Navigate, Balance, and Retain: Developing Success in the Mid-Career for Female STEM Faculty (NFS 1015932)

Chris McCord, Lesley Rigg, Amy Levin, Brian Coller, and Jeff Reynolds.

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Executive Summary

For the past several decades, research has been directed toward enhancing women’s and underrepresented minority groups’ participation in academic careers within mathematics, science, and engineering (STEM) at all levels (Gornick 2009, Stewart et al. 2007a,b, Bystydzienski and Bird 2006, Nelson 2005, Rankin and Nielson 2004, Jackson 2002, Sax 2001). The data for this study were collected as part of an NSF ADVANCE Catalyst grant focusing on the College of Liberal Arts and Sciences (CLAS) and the College of Engineering and Engineering Technology (CEET) at Northern Illinois University in late fall and early winter 2010-2011. Data collection took three forms: a survey, focus groups, and individual interviews. The faculty career (work-life) survey was administered to faculty members in the two colleges and included 169 Likert-type questions and 14 open-ended questions in which participants were invited to provide detailed responses. Of the 121 respondents, 49 were female, 66 were male, and 16 did not report gender. Similarly, 42 respondents were from Science or Engineering discipline (STEM), 73 were from Social Science or Humanities disciplines (non-STEM), and 7 respondents did not identify a discipline. We offered four focus groups, one each for males in STEM, females in STEM, males in non-STEM areas, and females in non-STEM areas. A total of 22 faculty members responded to questions about their career progress and work-life balance in the focus groups. The interviews, which included even more detailed questions, included a total of 12 participants from the four groups. Two of the 12 participants also work at national laboratories and some questions addressed their work in those settings.

CAMPUS CLIMATE SURVEY SUMMARY

- **Satisfaction:** In general, both female and male respondents were satisfied, or very satisfied with, their current position at NIU, with non-STEM faculty rating their work slightly more favorably than STEM faculty. Female STEM faculty reported the lowest levels of satisfaction in regards to career progression. Based on open-ended questions, regardless of gender, a large proportion (42%) of the respondents said that departmental atmosphere was the factor that most contributed to satisfaction, and work-life balance (or the lack of it) was the factor that detracted most from satisfaction at NIU.

- **Hiring Process:** Regardless of gender or discipline, 74% of the respondents reported being satisfied with the hiring process at NIU, with a majority of survey respondents reporting that they negotiated successfully for what they needed and that departments did their best to obtain resources for them.
In general, STEM faculty reported a lower proportion of satisfaction with negotiations than non-STEM faculty. Other than negotiation success, key variables in the hiring process were interaction with the search committee and perception that faculty made an effort to meet with interviewees.

- **Teaching and Service Workload:** While there was generally the perception among faculty that they were able to teach the courses they wanted and that teaching was assigned equitably, self-reporting of workloads suggest that female faculty (especially in STEM) have an overall higher undergraduate teaching load. Most participants serve on departmental level committees, and the highest proportion reporting that they had served as either chair or assistant chair were males. Regardless of discipline, females had the highest proportion of respondents reporting that they had served in university level administrative positions and college level administrative positions.

- **Research:** A higher proportion of STEM males had reported receiving grant support when compared to their female counterparts. The top five most important productivity indicators identified by respondents were: number of articles published in refereed academic/professional journals, prestige of publication outlets, number of monographs, number of presentations at national/international conferences, and number of book chapters. Non-STEM males had the highest proportion of respondents who ranked themselves as having a high overall level of research when compared to nationwide averages, and STEM males perceived the department’s view of their research productivity to be high to very high. Females in both STEM and non-STEM disciplines had equally high proportions of respondents that reported a low perception of research productivity when compared to their colleagues. While most respondents believed their colleagues valued their research, a nontrivial proportion of STEM faculty (females and males) believed their colleagues did not value their research.

- **Resources:** Respondents were generally satisfied with the resources available to them, but most STEM females reported feeling dissatisfied at the number of regular maintenance calls or upgrades made to their equipment, compared to their department peers. For teaching support, just under half of all participants reported that they had sufficient support (e.g. Graduate or Teaching Assistants). When broken into disciplines, however, the highest proportion of respondents who reported insufficient teaching support were STEM females.

- **Networks and Mentoring:** Approximately half of all the survey respondents reported that they have colleagues on campus who conduct similar or complementary research, including those they can turn to for career advice and guidance. Less than a quarter of all respondents took part in a formal mentoring program, with STEM females reporting the least participation and the greatest sense of isolation within their departments. Interestingly, at the university level female STEM faculty members do not report feeling isolated.

- **Perceptions of Respect and Inclusivity:** In general, most respondents reported that they were treated with respect by their colleagues. STEM females were less likely than their male counterparts to report that they felt like a full and equal participant in departmental problem-solving and decision-making. A majority of respondents believed they could voice their opinions openly within their department, but STEM females indicated that they tended not to be included in departmental informal networks. A majority of participants agreed with the statement that that their department chair treated them with respect.
• **The Tenure Process:** A higher proportion of STEM faculty than non-STEM faculty disagreed with the assertion that research, teaching, and service are given appropriate weight in promotion, tenure, and merit decisions. In regards to actual decisions on tenure and promotion, 100% of STEM female respondents reported agreeing that they were satisfied with the tenure/promotion process overall.

• **Work-Life Balance:** About half of the participants agreed that they often had to forgo personal activities because of professional responsibilities, and a higher proportion of female respondents suggested that personal responsibilities had slowed down their career progress. When asked to report how much they agreed or disagreed with the statement, “Most faculty in my department are supportive of colleagues who want to balance their personal and career lives,” a majority of both female and male participants reported that they either agreed or strongly agreed.

**FOCUS GROUP SUMMARY**

The team identified common themes across all focus groups:

- The requirements for full professor are somewhat vague.
- There is some variability in requirements for full professor within departments subfields.
- People in departments do not discuss work-life balance; they see it as a negative factor.
- Individuals’ sense of agency or openness in a department depends on the chair.
- Individuals can become as involved as they wish in service.
- There is some lack of clarity about how faculty members are appointed to department committees.
- People are satisfied with teaching schedules and their involvement in setting them.
- Faculty members do not experience mentoring in the department or college.
- Individuals received help from David Stone, director of the office of sponsored programs (OSP); OSP as a whole more received more mixed reviews.
- Departmental politics and the full professors play key roles in determining when someone comes up for promotion to full professor.

**Common themes from female focus groups:**

**Theme 1: “Confidence Squashed”**

Respondents (particularly in STEM) reported their confidence being “squashed” by

- Proposal rejections
- Negative feedback on paper reviews
- Negative feedback or even non-positive feedback on tenure/career progress reviews.
- Ideas shot down in department meetings
- Condescending responses to their questions
- The overall competitive/combative nature of STEM

This dovetailed with an expressed need to receive positive reinforcement and encouragement, which they reported not receiving.

**Negative consequences:**

- Faculty members do not express their opinions and do not take an active role in department decision-making
- Faculty members are afraid to ask important questions (e.g. about promotion and tenure) out of fear that the questions will reflect poorly on them. One respondent did not even ask her department and college leadership about maternity issues. She sought advice from outside.
Some respondents (mostly STEM but non-STEM as well) seemed to think that this was not as significant a concern for men.

- Men seemed less affected by these experiences
- Men are more plugged in to department social networks. They can get their questions answered and express their ideas in less threatening settings.

Other respondents (mostly non-STEM) did not see it as much of a male/female issue as a junior/senior issue or an “inside clique” vs. “outside crowd” issue.

Coping mechanisms:

- Finding a “safe” person (perhaps a mentor) to ask questions
- Finding a “safe” person to act as a proxy in bringing up issues at key meetings.
- Joining network of peers outside the department.

**Theme 2: Maternity**

- Respondents expressed concern about maternity (FMLA) leave policies and subsequent impact on promotion and tenure.
- For women, family responsibilities may present problems in the probationary period. Women may delay children for this reason.
- Women in STEM expressed concern that taking any extended maternity leave would be considered negatively by colleagues and leadership. Similarly, many thought extending the tenure clock due to maternity would be considered negatively.
- Fewer males in STEM (especially engineering) take leave after the birth of a child.
- Women in non-STEM seem to recognize maternity leave as their right. They are dismayed by what they perceive as a lack of uniform standards.
  - Unclear how much time to request.
  - Asked by department chair to perform unfair duties in lieu of teaching.
  - HR Policies not flexible.
  - Timing of baby has a big impact on duties assigned.
  - Stopping the tenure clock is “hugely important” in the abstract, but difficult in practice.
  - Stopping the clock has a negative impact on career.

**Theme 3: Unclear Promotion and Tenure Standards**

- Reported by female respondents in STEM and non-STEM

**INTERVIEW SUMMARY**

**Dominant items included the following:**

- Difficulties with the stop the tenure clock policy and FMLA leaves; inconsistencies in application.
- Complaints about poor facilities for research.
- Struggles for parents of young children, both in achieving tenure and promotion and in maintaining a satisfying work/life balance.
- Challenges in maintaining work/life balance; faculty believe that this balance is growing increasingly difficult to achieve.
- Social barriers affect faculty members’ career progress, satisfaction, and productivity.
- Informal mentoring is necessary and helpful—lunches for women in STEM were mentioned repeatedly.
- Incentives include pay, course releases, and contact with students.
College Demographics

College and Disciplinary Association

- **STEM**
  - CEET & CLAS Natural Sciences
  - STEM female, n = 11
  - STEM male, n = 31
- **Non-STEM**
  - CLAS Humanities & CLAS Social Sciences
  - Non-STEM female, n = 38
  - Non-STEM male, n = 35

![Percentage of respondents by gender](chart)

How satisfied are you?

Position at NIU?

- **very satisfied**
  - Male: 18
  - Female: 11
- **satisfied**
  - Male: 35
  - Female: 24
- **neither satisfied nor dissatisfied**
  - Male: 8
  - Female: 5
- **dissatisfied**
  - Male: 2
  - Female: 7
- **very dissatisfied**
  - Male: 3
  - Female: 2

Career progression at NIU?

- **very satisfied**
  - Male: 15
  - Female: 10
- **satisfied**
  - Male: 33
  - Female: 17
- **neither satisfied nor dissatisfied**
  - Male: 12
  - Female: 9
- **dissatisfied**
  - Male: 5
  - Female: 10
- **very dissatisfied**
  - Male: 1
  - Female: 1

![Percentage of respondents by gender](chart2)
**Survey Questions**

- Q 1. How satisfied or dissatisfied are you with your position at NIU?
- Q 2. How satisfied or dissatisfied are you with the way your career has progressed at NIU?
- $\rho = 0.749$

**By Gender and Discipline**

<table>
<thead>
<tr>
<th>Gender</th>
<th>STEM</th>
<th>Non-STEM</th>
<th>All Disciplines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0.7</td>
<td>0.5</td>
<td>0.65</td>
</tr>
<tr>
<td>Male</td>
<td>0.5</td>
<td>0.2</td>
<td>0.65</td>
</tr>
</tbody>
</table>

*Z-score of zero indicates the average response*

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**IT – Catalyst Focus Groups**

**STEM Women**

- I have lots of good friends outside of my department but I just don’t feel that my department is very supportive. It’s not a good fit ... for what I do. ... I feel like we’re not given enough credit for enjoying our work and being motivated by the enjoyment for work.

**Non-STEM women**

- It feels like we [females in the department] don’t have a voice and that when we have faculty meetings, the faculty meetings are dominated by male voices and God forbid that you ever bring up gendered issues, because people will, the chair will quickly hit you back down and say, “there is no gender issue here.”
I feel isolated in my Department

STEM (female n = 10, male n = 31)

Non-STEM (female n = 35, male n = 33)

I feel isolated at NIU

STEM (female n = 10, male n = 31)

Non-STEM (female n = 35, male n = 33)
Agency and Respect

Survey Questions

- Colleagues treat me with respect.
- I feel like a full and equal participant in the problem-solving in my department.
- I feel like a full and equal participant in the decision-making in my department.
- I am included in informal networks in my department.
- Colleagues value my research.
- Faculty meetings allow for all participants to share their views.
- I can voice my opinions openly in my department.

By Gender and Discipline

<table>
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<th>Non-STEM</th>
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<tr>
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<tr>
<td>I can voice my opinions openly in my department</td>
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Gender Marginalization:
Female faculty are less likely than their male counterparts to have influence in departmental politics & administration.

Percentage of respondents by gender within each category

<table>
<thead>
<tr>
<th></th>
<th>Male non-STEM</th>
<th>Male STEM</th>
<th>Female non-STEM</th>
<th>Female STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>neither agree nor disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>strongly disagree</td>
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Male faculty are more likely than female faculty to be involved in informal social networks within the department

STEM males n = 30, STEM females n = 10
Non-STEM males n = 33, Non-STEM females n = 35

Gender: $F = 14.6, p < 0.001^{***}$
Discipline: $F = 9.70, p = 0.002^{**}$
G x D: $F = 0.00, p = 0.988$

April 2013
Networking outside the Sciences

<table>
<thead>
<tr>
<th>No preconceived biases</th>
<th>A relief to meet other women</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Many of the older, male faculty in my department consider my work marginal to the discipline because my areas of research is a newer, people-oriented one. So it is nice to make contacts with people who do not have preconceived biases about my discipline and are interested in people-oriented aspects of it.</td>
<td>• Most of the faculty in my department are completely unaware of the biases built in to our department’s written and unwritten rules, and totally deny any bias even when it is pointed out to them. So it is a relief to meet other women through Women’s Studies and WISTEM who have had the same experiences.</td>
</tr>
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Increasing trend towards collaboration

<table>
<thead>
<tr>
<th>Year</th>
<th>Average # authors per paper</th>
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<tbody>
<tr>
<td>1995</td>
<td>1.2</td>
</tr>
<tr>
<td>1996</td>
<td>1.4</td>
</tr>
<tr>
<td>1997</td>
<td>1.8</td>
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<tr>
<td>1998</td>
<td>2.0</td>
</tr>
<tr>
<td>1999</td>
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</tr>
<tr>
<td>2000</td>
<td>2.4</td>
</tr>
<tr>
<td>2001</td>
<td>2.6</td>
</tr>
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<td>2002</td>
<td>2.2</td>
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<tr>
<td>2003</td>
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<tr>
<td>2004</td>
<td>1.8</td>
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<tr>
<td>2005</td>
<td>1.6</td>
</tr>
<tr>
<td>2006</td>
<td>1.4</td>
</tr>
<tr>
<td>2007</td>
<td>1.2</td>
</tr>
<tr>
<td>2008</td>
<td>1.0</td>
</tr>
<tr>
<td>2009</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Junior Faculty desire a higher quality of training in collaboration, teamwork, leadership, and publishing.
Work-Life Satisfaction

Survey Questions

- Most faculty in my department are supportive of colleagues who want to balance their personal and career lives.
- The head of the department understands the existing policies regarding family leave (e.g. FMLA).

By Gender and Discipline

<table>
<thead>
<tr>
<th>Work-Family Balance (z-score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM</td>
</tr>
</tbody>
</table>

Gender: $F = 0.90, p = 0.346$
Discipline: $F = 16.7, p < 0.001^{***}$
G x D: $F = 0.21, p = 0.645$

Balancing professional and personal

### I often have to forgo professional activities

<table>
<thead>
<tr>
<th>Percentage of Respondents</th>
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<td>Strongly Agree</td>
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### I often have to forgo personal activities

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</table>

### Personal responsibilities and commitments have slowed down my career progression

<table>
<thead>
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<th>Percentage of Respondents</th>
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<tr>
<td>Strongly Agree</td>
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<tr>
<td>10</td>
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</tbody>
</table>
Open-ended survey responses

Paths to Satisfaction
Concerns and Action Steps

FMLA leave, extension of probationary period, and faculty work plans.

Concern: Faculty members report a lack of clarity about what constitutes an appropriate work plan for return from an FLMA leave and they express concerns about consistency in policy implementation. Some report that they have been discouraged from applying to “stop the tenure clock” by peers and unit administrators.

Action Steps:
1. University Council should develop clearer guidelines (or a template) for work plans to be included in the APPM.
2. HRS should offer on-line administrator training regarding these issues.

Processes and criteria for gaining promotion to full professor.

Concern: Faculty members indicated that in many cases university, college and department documents do not provide much specificity regarding promotion to full professor.

Action Steps: University Council should revise the bylaws; colleges and units should clarify personnel documents so they contain clear and thorough guidelines for promotion to full professor.

“Informal” reviews prior to applications for promotion to full professor

Concern: In many units, a small group screens associate professors’ vitae and suggests whether they are ready to apply for promotion. These processes lack transparency and mitigate against diverse candidates or those with nontraditional careers. They function as if they were official because faculty members are reluctant to oppose colleagues’ judgments.

Action Steps: Departments should develop equitable and transparent practices for determining when an application for promotion to full professor can occur. University Council should revise the University Bylaws to require such practices, which must be approved by College Councils.

Campus Climate Recommendations

1. Mentorship.
   Concern: STEM women face difficulties accessing informal male networks and find mentors outside their departments.
   Action Steps: Alternative paths for networking and mentorship such as the WiSTEM lunch group have been effective. CLAS is appointing a faculty member through Women’s Studies to coordinate such alternatives and offer the support of a half-time teaching assistant.

2. Career progress.
   Concern: When STEM women are excluded from department networks, they find themselves overlooked for leadership roles and opportunities to develop necessary skills.
   Action Steps: See above; in addition, PCSW develops appropriate programs.

   Concern: Faculty members in all areas experience difficulties achieving a satisfying work-life balance.
   Action Steps: Employee Wellness should be asked to explore the issue and provide advice on ways to establish a positive climate. Since department chairs were perceived as playing an essential role in faculty members’ satisfaction, advice on how to provide effective action at the unit level is particularly valued.