is STEM, the data discussed herein pertain to STEM faculty. However, it's noteworthy that 67% of non-STEM tenure-eligible faculty members have considered leaving MTSU. Sixty-six percent cited salary as a reason. Forty-three percent cited climate as a reason to leave.

minimum range (30 faculty received salary adjustments). While the administration has articulated faculty salary as a priority, there is no plan to acquire or direct funds to equity adjustments. Of equal importance, the faculty senate should work with the administration to engage as many people as possible in a comprehensive effort to lobby for funding. Simply pointing out the inequity without funding an adjustment confirms suspicions that faculty are not compensated fairly because the work they do is not valued.

The Hiring Process

Questions about the interview process at MTSU generate reasonably positive responses. Men are slightly more positive in their evaluation of the process, but the difference is not statistically significant. Questions about the negotiation process, shown in Table 4, reveal a moderate level of dissatisfaction with the outcome of negotiation. Twenty-three percent of women and 25% of men indicate dissatisfaction with the negotiation experience; slightly more than half of the respondents indicate satisfaction. Table 4 presents the rate of satisfaction/dissatisfaction with the outcome of negotiations (for those who negotiated) across a range of factors.

Table 4: STEM Faculty Satisfaction with the Outcome of Negotiations[4]

	Unsatisfied		**Did Not Negotiate**		**Satisfied**	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
Starting Salary	26%	26%	16%	16%	53%	54%
Lab Space	21%	28%	13%	14%	21%	25%
Equipment or Supplies	16%	26%	13%	11%	50%	48%
Travel Funds	29%	33%	16%	14%	47%	44%
Graduate Assistants	13%	22%	18%	13%	26%	26%
Undergraduate Student Workers	13%	9%	18%	21%	39%	44%
Release Time	18%	25%	32%	17%	42%	40%
Space (non-Lab)	8%	21%	22%	18%	43%	43%
Spouse/partner Employment	3%	10%	21%	21%	13%	12%

Women appear to have internalized the message to negotiate as there are few differences between the rate of men and women who chose not to negotiate most issues. Negotiation satisfaction varies little by gender; however, more men indicated dissatisfaction with the outcome of negotiations across most issues.

When asked whether they had attempted to negotiate since being hired, 61% of women indicated they had and 41% of men indicated they had, a difference that is statistically significant (p<=.05). Of those who attempted negotiation since being hired, 33% reported that the negotiation was successful with women reporting a slightly higher success rate (not significant). Faculty who received an outside offer were more likely to engage in post-hire negotiations (p<=.05) and more likely to be successful (p<=.11). Outside offers were

[4] For all of the following tables, those who answered N/A or don't know are excluded and items in bold differ significantly by gender (p<=.10).

more likely to result in a salary increase for men than women, but the difference was not statistically significant.

Institutionally, the hiring process appears congenial (to those who were hired). Those who negotiated were more likely to be dissatisfied with salary, lab space, and travel funds than other issues open to negotiation, but the rate of dissatisfaction even across those areas is moderate. The lack of satisfaction with the negotiation process with respect to salary is likely tied to the overall lack of satisfaction with salary, which reflected a demonstrated problem with salary at MTSU compared to peer institutions (Canak et al. 2015).

Resource Allocation

The survey contained numerous questions about satisfaction with resources that fall in two broad themes: satisfaction with resource availability and the perception of fairness in the allocation of resources.

Satisfaction. Respondents were asked how much they agree with a set of statements about the sufficiency of resources potentially available to faculty working in STEM disciplines at MTSU. Men and women did not differ significantly in their evaluation of the availability of resources as shown in Table 5.

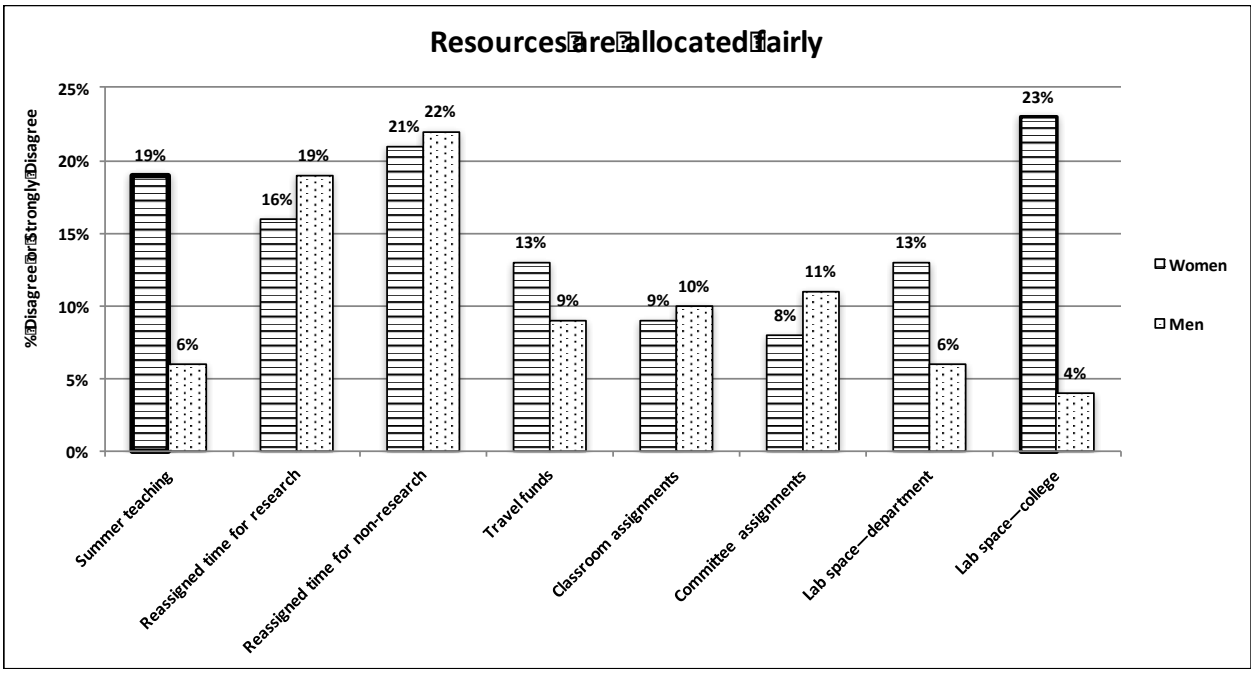
Table 5: Satisfaction with Resource Allocation

	Disagree		Agree	
	Women	**Men**	**Women**	**Men**
Sufficient lab space of reasonable quality	24%	22%	48%	55%
Equipment and supplies for research	9%	14%	53%	61%
Office space of reasonable quality	11%	9%	76%	86%
Classrooms with sufficient equipment	8%	6%	68%	80%
Access to TAs/RAs	18%	12%	64%	71%
Travel support for conferences	30%	39%	43%	41%
Support for pedagogical development	14%	14%	58%	65%
Support for professional development	17%	18%	50%	48%
Access to mentors	28%	25%	50%	59%

Lab space of reasonable quality and access to travel funds for conferences were the two areas with the lowest satisfaction for men and women in STEM. Given the rapid growth at MTSU (MTSU Fact Book 2013-2014) space allocation has been an issue for some time. However, the opening of a 250,000 square feet science facility in 2014 and the 2017 opening of the newly renovated existing science facilities should mitigate the space issues for faculty in most STEM disciplines (the Social Sciences will not benefit as much from these changes). Travel funding is unlikely to improve unless the overall outlook for state funding improves.

Fair Allocation. In the resources section, respondents were asked to indicate their level of agreement or disagreement with statements about the fair allocation of resources across a variety of areas that are likely to matter to STEM faculty.

Figure 9: Dissatisfaction with the Fairness of Resource Allocation[5]



Women are more likely than men to disagree with the assertion that summer teaching assignments are allocated fairly in the department. Summer teaching is potentially lucrative for fulltime faculty at MTSU as it is one of only a few ways to improve gross salary for faculty. Women are also far more likely to disagree with the statement that lab space is allocated fairly at the college level. In order to understand better why women in STEM are less likely to find resource distribution equitable, we included a discussion of resources in the focus groups.

Focus Groups: Resource Allocation. Resources in general are a concern because many faculty feel that MTSU overall lacks enough resources to support faculty at the level of research expectations that exist today. Specifically, women STEM faculty indicated that they were less proactive in requesting resources as compared to men.

> **Participant**[6]: *You have some of the guys who ALWAYS ask whether they need it or not. because we just don't ask as much . . . one thing I've noticed is that females aren't as apt to ask [for resources]. And so I found that I had to kind of combat that.*
>
> **Participant**: *Resource allocation in my department is kind of like the squeaky wheel gets the grease so whoever asks first or asks most forcefully usually gets it so.*

[5] Bars outlined in bold indicate a statistically significant difference between the responses of men and women. This indication of significance applies to Figures 10-12 as well.

[6] Each participant comment in a section represents a different faculty member.

Resource allocation of all types must be uniform and consistent, as women may be less likely to ask or to ask with less force for resources, which could lead to an unequal distribution (Babcock and Laschever 2003). This hesitancy to ask could also be related to gendered expectations and socialization differences as more often for men they have been taught to be aggressive and forceful, which may result in them pursuing and receiving more resources than women STEM faculty.

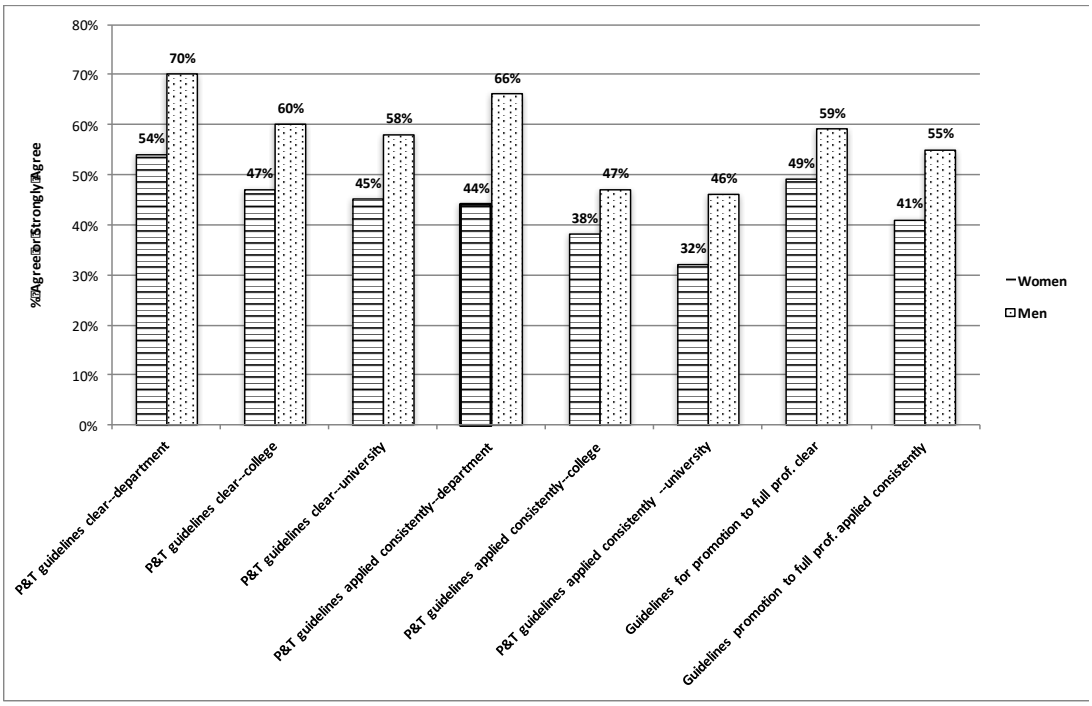
Recommendation 2

Given the perceived lack of fairness in allocation of resources combined with the notion that women do not ask effectively or frequently enough, we recommend post-hire training for women focused on the processes for resource allocation and the importance of asking. Additionally, we recommend training for department chairs and faculty mentors to equip them with the tools to both understand why women may be less likely to advocate effectively for resources and how they can alleviate this problem. The College of Liberal Arts piloted a comprehensive professional program for departmental chairs in 2016-2017 in which many of the issues identified in this report were addressed directly or indirectly. Should evaluations demonstrate success, the Office of the Provost is committed to expanding the training to other colleges. Additionally, we recommend that departments must have transparent processes for determining resource allocations. In this regard, chairs must evaluate the allocation process and ensure fairness across the board rather than respond to vocal critics.

The Tenure and Promotion Process

Fox and Colatrella (2006) interviewed twenty tenured and tenure-track women faculty in a variety of STEM fields to examine how women participate, perform, and advance in academic sciences. When examining the promotion process, they found that women considered the criteria for promotion to associate professor to be clear; on the other hand, when considering the criteria for being promoted to full professor they found that women thought the criteria were ambiguous. This also led the women to believe that the criteria could be unevenly applied and depend more on one's "personality" and "one's relationship with those in power," which is detrimental because women are less likely to have close relationships with those in powerful and influential positions within their organizations (Ibarra, Carter, and Silva 2011). We asked respondents to tell us how much they agree with a series of statements about the tenure and promotion process at MTSU. Generally, respondents found the policies to be clear at all levels (men more so than women) but are not as likely to perceive the application of policy as consistent.

Figure 10: Perceptions of the Tenure and Promotion Process[5]



Respondents have concerns about the consistent application of tenure and promotion guidelines as well as the consistent application of guidelines for promotion to full professor. In the case of consistent application of T&P guidelines at the department level, men were significantly more likely to agree that the application is consistent. Faculty are more likely to have served on a department T&P committee routinely than to have served on the college committee, and faculty are not involved in the process at the university level. Therefore, respondents likely have better information about the process at the department level than at all other levels. The lower level of agreement by women with the assertion that T&P policies are applied consistently at the department level may reflect negative experiences in the department committees.

Focus Groups: Tenure and Promotion. Discussions of the tenure and promotion process generated several observations directly and indirectly related to the ability of women to be successful.

1. Teaching Load Allocation.

Faculty see that teaching loads vary depending on program specific teaching requirements, but it was not explicitly clear how these assignments are distributed. It seems that for some departments with graduate programs, especially Ph.D. granting, there may be a lower teaching load. However, it seemed unclear to participants, even in those departments

whether there are written policies[7] about how teaching and research hours are assigned or released.

> **Participant**: *I don't know that there are written guidelines.*
>
> **Participant**: *I think there's preferable guidelines because I had a conversation about it.*
>
> **Participant**: *I'm not sure if it's exactly written down but it's been formal since I've been there, it really has all to do with whether you're attached to . . . a graduate program or not. So those of us attached to a graduate program or that teach a heavy graduate load do have a course reduction.*

Part of what may explain women's belief that the application of tenure and promotion process is questionable is related to several other issues that impact climate and resources as well. Women perceive that they are being asked to do more service and that they are performing more service, yet service is not seen as important in evaluation for tenure and promotion. While official documents may state that research, teaching and service all are important, participants noted examples where service work did not help them or others they knew. In describing various activities they performed, participants found out that these were not valued at promotion time:

> **Participant**: *But faculty senate [doesn't] count? . . .internships at the administrative office, that didn't count. I did exactly what you asked me to do. . . I got the grant. But that's a service grant.*
>
> **Participant**: *The guidelines say you know teaching, research, and service but really service doesn't count.*
>
> **Participant**: *You hope it helps you in the long run. You [think] well, if I do this . . . then maybe, we have those hopes and they may pan out.*

2. College Level Tenure and Promotion Committee.

College level T&P Committee composition makes a difference in how decisions turn out and this can create concern about fairness and transparency. One issue is that committee members at the college level may not have enough information to make informed decisions about quality of publications across disparate disciplines. The information provided (by faculty member seeking promotion) may not have enough context to accurately compare portfolios of different faculty. Without a knowledgeable advocate on the committee, participants felt that judgments may be unfair. The composition of the committee was noted as very important because if a faculty member lacks an advocate, then there is no one

[7] There are guidelines governing the distribution of workload, but a great deal of latitude in the application of the guidelines exists. See http://www.mtsu.edu/provost/forms/wkguide.pdf

to explain the nuances of the Outline of Faculty Data (OFD), the instrument faculty submit as evidence of having met the criteria for tenure and/or promotion.

> **Participant***: I am on my college committee now but the materials that get submitted to the college are just the outline faculty data, and not your supporting materials. And that has always blown my mind. Because here I am evaluating people from a bunch of different departments where I don't* really know their stuff. And so I'm relying on [someone from another department] *that I turn to [to advocate].*

> **Participant**: *I've been on those* [college] *committees, often times and I've said somebody explain this to me.*

> **Participant**: *You would never hire an applicant for a position, just off paper; you always bring that person in.*

Committee makeup shapes outcomes, and this can produce perceptions about lack of fairness. Additionally, women may not be part of informal networks, especially those with older generation men faculty, so they may lack senior advocates who can contextualize their contributions at the college level.

3. Work Trajectories.

A combination of concerns that surfaced are relevant to perceptions of fairness. Women faculty may have varied work trajectories because of having children, or other caregiving responsibilities. If a woman takes maternity leave then she may have gaps in her research record, and although her overall record may be strong, the gaps may result in concerns about her productivity.

> **Participant**: *The department specifically talked about my research record and it specifically talked about the gap in my research record. That gap is there because I took maternity leave. And I feel like there is nothing that I could have done-service or research-that would have addressed that. And I thought that my package showed that I have a good research record going forward, and what they thought my package showed was that I'm sporadic because there are these gaps in my record. Furthermore, I think I need to rewrite my letter to point out that if you take maternity leave, the human resources department tells you, YOU CANNOT DO ANY WORK DURING THAT TIME.*

> **Participant**: *It's not like you take off time and then you do some research while you're home, HR told me if I did any work while I was on that time I would lose my maternity leave.*

This problem reflects a narrow norm, modeled on traditional work trajectories that men have followed more than women because of gendered caregiving arrangements. Perceptions of fairness in tenure and promotion are also related to other issues that we will discuss within the general climate section.

Recommendation 3

Given the concerns women STEM faculty have about the application of the tenure and promotion policy, we recommend all departments evaluate the tenure and promotion policies regularly to ensure the policies are consistent with college, university, and governing board policy and that the policies reflect the activities that the department actually values. Additionally, new faculty should receive training about the allocation of workload and the tenure and promotion policy.

General Climate

Respondents were presented with a variety of general statements about the climate at MTSU and asked to indicate how much they agree or disagree with the statements. Table 6 lists the statements and level of agreement by sex.

Table 6: General Climate

	Disagree		Agree	
	Women	**Men**	**Women**	**Men**
Department colleagues value my research/creative activity	9%	13%	58%	64%
Department colleagues value my teaching contribution	3%	8%	79%	75%
Colleagues trust me to serve on "high stakes" committees	3%	5%	89%	78%
Department service rotated fairly to allow all to participate	14%	22%	54%	52%
I am treated with respect by most colleagues	0	2%	84%	80%
I feel isolated at MTSU	75%	67%	11%	14%
I feel like a full/equal participant in department decision-making	5%	12%	66%	53%
I have been given opportunity to be included in informal department networking	8%	4%	82%	76%
Colleagues regularly solicit my opinion about work-related matters	8%	11%	63%	65%
Most colleagues care about my general well-being	3%	7%	81%	71%
Most department colleagues supportive of one another professionally	8%	13%	72%	67%
Most colleagues would fail to notice if I did the best job possible	53%	48%	15%	30%
I have equal opportunity to influence resources allocation in department	11%	20%	68%	45%
My department head/chair treats me with respect	3%	4%	94%	89%
My department head/chair values my contribution	3%	4%	91%	87%
Department meetings are hostile and confrontational	69%	69%	6%	11%
My level of family obligations is about equal to most colleagues'	44%	40%	41%	48%
I am treated with respect by most undergraduates	3%	1%	92%	81%
I am treated with respect by most graduate students	0	1%	94%	93%
I would recommend employment at MTSU to a colleague	3%	14%	79%	60%

Notably, most respondents evaluated the climate at MTSU positively. They appeared to feel respected by colleagues and students, valued by their department, and supported. Men were significantly less likely to indicate that they have equal opportunity to influence resource allocation in the department and were also less likely to indicate that they would recommend employment at MTSU to a colleague.

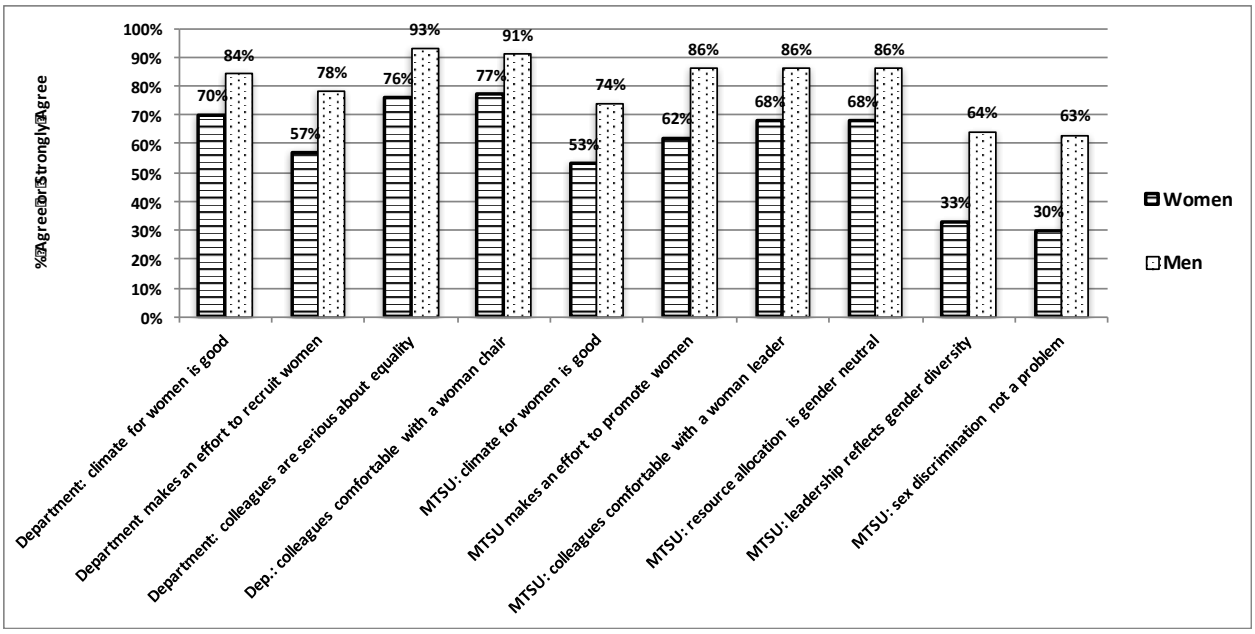
Focus group data demonstrated that in general, the climate is considered adequate. However, as we proceeded through the focus groups, nearly every faculty member raised some issue of concern that impacts climate. While there were no glaringly obvious and egregious examples of discrimination, there were areas of concern. Morale, in general, could be better.

The good news: There seems to be a fairly broad ethos in departments of faculty working together to schedule their courses in ways that both meet the needs of the students while trying to accommodate various issues that faculty may face, such as health issues, or caregiving responsibilities.

The Climate for Women STEM Faculty

Following the general questions above, we asked respondents to think about the climate *for women* in their department, at MTSU, and in their discipline (not reported herein) and respond to a set of statements about each area. The responses in these sections generated more significant disagreement by sex than in any other section. Figure 11 contains statements about the climate for women at MTSU that were framed positively and the level of agreement by sex.

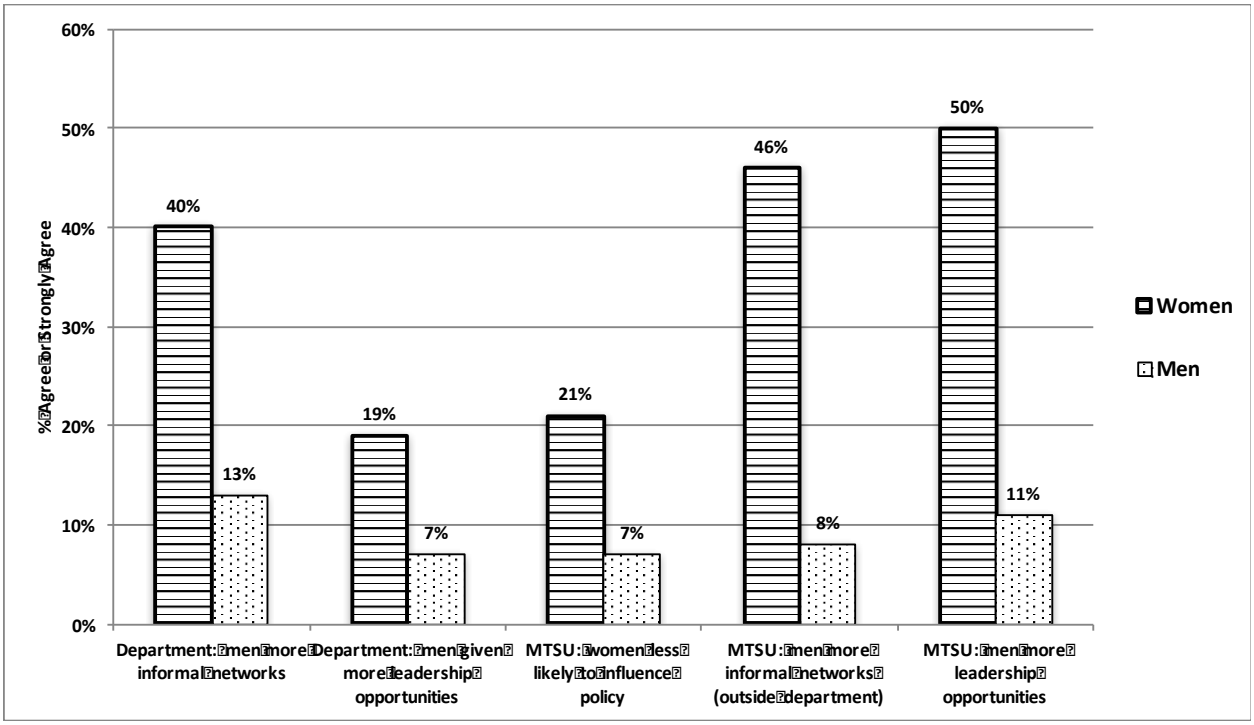
Figure 11: The Climate for Women STEM Faculty at MTSU (Positive Evaluations)[5]



Although men and women alike are reasonably satisfied with the climate for women, men were more likely to agree with statements that frame the climate for women at MTSU in a positive way; for example, "the climate is good." In every case, women were significantly less likely to agree with such statements. However, when statements employed a negative

framing, such as "women are less likely to influence policy," women were far more likely to agree than men as illustrated in Figure 12 below.

Figure 12: The Climate for Women STEM Faculty at MTSU (Negative Evaluations)[5]



The difference in perception between women and men when asked about the climate for women in a negative way is stark. Overall, when asked directly about the potential outcomes of sex discrimination (influence, attitudes, etc.), women were much more likely than men to "see" these problems. Women saw informal networking as being more widely available to men at the department level and beyond. Informal networks are an important part of the career progression process because such networks are used to convey values and norms in the discipline and provide useful but unofficial advice (De Welde and Laursen 2011, 578). Women do not perceive the leadership at the institution to be gender diverse, which reflects the reality. Interestingly, 64% of men agreed that leadership at MTSU is gender diverse when all but one Executive Vice-President is a man and all but one of the deans of traditional academic colleges are men. Since we did not define "leadership," it is not clear whether this is an artifact of how one sees the threshold for diversity or what one means by leadership. As of the date of the survey, three women sat as chairs of three STEM departments, but still women perceived the allocation of leadership opportunities as more likely to be directed to men as well. Women were less likely to feel that their colleagues would be comfortable with a woman in leadership. Women were less likely to see resource allocation and policy influence at the university level as gender neutral.

The leadership dilemmas women face are not unique to MTSU. An ADVANCE-funded survey of academic deans in Arts and Sciences found that intentional recruiting of women

into leadership is key to overcoming some of the barriers because "women deans were less likely than men to have aspired to an academic leadership position. They were more likely than men to have been recruited rather than to have volunteered" (Behr and Schneider 2015, 12). Even women who reached the level of Dean "indicated less interest in ascending to the presidency than did men" (Ibid.). Women deans reported less willingness to relocate for advancement as well (Ibid.).

The series of questions about sex discrimination revealed significant differences in perception by sex, which led to extensive discussion of these issues in the focus groups.

Focus Groups: Informal Networks. There were multiple descriptions of "old school" faculty who keep an 8-4 schedule in the office that often includes a lunch hour with other men faculty. Women STEM faculty were usually not part of this arrangement.

> **Participant**: *When I first got here there was some of the older [male faculty] who would go to lunch together and . . .I don't have a lot of time because I have kids and I would rather eat in my office.*
>
> **Participant**: *In my department, it almost categorizes into kind of the old school older men who get there at the same time every day, work the X amount of hours, and leave at the same time and don't do all the extra as some of us do. Versus, I'm going to be here till 6 I'm not going to come in until 8:30.*
>
> **Participant**: *We've got some of those old school guys that are here from 8-4:30, they take an hour and a half lunch and they're walking around with a coffee in their hand and they go and visit everybody. I [arrive] at 8:30, work my tail off, eat my lunch while checking email and leave. [Being] here, it's being productive with your time.*
>
> **Participant**: *It's men that have been here a long time and are just good friends*

Departments are a blend of faculty who have been here a long time and faculty who have come more recently. Work and life expectations have changed over the past 30+ years, with more women entering the workplace, more men seeking time with their families, and younger generations seeking more flexibility in their work lives (Anderson and Solomon 2015; Bianchi et al. 2006; Gerson 2011; Jacobs and Gerson 2004. These shifts in ways of working can make it harder for women STEM faculty to be perceived as productive if they are not adhering to what was once considered a typical schedule (Misra et al. 2011).

The informal networks are places where information may be shared, personal relationships built, and collaborative opportunities developed. If women STEM faculty are not part of these networks because they seek a different way of working, then that can result in them being left out.

Focus Groups: Leadership. There is concern about lack of women in leadership, specifically at the highest levels of administration. But across different departments there is still concern that some male faculty are resistant to women in leadership positions.

> **Participant**: *I've heard among our faculty, male and female, saying that they've noticed the change [in fewer women at the top echelons]. And that routinely now, as positions come open they're more likely to be filled with males than females. That has been an open discussion we've had. I feel like once you have a situation where the group of people that are part of that inner cabinet are predominately male, then it [women in leadership] falls off the radar some ways. It's not an intentional bias to exclude women but [without] women present or not enough women present, it becomes more subtle. Having a seat at the table allows you [as women] to help in mentoring other females and when there's nobody there at the table to help bring that across, [that is a problem].*

> **Participant**: *Among our senior faculty within* [my program] *I feel like there's a little bit of hesitancy among the male faculty to give more, or have better representation of the women faculty in decision making.*

Further, without the presence and representation of women in leadership, it is more difficult for women to access leadership positions as they are less likely to be recruited for such positions. This can be unintentional and subtle if leadership consists of primarily of men.

There was some discussion among women STEM faculty who have been at the university for over 5-7 years that they felt like they had seen better representation of women at the top tier in years past. They reported more recently that several high-level women were no longer in those positions. While no one knew the inside details of what occurred, they discussed that from the outside it appears that women in high level positions do not last long.

> **Participant**: *Well who decides who fills these positions anyway? I mean we're not privy to these conversations right?*

There is also the on-going concern that a woman in a high-level position faces additional scrutiny on her performance as compared to men.

> **Participant**: *I think it's a very broad perception though that if a woman in a leadership position especially in academia, she is representing [all] women. A man, in a leadership position in academia, he is representing a leader in academia, and not his gender.*

> **Participant***: Because it makes everybody look bad, because [if the women] don't succeed and then [reaction is] so we're not going to put a woman in there now.*

> **Participant**: *To be perceived as professional you have to be more manlike. I was actually told this in graduate school.*

Women STEM faculty worry about facing harsher scrutiny because there are fewer of them in high levels.

Focus Groups: Expectations of Climate. Women STEM faculty have low expectations in terms of a supportive climate because their experiences of being in male-dominated graduate schools, other universities, and disciplines has inured them to a variety of slights.

> **Participant**: *I've been in* [STEM Discipline] *. . . for 30 years I've been in male dominated areas, so I guess nothing phases me anymore.*
>
> **Participant**: *When I came it was just* [name] *in the department, the only female in the department. But I came with very little expectation that there was going to be a lot of female role models.*
>
> **Participant**: *So, I came with very little expectation. …Nothing really bothered me.*

One respondent was reminded recently by some women students entering STEM majors about the experiences of being the only female. She recalled that she remembered feeling alone but had apparently "forgotten what that was like." She commented, "You would think that it had changed over time and it's like 'oh wow its sort of the same thing all over again.'"

Women's entrance into and length of time spent in male dominated disciplines appears to desensitize them to negative climate concerns. Seemingly, they expect to encounter inappropriate comments and treatment; when they do, they are not surprised and work hard to ignore it. Nevertheless, this can create a climate that is not supportive or conducive to women feeling included as full members of the faculty.

Another outcome of fewer women in a STEM department is that the women who enter that department may feel like they lack role models with whom they can discuss career and family issues in particular.

Focus Groups: Importance of Department Chair in Climate. Chair involvement can be very important in providing opportunities and mentoring, explaining processes, and generally offering support, especially for new faculty seeking tenure.

> **Participant**: *I will say climate, I've been through four department chairs, climate for female faculty varied greatly by department chair. When there were a group of us that were all pre-tenure, one chair met regularly with the male faculty to mentor them but never met with the female. It was even pointed out to him that he ought to start meeting with the females . . . but I know he never contacted me.*

<u>Recommendation 4a</u>

Findings from the ADVANCE survey of Deans cited earlier "reinforce the importance of mentorship and sponsorship for both identifying and supporting women who will assume leadership roles in the academy" (Behr and Schneider 2015, 12). Therefore, we recommend two activities based on the results of our climate analysis and discussion. First, a formal

mentoring structure needs to be developed to ensure that new faculty receive mentoring regardless of department chair changes. Consistent access to mentoring must be coupled with incentives for senior faculty to participate actively as mentors. Simply decreeing that mentoring will occur without providing training and resources for mentors will not improve the outcomes for women. In addition to formal mentoring, informal mentoring can be very important for women faculty to feel that they "fit" in the department (Hill et al. 2010). In departments with few women faculty, it is problematic for the few (if any) senior women faculty to bear all the mentoring responsibilities.

Other faculty may feel that they cannot be an effective mentor for women if they have not had shared experiences, but there are a variety of mentoring tasks that senior faculty can provide. Individual faculty can consider what specialty knowledge they can impart without taking on a wholesale mentoring effort. For example, mentoring in single areas such as project planning, grant writing, managing labs, and navigating upper levels within the university institutional are all important to professional faculty development.

Recommendation 4b

We also recommend a systematic effort to recruit women for leadership roles. This effort may involve an investment in leadership training within and outside of the institution. Related, it is critical for senior faculty to provide institutional sponsorship of high achieving faculty, advocating for their best interest behind closed doors. This may likely require a wider understanding and broadening definition of success and career trajectories.

Allocation of Professional Duties

Men continue to hold the majority of full professoriate positions and are more likely to advance to these positions faster than women (Misra et al. 2011). Numerous studies have examined this situation and attempt to provide some explanation. Misra et al. (2011) conducted research at the University of Massachusetts Amherst with 350 faculty members in 2008-2009. Their goal was to examine service work and how it affects men and women faculty. They found that although men and women spend about the same amount of time working in general, women spend considerably more time teaching, mentoring, and doing service work when compared to men. All of these things take time away from women's research, which hinders them in the promotion process. They also found this gendered pattern when they focused solely on STEM fields. In fact, this division was more distinct when focusing on STEM fields as they found that men spend approximately 42% of their time doing research while women spend about 27%. When focusing on rank, associate professors take on the majority of service and administrative roles. However, women still feel more pressure to take on these service roles, even though they see them as draining on their time and not necessarily beneficial in the promotion process (Ibid.). Therefore, we asked respondents a series of questions about how they allocate their time professionally and how they believe others perceive the value of their work.

At MTSU, the reported average teaching load per semester for STEM faculty was nine credit hours for men and women (with an average of two hours of that instruction at the graduate level). Women and men reported an average of two peer-reviewed publications accepted

within the last two years, and both men and women reported serving as PI or co-PI on one grant over the last two years. Women reported an average of five research-related conference presentations over the last two years and men reported four. Both men and women reported spending an average of 13 hours per week engaged in service to the institution during the academic year. Across the three areas of academic work, teaching, research, and service, men and women self-reported nearly identical levels of productivity on average.

Table 7 contains the results from a set of questions about research and service productivity compared to one's national peer group and department.

Table 7: Perceptions of Productivity of STEM Faculty in Research and Service

	Below Average		Average		Above Average	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
Rate your level of research productivity over the last two years compared to others in your field	30%	36%	59%	46%	11%	18%
How does your department view your research productivity compared to department average	17%	19%	42%	51%	42%	31%
Rate your level of service compared to colleagues at same rank in your field nationwide	3%	2%	49%	48%	49%	49%
How does your department view your level of service compared to department average	5%	3%	54%	59%	41%	37%

Men and women in STEM reported similar perceptions of how productive they are and how productive their departments perceive them to be. When asked whether their departments view the importance of service productivity differently for them compared to others in the department, 78% of women and 79% of men selected "no." However, in our focus groups, women reported feeling as if though men do much less service than women, and that service is not valued.

Focus Groups: Service. A common theme was that "service doesn't count," particularly when it comes time for tenure review or promotion to full professor. This is an important area of concern and one where it seems that there is a gender imbalance based on focus group responses. There were multiple comments and examples that indicated women STEM faculty are doing more service work than men STEM faculty.

Why? This happens in multiple ways. First, men often refuse or say no, where women will be more likely to say yes. Second, women reported that students come to them more often for help so they find themselves spending time with advising, counseling on personal problems, curriculum issues, or career questions, all of which require a lot of time. They do not see men faculty doing the same. Women volunteer or feel pressure to volunteer so spend more time doing non-research work.

> **Participant**: *I think women are drawn into service roles more in the department. And that can drain your time, your ability to think, but you're asked to do those things a*

whole lot more, recruiting for the department or you're asked to sit on a committee because you're the token female that has to sit on a committee.

Participant: *I almost did not get promoted. It was [concern over] research. [Service] didn't count in my department.*

Participant: [In my department] *there was a female faculty member going up for full and the department chair overloaded her with service things and other roles in the department and said "well and you haven't done enough research." [She responds] "how can I when you don't give me any time to do that, I'm doing all these other things."*

Participant: *[Demands are] students and it's that committee meeting and the recruiting, and that kind of thing.*

1. Service Work Impedes Promotion.

Mid-career tenured faculty expressed that increased service work can present a barrier to moving to full professor. Often tenured faculty are expected to perform more service than they did as tenure track faculty. These service work requirements are critical in running departments, yet many feel like the service work performed as associates at mid-career is not counted toward full professor requirements. And in some cases, women STEM faculty went up for full professor but were turned down and they said they would not try again for promotion. This is a challenge as we need tenured faculty to teach, advise, work with graduate students (as applicable), serve on department and university committees, but if they produce less research because of it then they feel that they are punished in their attempts to move to full professor.

2. Service Needs That Require Diversity.

In the attempt to have gender diversity on committees, there are multiple requests for women to be members on committees at all levels in the university. This policy, while positive in spirit, intensifies the service expectation for women STEM faculty. Because there are fewer women in STEM, and especially fewer minority faculty, those faculty who meet diversity definitions are often over burdened with service work. This can hurt their research productivity, which in turn impairs their career mobility. In sum, the policy of seeking broader gender and racial representation on committees can create a problematic outcome when there are too few women and minorities in the organization.

Participant: *[Whether it's] recruiting for the department or you're asked to sit on a committee because you're the token female that has to sit on a committee, so those things can drain on your time.*

Participant: *If you're a woman or a minority [you are in demand]. We have two black professors in our department, [they] are on every committee and I know they don't appreciate it.*

> **Participant**: *You know so if you're a woman or a minority I think you get asked more because they've got to fill those minority positions.*

Nevertheless, it is important for committees to have broad representation of faculty. This is a conundrum for STEM disciplines in particular because of fewer women. When committee assignments are made, sensitivity to this dilemma is paramount

Women STEM faculty view service work as an important aspect in the day-to-day operations for the university, their colleges and their departments; however, they reported that they are not rewarded for contributing to this service work, especially during the promotion process. With fewer women in STEM departments more of their time may be spent doing service work, which ultimately does not benefit them professionally (in terms of tenure and promotion).

Overall, there was widespread agreement that service is not valued across the board in terms of promotion, recognition, or even opportunities for upward mobility. This results in women STEM faculty feeling that they are doing more service to the detriment of their research, often because they are asked to serve, yet this major time and effort does not necessarily count equally toward professional advancement.

Recommendation 5a
We recommend that departments focus part of the review of tenure and promotion policy on the service criteria for promotion to full professor. If service is in fact critical to the functioning of the department, then it should be rewarded.

Recommendation 5b
We recommend that the MTSU Office of Institutional Equity and Compliance evaluate the criteria for representation on committees to ensure that we strike a balance that preserves inclusiveness without over burdening minority and female faculty members. Chairs must ensure that service responsibilities are not falling disproportionately on women faculty, and that these responsibilities are valued in department evaluations. Deans must provide support for this approach as well.

Recommendation 5c
We recommend a series of workshops that help women learn and experience the value of a "strategic yes."

Work-Life Balance

The family continues to be a central factor not only in understanding the lack of women in STEM fields overall but also in explaining their lower representation as full professors. Although gains have been made, women continue to perform the majority of household and childcare responsibilities (Jacobs and Gerson 2004; McCullough 2011; Tanenbaum and Upton 2014). According to Fox, Fonseca, and Bao (2011) both women and men in academe experience family and work conflict, although women report higher levels. Amy Kittelstrom (2010) claims that academic mothers face discrimination in unique ways when compared

to academic fathers and other professionals. According to her article on academic motherhood, women are less likely to get hired into tenure track positions and more likely to get stuck in positions that are lower paying and with less security. She also attributes the wide gap in higher ranking faculty to men being considered the "ideal worker," those who can devote many hours to professional work with little to no distraction from home life because they have spouses at home who take care of those responsibilities. Another problem cited by Kittelstrom (2010) that women face consists of the gap(s) that occur in a woman's curriculum vita when she bears and cares for a child. These gaps cannot be undone or discussed in the interview process; therefore, they hurt women during the hiring and promotion process. Our focus groups indicate that these gaps can damage women's opportunities to be promoted to full professor (noted earlier in work trajectories).

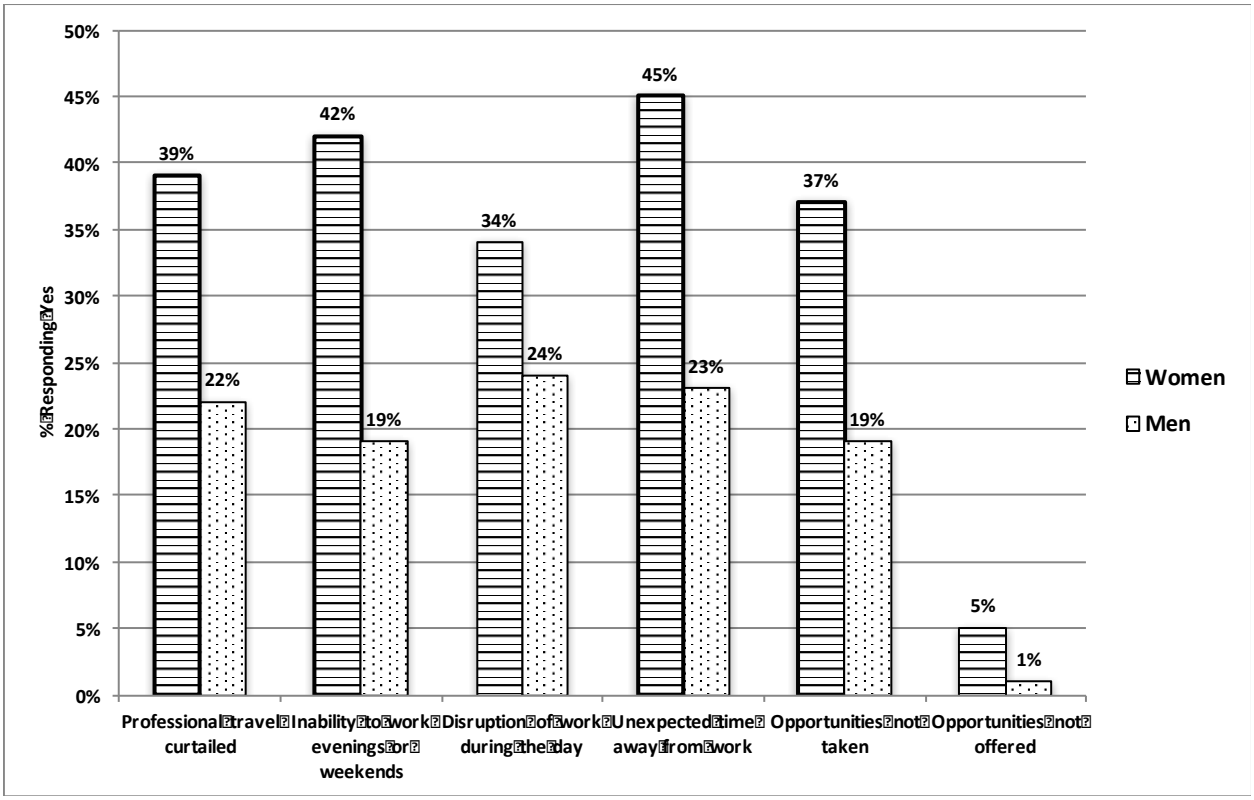
Because work-life balance is a frequently cited concern for women across all professions, we included a set of questions to gauge the degree to which women and men feel successful in balancing their obligations at work with those outside of work.

Demographics. A series of demographic questions preceded the questions about work-life balance. The average age of respondents was four years higher for men (52) than women (48). Eighty-six percent of men and 69% of women reported that they are married and living with their spouse. Thirty percent of women and 16% of men reported at least one divorce, and 40% of that group indicated that their career contributed to the divorce (43% for men and 36% for women). Women reported a much higher rate of divorce than men and a stronger relationship between career and divorce, indicating that balancing the professional and personal aspects of life may be more difficult for women.

Twenty-three percent of women and 29% of men reported an unemployed spouse, with men more likely to have a voluntarily unemployed spouse than women (25% versus 17%). Men and women reported providing some care for an average of two dependents, while men reported providing primary care for more dependents on average than women (two versus one). Women with a spouse or partner cohabitating reported being responsible for 54% of childcare and men reported being responsible for 41%. In situations where adult care is applicable, women report responsibility for 24% of adult care compared to 17% for men. Co-habitating women report a higher level of responsibility for household care than co-habitating men (62% versus 39%).

We then asked respondents to identify specific ways in which their professional life has been affected by personal responsibilities (specifically, having children), the results of which appear in Figure 13 below.

Figure 13: How Children Affect Professional Activity



Men and women estimate relatively similar levels of responsibility for childcare, yet women are much more likely than men to report adverse career effects resulting from children. Perhaps women are underestimating and men are overestimating their level of responsibility, or men are less likely to allow those responsibilities to influence career decisions.

We asked respondents a series of general questions about work-life balance as well, the results of which appear in Table 8 below.

Table 8: General Work-Life Issues for STEM Faculty

	Disagree		Agree	
	Women	**Men**	**Women**	**Men**
I often forgo professional development due to personal responsibilities	52%	54%	28%	21%
I often forgo personal activities due to professional responsibilities	44%	40%	32%	33%
Personal responsibilities have slowed my career progression	64%	52%	16%	24%
I have a good work/life balance	8%	18%	73%	58%
I find it difficult to maintain personal relationships due to professional obligations	73%	66%	8%	14%

When responding to these generic questions about work-life balance, men and women report similar outcomes. Yet, women are significantly more likely than men to report adverse professional consequences as a result of having children. Women also report a "good work-life balance" at a higher rate than men despite acknowledging that life has impeded work. Since we did not define work-life balance for participants, it could be that women *expect* life to impede work and see that as normal, whereas, men, who may now be taking on a larger share of child-rearing, do not expect or accept these consequences and are thus less likely to be satisfied with an arrangement that is not truly balanced.

Focus Groups: Gendered Expectations. There are subtle ways in which ideas about how men and women are expected to behave play out in women STEM faculty experiences. Not all women STEM faculty are mothers, but obviously a large percent of faculty become parents. Culturally, the expectations for mothers differ from fathers, though many younger couples today are trying to share work and family responsibilities more equitably than previous generations (Blair-Loy 2003; Ridgeway and Correll 2004; Townsend 2002). These arrangements manifest in the actual responsibilities that women STEM faculty have at home, how they feel they need to present themselves at work, and how this can impact their career mobility.

1. Women Experience Many Obligations.

All the women STEM faculty in the focus groups were very committed to their jobs, and spent considerable time and effort to be productive. Many spoke of late night work after children are in bed, weekend work and being available to students and colleagues as needed.

> **Participant**: *Women are scrambling hard in our department, I think women are pulled in LOTS of different directions, more strongly than men are.*

Women STEM faculty are focused on getting their work done, and managing their schedule in order to meet both work and family expectations. They experience stress in trying to juggle multiple and often competing expectations. They manage their responsibilities by eating lunch at their desks, cutting back on some socializing, and being very focused on work productivity.

2. Personal Identity Should Be Kept Away from Work.

> **Participant**: *You can't talk about your kids, and I actually had someone tell me that they purposely lowered their voice and they changed the way they dressed and they did better. They were given more leadership*

> **Participant**: *I purposely have to not talk about my kids at work. And detach myself from them.*

> **Participant**: *I think that in general it is perceived badly to b*e able to talk about your kids, because then you're not perceived as professional.
>
> **Participant**: *I have a gap in my research record. And that gap is there because I took maternity leave. And I feel like there is nothing that I could have done service or research that would have addressed that. I already had tenure so I can't stop the clock for promotion. What I thought that my package showed was that I have a good research record going forward, and what they thought my package showed was that I'm sporadic because there are these gaps in my record. If you take maternity leave, the human resources department tells you [that] you cannot do any work during that time.*

Research shows that STEM culture is very problem-focused (Hill et al 2010). In both academic and non-academic arenas, keeping work conversations focused on work issues, and avoiding expressing personal issues is common. Women STEM faculty are particularly sensitive to being viewed as lacking commitment to their work if they share their personal lives. For example, women's lives may take different trajectories than men's if they take maternity leave, but this does not mean they are not productive employees (For more information, see Mason, Wolfinger, and Goulden 2013).

Recommendation 6a

As a state institution, MTSU has both comprehensive policy and institutional structure in place for family leave. However, the policies can harm women if applied too rigidly. We recommend an evaluation of leave policy to ensure that there is some flexibility for faculty who may want to take partial leave in order to continue an active research agenda.

Recommendation 6b

We recommend that MTSU invest in a "Work-Life Coordinator." A Work-Life Coordinator in the academy would facilitate resource support in a wide range of work-life issues including: parenting, childcare, aging and elder caregiving, family services and other support for balancing work and personal life.

Conclusion and Prioritized Action Items

We found several areas of concern for women faculty in STEM at MTSU, ranging from compensation to frustration with the allocation of service responsibilities. Based on the findings, we recommend above a set of modest yet comprehensive institutional changes that should improve the persistence, retention, and satisfaction of women in STEM. Below, we divide the recommendations into tiers in order to prioritize resource allocation knowing that all recommendations will not be attempted simultaneously.

Improvements for women STEM faculty at MTSU will help faculty recruit more women into the "pipeline" as well. Again, some of the recommendations may be subsumed in the policy evaluation process resulting from the transition to a local board.

A. First-tier Priorities: Work-Life Balance.

The literature as well as our study found that despite changes, women more so than men report adverse professional consequences as a result of having children, having greater responsibility for adult care, and a higher level of household and family responsibilities. These responsibilities are felt more acutely in the academic environment where the "ideal" worker is one who can work long hours with few distractions from home life. Women and men who might otherwise flourish with more work-life balance often fear the repercussions of requests for time away or flexible scheduling to meet their multiple demands.

1. With this in mind as a real impact for women faculty, and some men, in STEM, we recommend that MTSU invest in a "Work-Life Coordinator." A Work-Life Coordinator in the academy would coordinate resource support in a wide range of work-life issues including; parenting, childcare, aging and elder caregiving, family services and other support for balancing work and personal life
2. Over and over women (and minorities) talked of feeling service heavy in an environment that more strongly rewards research and publications. Women in particular spoke of having trouble turning down this committee work because there were fewer women available for creating a diverse committee and that once asked, they felt turning down an assignment would indicate they were not "good colleagues." With this in mind we recommend:
    a. A renewed emphasis within Tenure and Promotion committees on the value of service;
    b. A series of workshops that help women learn and experience the value of a "strategic yes."
3. A series of workshops for each department dedicated to creating diversity in thought that does not necessitate physical diversity in each committee.
4. Department and college training that targets expectations and opportunities for those moving to the Professor level. This training would also include the strategic use of leave and stop-outs.

B. Second-tier Priorities: Tenure and Promotion.

1. Early and continued emphasis on understanding the expectations and strategic negotiation of workload, tenure and promotion to Associate Professor, which would include training for department chairs as discussed above. This training would also include the strategic use of leave and stop-outs.
2. Post-hire training for women focused on understanding the processes/practices related to university resource allocation and the importance of learning how to ask for such allocations as they relate to one's research and teaching needs.

C. Third-tier Priorities: Overall Climate.

1. Formal mentoring policies and informal mentoring processes -- continue to evaluate as this has been emphasized by the current administration. It would be worthwhile to create a way to evaluate the effectiveness of these introduced policies and processes.
2. Equitable and comparable salary study with funding initiatives. The 2015-16 administration conducted this study but there are no obvious funding initiatives at present. We strongly recommend that MTSU administration keep looking in a very real way for these initiatives.
3. Continue to evaluate the usefulness of current workload practices. This would include developing an understanding that quality research and teaching are highly integrated but that quality research requires sustained and strategically meaningful access to time.

WORKS CITED

Anderson, Erin K. and Catherine Solomon. 2015. F*amily-Friendly Policies and Practices in Academe.* Maryland: Lexington Books.

ADVANCE Portal Website. http://www.portal.advance.vt.edu/

Babcock, Linda, and Sara Laschever. 2003. *Women Don't Ask: Negotiation and the Gender Divide*. Princeton, NJ: Princeton University Press.

Behr, Michelle, and Jennifer S. Schneider. 2015. *Pathways to the Deanship: An Examination of Gender Differences among CCAS Member Deans*.

Bianchi, Suzanne M., John P. Robinson, and Melissa Milkie. 2006. *Changing Rhythms of American Family Life*. New York: Russell Sage.

Blair-Loy, Mary. 2003. *Competing Devotions: Career and Family among Women Executives*. Cambridge, Mass.: Harvard University Press.

Canak, William, Mary B. Martin, Alfred Lutz, Hyrum D. Carroll, and Brian Hinote. 2015. *Study of Faculty Salaries at Middle Tennessee State University: A Report Submitted to the Faculty Senate of Middle Tennessee State University*.

Corbett, Christianne and Catherine Hill. 2015. *Solving the Equation: The Variables for Women's Success in Engineering and Computing*. AAUW: Washington, DC.

Fox, Mary Frank and Carol Colatrella. 2006. "Participation, Performance, and Advancement of Women in Academic Science and Engineering: What is at Issue and Why." *Journal of Technology Transfer* 31: 377-386.

Fox, Mary Frank, Carolyn Fonesca, and Jinghui Bao. 2011. "Work and Family Conflict in Academic Science: Patterns and Predictors Among Women and Men in Research Universities." *Social Studies of Science* 41(5): 715-735.

Gerson, Kathleen. 2011. *The Unfinished Revolution: Coming of Age in a New Era of Gender, Work, and Family*. New York: Oxford University Press.

Glass, Jennifer L., Sharon Sassler, Yael Levitte, and Katherine M. Michelmore. 2013. "What's So Special about STEM? A Comparison of Women's Retention in STEM and Professional Occupations." *Social Forces* 92(2): 723-756.

Hill, Catherine, Christianne Corbett, and Andresse St. Rose. 2010. *Why So Few? Women in Science, Technology, Engineering, and Mathematics*. AAUW: Washington, DC.

Hollander, Jocelyn. 2004. "The Social Context of Focus Groups." *Journal of Contemporary Ethnography* 5:602-637.

Ibarra, Herminia, Nancy M. Carter, and Christine Silva. 2010. "Why Men Still Get More Promotions Than Women." *Harvard Business Review* 80-85.

Jacobs, Jerry, and Kathleen Gerson. 2004. *The Time Divide: Work, Family, and Gender Inequality.* Cambridge Mass: Harvard University Press.

Kittelstrom Amy. 2010. "Academic-Motherhood Handicap." Retrieved July 21st 2015. http://chronicle.com/article/The-Academic-Motherhood/64073/

Mason, Mary Ann, Nicolas Wolfinger, and Marc Goulden. 2013. *Do Babies Matter? Gender and Family in the Ivory Tower.* New Brunswick, NJ: Rutgers University Press.

Mclean, Marsha R. 2012. "Analyzing the Relationship of Geographic Mobility and Institutional Prestige to Career Advancement of Women in Academic Medicine." Presented at the American Educational Research Association Annual Conference - 2012, At Vancouver, British Columbia, Canada. Available at: https://www.researchgate.net/publication/267210271_Analyzing_the_Relationship_of_Geographic_Mobility_and_Institutional_Prestige_to_Career_Advancement_of_Women_in_Academic_Medicine

McCullough, Lauren. 2011. "Women's Leadership in Science, Technology, Engineering and Mathematics: Barriers to Participation." *Forum on Public Policy Online* 2011(2): 1-11.

Misra, Joya, Jennifer Hickes Lundquist, Elissa Holmes, and Stephanie Agiomavritis. 2011. "Service Work Continues to Pull Women Associate Professors Away From Research. What Can Be Done?" *Academe* 97(1): 22-26.

MTSU Fact Book (2013-2014), http://www.mtsu.edu/iepr/factbooks.php

National Science Foundation, National Center for Science and Engineering Statistics. 2017. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017.* Special Report NSF 17-310. Arlington, VA. Available at www.nsf.gov/statistics/wmpd/.

Nelson DJ. *Nelson Diversity Surveys: Tables with Number of Faculty, by Sex, Race/Ethnicity, and Rank at Top 50 Institutions, by Field*. Norman, OK: University of Oklahoma, Diversity in Science Association. Available at http://faculty-staff.ou.edu/N/Donna.J.Nelson-1/diversity/top50.html.

Ridgeway, Cecilia, and Shelley J. Correll. 2004. "Motherhood as a Status Characteristic." *Journal of Social Issues* 60:683–700.

Tanenbaum, Courtney and Rachel Upton. 2014. *Early Academic Career Pathways in STEM: Do Gender and Family Status Matter?* Washington, DC: STEM at American Institutes for Research. Available at http://www.air.org/resource/early-academic-career-pathways-stem-do-gender-and-family-status-matter

Townsend, Nicholas. 2002. *The Package Deal: Marriage, Work and Fatherhood in Men's Lives*. Philadelphia: Temple University Press.

Williams, Joan, and Rachel Dempsey. 2014. *What Works for Women at Work*. New York: NYU Press.

APPENDICIES

APPENDIX 1: Survey Instrument

The complete survey is available at the following link:
http://www.mtsu.edu/advance/docs/ADVANCE-SURVEY-with-citations.pdf

APPENDIX 2: Focus Group Protocol

1. GENERAL CLIMATE

Let's start with general question on climate at various levels in the university. How would you describe the general work climate for women in your departments? At the college level, at MTSU?

RESOURCE ALLOCATION

2. How would you describe resource allocation across your departments? (college if needed) Please describe specific instances of how resources are allocated in your experiences?
    a. What are different resources available? Describe how resource allocation is done in your department, college, university? Do you have concerns about fair allocation? Need specific aspects.

INFORMAL NETWORKS

3. What are your experiences with mentoring? Have you all had mentors?
4. What are your experiences with informal networks in our dept? Who is part of these?
    a. Do informal networks exist in your dept? in your college? How do they influence climate in department, college? Does everyone have similar access to these networks? What examples?

LEADERSHIP

5. Do women have opportunities and access to leadership positions?
    a. Do you hear concerns from some faculty about women in leadership positions? Where do you see these concerns? How do they manifest?
    b. Do women influence policy in your departments in the same way that men do?

6. How do you see women being perceived as leaders? Do you see women influencing policies, practices?
    a. Do you see limits to women's leadership opportunities? Limits to women's influence?

7. When you think of MTSU administration, do see gender diversity? What does admin mean you? Who, what levels?

PROMOTION PROCESSES

8. Describe the guidelines and expectations for being promoted to Full professor. Are these fairly applied? Are they clear? Do you feel that they are followed?
    a. If you are a Full now, what did they consider when they decided to apply for full professor?
    b. What were their experiences in the process? From Chair, others in department?

OTHER

9. Are there other issues that I have not covered that are important for us to know in trying to improve the recruitment, retention, and promotion of women STEM faculty?

10. Finally, we have talked about many issue, I'd would like to hear from you some ideas for improving issues that we have discussed.
    a. What can be done to improve these concerns?

    Do you participate in a graduate or doctoral program? If yes does that impact these issues? (leadership and resources, climate)