
AC 2011-2271: ESTABLISHING THE FOUNDATION FOR FUTURE ORGANIZATIONAL REFORM AND TRANSFORMATION AT A LARGE PRIVATE UNIVERSITY TO EXPAND THE REPRESENTATION OF WOMEN FACULTY

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Establishing the Foundation for Future Organizational Reform and Transformation at a Large Private University to Expand the Representation of Women Faculty

Abstract

The ADVANCE IT-Catalyst project, “Establishing the Foundation for Future Organizational Reform and Transformation at Rochester Institute of Technology” is a three-year study across six colleges which include computing, science, technology, engineering, and mathematics disciplines funded through the National Science Foundation ADVANCE Institutional Transformation – CATALYST (project # 0723719, <http://nsfadvance.rit.edu/>). The research objective is to identify barriers for current women STEM faculty in regards to rank, tenure, career advancement, leadership role progression, and resource allocation in order to establish how well the university addresses issues that have been found to be important in the recruitment, retention, and advancement of women faculty. During the study, the research team seeks to answer six primary research questions: 1) What is the distribution of STEM faculty by gender, rank, and department? 2) What are the outcomes of institutional processes of recruitment and advancement for men and women? 3) What is the gender distribution of STEM faculty in leadership positions? 4) What is the allocation of resources for STEM faculty? 5) Are there barriers to the recruitment and advancement of women? 6) How successful are existing structures at addressing these barriers? Climate survey results, in conjunction with objective human resource data review and benchmarking of policies and benefits against peer schools with a focus on elements that have been tied to potential barriers are used to address each question. This paper explores answers to each research question and summarizes accomplishments made over the grant period and plans for institutionalizing various initiatives.

Background

RIT currently employs 95 women tenured and tenure-track (T TT) faculty in the science, technology, engineering, and mathematics (STEM) disciplines, or 22.8% of the total STEM T TT faculty (Table 1); this is significantly below the 30.10% represented by the 2006 average of doctoral scientists and engineers employed in four-year colleges and Universities in the United States [1]. However, the overall percentage of female STEM assistant professors of 31.3% puts RIT ahead of the national pool of doctorates awarded to women in respective STEM fields of 26.6% [2]. This value is obtained from national pool data using weighted averages based on disciplines at RIT and discipline faculty counts. RIT’s STEM colleges have made strides in recruiting women faculty, and the number of STEM women faculty has nearly tripled in the past 15 years as the size of the RIT faculty has grown, although the representation of women STEM T TT faculty has increased slowly from 15.9% in 1995 to 22.8% in 2010. There is also variability in the representation of women faculty members between STEM departments even within the same college. For example in October 2010, within the College of Science there was a large disparity between the percentage of women faculty within life and physical sciences with representations of 42% (14/33) and 15% (3/17), respectively which is in-line with national trends [2]. In addition there were five academic STEM units in October 2010 with no female T TT faculty.

The status of women faculty at RIT mirrors that of women in the U.S.: challenges clearly exist for women faculty in engineering, computing, and science. Although the number of women faculty at RIT is slowly increasing, many are highly successful, representing 22% (11/51) of department head/chair, 45% (5/11) of associate/vice dean, and 13% (1/8) of dean positions (October 2009).

Table 1. Tenured and Tenure-Track Women Faculty in STEM at RIT Oct 2010

| College ⁵ | Number of Women Faculty (Tenured and Tenure-Track) ¹ | | | | | | | |
|---------------------------------|---|------------------------|------------------------|----------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| | # Women Faculty 1995 | # Women Faculty Oct 08 | # Women Faculty Oct 10 | % Women Faculty 2010 | National Pool PhD Women Grads ² | Asst: % Women @ RIT ⁴ | Assoc: % Women @ RIT ⁴ | Full: % Women @ RIT ⁴ |
| KGCOE | 4 | 8 | 10 | 12.4% | 18.6% | 17.4% | 7.1% | 13.3% |
| CAST³ | 3 | 7 | 11 | 19.3% | n/a | 35.7% | 4.8% | 22.7% |
| GCCIS | 5 | 23 | 26 | 27.7% | 22.0% | 33.3% | 34.1% | 13.8% |
| COS | 19 | 29 | 32 | 23.7% | 35.5% | 36.7% | 26.8% | 15.6% |
| NTID³ | n/a | 12 | 11 | 32.4% | n/a | 35% | 40% | 0% |
| CIAS³ | n/a | 4 | 3 | 25% | n/a | 0% | 66.7% | 25% |
| GIS | n/a | 0 | 2 | 50% | n/a | 100% | 0% | n/a |
| STEM Dean's Offices | 1 | 3 | 5 | 45.5% | n/a | n/a | n/a | 45.5% |
| Total Women STEM Faculty | 32 | 86 | 95 | 22.8% | 26.6% | 31.3% (36/115) | 23.7% (35/148) | 15.6% (24/154) |

¹ Represents Teaching (as opposed to Research) Faculty

² [2] Table F-2, <http://www.nsf.gov/statistics/wmpd/tables.cfm> NSF, Women, Minorities, and Persons with Disabilities in Science and Engineering, S&E doctoral degrees awarded to women, by field: 2000–08. Values listed in Table 1 were adjusted to reflect RIT S & E disciplines and necessary weighting based on discipline faculty count

³ Data listed is for a subset of departments within college classified as STEM.

⁴ Represents percentage of women faculty at each rank within each STEM college

⁵ Kate Gleason College of Engineering (KGCOE), College of Applied Science and Technology (CAST), Golisano College of Computing and Information Sciences (GCCIS), College of Science (COS), National Technical Institute for the Deaf (NTID), College of Imaging Arts and Sciences (CIAS), Golisano Institute for Sustainability (GIS)

Prior work done at RIT to assess climate includes a 2002-03 climate study conducted by the Center for Governmental Research [3], which contained a small subset of questions to assess the climate for women, and a series of focus groups conducted during Spring 2005 with RIT women faculty. Key findings from this earlier work related to STEM and non-STEM faculty include:

Earlier Climate Study Results

- 64% of female and 29% of male faculty respondents know of people treated unfairly because of gender.
- 15-20% of male and 34% of female faculty respondents felt the campus tends towards being sexist.
- 65% of female faculty respondents did not agree that the tenure process is fair for all compared to 54% of all faculty who shared the same opinion.

- 75% of male faculty, but only 56% of female faculty respondents indicate, “Women feel comfortable at RIT”.
- Over 40% of male faculty respondents did not favor having more female faculty teaching classes at RIT.

Focus Group Observations

- Overall, RIT provides a very good environment in which to work, and the environment has improved over time, in part due to administrative initiatives.
- Contribution of women faculty is devalued.
- Work-life balance is either a challenge or strength (variable across campus, and strongly dependent on college/department).
- Women seem to lack the ability to negotiate/advocate for resources.
- Initial male student perception of women faculty is poor (i.e., women faculty must prove themselves).

A number of studies published in the literature have resulted in similar lists of barriers that are faced by women in the STEM fields and reasons why women may leave these jobs. These reports that women in science and engineering have found “balancing work with family responsibilities” to be their most significant challenge; for women engineers this was followed by “gaining credibility and respectability”, and “isolation/lack of camaraderie or mentoring”. Interviews with men and women leaving and staying in science and engineering careers [4] revealed that one third of the women left due to lack of guidance and 73% cited mentoring as an important factor in their careers. Conversely, the presence of a mentor for men did not significantly affect whether or not they left their career/degree program, although 65% of men reported having mentors in graduate school, compared with just 20% of women.

Women view the workplace in personal terms, as opposed to a more male process-oriented view, meaning that issues of connectedness, support, and interpersonal relations, are important to their success [5-8]. A compilation of the many reports of barriers facing women in academia shows that these challenges can be broken into two general categories: workplace issues and personal challenges. Workplace issues include: feelings of isolation or marginalization [4,5, 9,10], lack of mentoring [4,5,9-12] and sponsorship by senior colleagues [13,14] that may lead to accumulated disadvantage over a career [15], a need to gain credibility or respect [5,16,17], unclear expectations for tenure and promotion [9,10], and biases ranging from subtle to open [9,10,18-20]. Personal challenges include: childbearing and childrearing decisions [9,21-24], balancing work/family time [9,20,24,25], and controlling overflow of work life into home life [26].

Research Approach

Based on preliminary findings, and supported by the literature, the research team developed a survey to collect more detailed information about the state of faculty, particularly women in STEM fields, at RIT. A review of objective Human Resources Data was undertaken, and RIT’s policies and benefits were benchmarked against peer schools with a focus on elements that have been tied to potential barriers to recruitment, retention, and advancement of women faculty. A

climate survey was developed using prior ADVANCE climate surveys as a guide. The survey was then administered at RIT in the fall of 2009.

Efforts to recruit, retain, and advance more women faculty members in the STEM fields at RIT must begin by answering several research questions. The project seeks to answer these questions and build strategies to address identified organizational weaknesses. Figure 1 shows the conceptual framework for the overall project. The organizational chart for the project is included within Figure 2. The project management team is inclusive of faculty leaders from the four largest STEM Colleges and a representative from Human Resources. Table 2 maps the project research questions to associated measures and/or methods.

Methodology

Human Resources Objective Data Review: Using data from the Human Resources Information System, counts of STEM, T TT faculty were developed for the periods of October 2004 through October 2010 to examine trends. Where more in-depth data was readily available, it was used to study areas including leadership, applicants, hires, attrition, promotion and tenure.

Institute Policy Review and Benchmark: The policy benchmarking activity was one of the earliest activities in the grant, providing a starting point for identifying areas that should be investigated further in the survey activity. A literature review identified several policy areas that are typically associated with cultural and gender diversity. These include:

- Diversity statement
- Tenure policies
- Mentoring
- Faculty awards
- Leave and grievance policies
- Procedures/Benefits considered relevant to women seeking an academic position
- Tuition support for family

RIT's policies and procedures were researched to determine whether or not these policies were in place. RIT's thirteen benchmark schools, as defined on the Human Resources website, were then investigated to identify if they had the policies in place. Four of the benchmark schools are also ADVANCE schools, which provided another comparison.

Climate Survey Creation and Administration: Over the course of the 2008 academic year, the Survey Group developed a comprehensive career-life survey focusing on gender issues in STEM. The team reviewed climate surveys previously developed and administered at other NSF ADVANCE institutions, primarily the survey developed at the University of Michigan [26] and the University of Wisconsin-Madison [27]. The survey titled the "RIT Faculty Career Life Survey" was administered at RIT in the fall of 2009. Questions from these surveys were adapted to meet the specific needs of the RIT environment. Additional questions were composed based on existing RIT culture and background. The survey was structured around four primary areas:

- Teaching, Resources, and Service
- Career Satisfaction, Work Load, Recognition
- Climate, Mentoring, Tenure, Promotion

- Balancing Personal and Professional Life

Four individuals with experience in assessment and evaluation, but not involved in this study as investigators or survey participants, tested the final survey instrument in a paper format for clarity of questions and categories, formatting and time requirements. Minor updates were made based on their feedback.

Figure 1. Activity Plan and Strategies

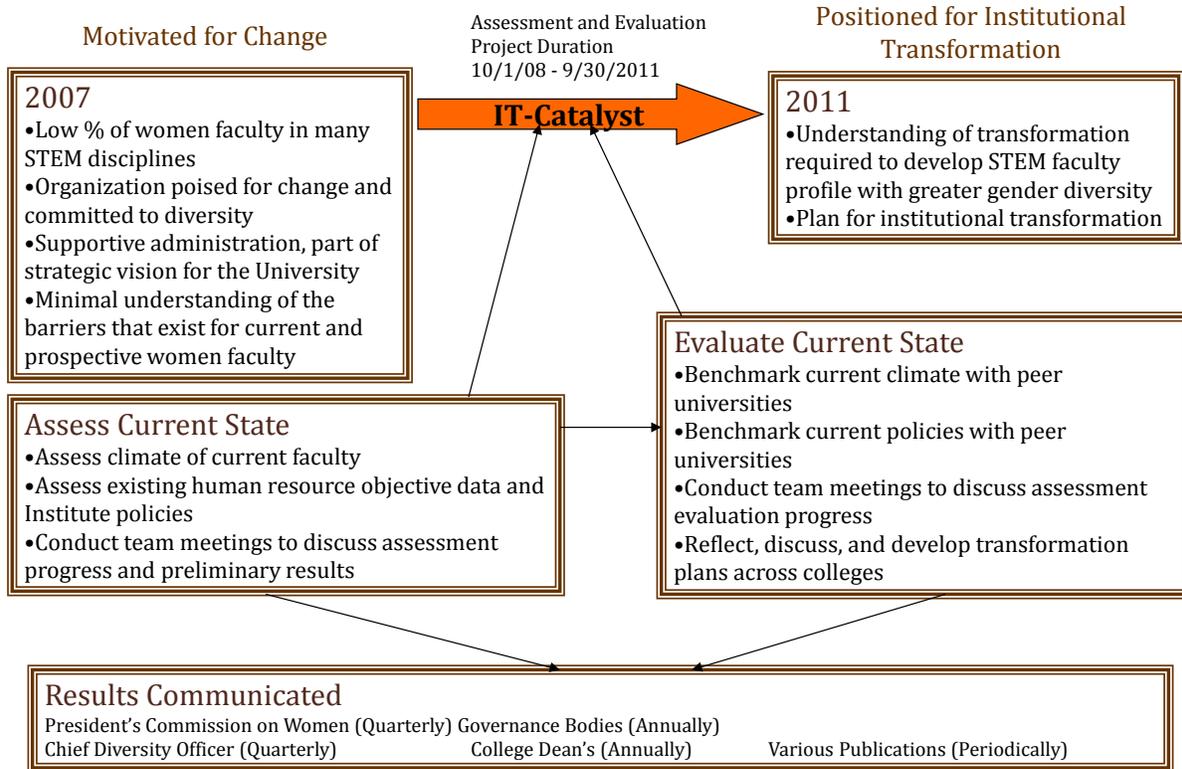


Figure 2. Project Management Structure

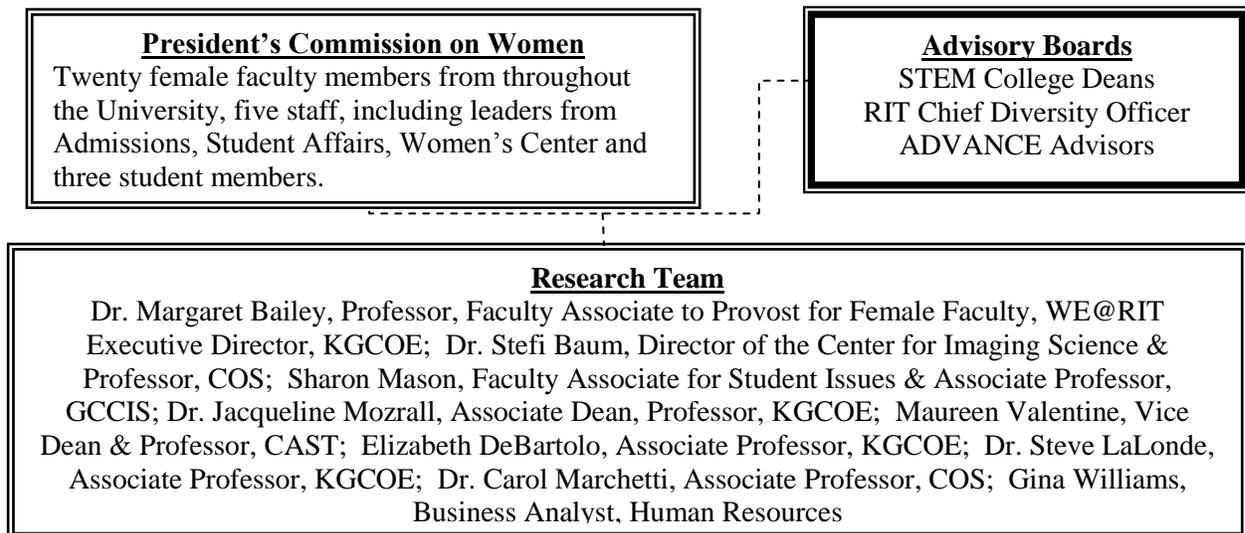


Table 2. Research Questions Mapped to Method(s) and Measures

| Research Questions | Method | Measures |
|---|--|---|
| <i>(1) What is the distribution of science and engineering faculty by gender, rank, and department?</i> | HR Obj. Data Review | <ul style="list-style-type: none"> • Current number of faculty by department, rank, gender, and college (2004-2010) • Percentage of female by college (2004-2010) • Current number of non T TT faculty (2009) • Benchmark data (where available) |
| <i>(2) What are the outcomes of institutional processes of recruitment and advancement for men and women?</i> | HR Obj. Data Review | <ul style="list-style-type: none"> • Faculty applicant data by college (2007-2010) • Faculty hires (2004-2010) with comparison of applicants by gender, rank, and college (2007-2010) • Summary of TT acceleration or tenure credit upon hire • Tenure and promotion review outcomes by gender, department, and rank transition (2006-2010) • Cohort analysis of tenure and promotion, including to full professor (2006-2009) • Number of tenured Associate Professors by department and gender with years-in-rank, years in previous rank, and hired rank • Number of faculty who left their departments by rank, gender, and department (2004-2009) • Number of faculty voluntarily leaving before reaching tenure excluding retirements (2004-2009) |
| <i>(3) What is the gender distribution of science and engineering faculty in leadership positions?</i> | HR Obj. Data Review | <ul style="list-style-type: none"> • Number of men and women in leadership positions or on select committees (2009) |
| <i>(4) What is the allocation of resources for science and engineering faculty?</i> | HR Obj. Data Review | <ul style="list-style-type: none"> • Study of salaries of men and women faculty (averages based on rank then more detailed model with additional controls such as department, degree earned, years in rank; salary adjustments occurred in OCT 2010) • October 2008 Comparison of RIT Average STEM Salaries to CUPA Salaries by Discipline (for n >5) • Study of Space Allocation and start-up packages of newly hired faculty by gender (data difficult to assemble) |
| <i>(5) Are there barriers to the recruitment and advancement of women?</i> | HR Obj. Data Review RIT Faculty Work-Life Survey Institute Policy Review/Benchmark | <ul style="list-style-type: none"> • Evaluation of results from research questions 1 – 4 • Statistical analysis of responses to the RIT Faculty Work-Life Survey • Results of Institute Policy Review and Benchmark |
| <i>(6) How successful are existing structures at addressing barriers to the recruitment and advancement of women?</i> | HR Obj. Data Review RIT Faculty Work-Life Survey Institute Policy Review/Benchmark | <ul style="list-style-type: none"> • Evaluation of results from research questions 1 – 4 • Statistical analysis of responses to the RIT Faculty Work-Life Survey • Results of Institute Policy Review and Benchmark |

The Survey Research Institute (SRI) at Cornell University then coded the instrument to be offered to all tenure and tenure-track faculty at RIT via a secure website. To ensure

confidentiality, SRI directly invited participation of RIT faculty by sending all email on behalf of the RIT administration (invitation plan included as Table 3), tracking respondents, communicating with non-respondents and collecting and aggregating data. Overall, more than 66% of all tenured and tenure-track faculty at RIT completed the survey (Table 4). To download the full RIT Career Life Survey, visit <http://nsfadvantage.rit.edu/>.

Table 3. Survey Invitation Plan

| Email Correspondence | Sent by | Date (week number during 10-week academic quarter) |
|---|----------------|---|
| Invitation email from University President and Provost | SRI | OCT 1, 2009 (week 4) |
| First reminder email to non-respondents from President and Provost | SRI | Oct 14, 2009 (week 6) |
| Second reminder email to non-respondents from Provost | SRI | Oct 21, 2009 (week 7) |
| Third reminder email to non-respondents from Research Team | SRI | Oct 28, 2009 (week 8) |
| Fourth (final) reminder email to non-respondents from Research Team (indicating close date) | SRI | Nov 4, 2009 (week 9) |

Table 4. Survey Response Rates by Gender and College

| Gender | Completions | Out of | Rate |
|----------------|--------------------|---------------|----------------|
| Female | 175 | 245 | 71.43 % |
| Male | 360 | 563 | 63.94 % |
| Overall | 535 | 808 | 66.29 % |

| College/Division | Completions | Out of | Rate |
|---|--------------------|---------------|----------------|
| Center for Integrated Manufacturing Studies | 3 | 6 | 50.00 % |
| College of Applied Science and Technology | 56 | 71 | 78.87 % |
| College of Imaging Arts and Sciences | 55 | 100 | 55.00 % |
| College of Liberal Arts | 83 | 124 | 66.94 % |
| College of Science | 99 | 137 | 72.26 % |
| E. Philip Saunders College of Business | 18 | 38 | 47.37 % |
| Golisano College of Computing & Info Sciences | 68 | 92 | 73.91 % |
| Kate Gleason College of Engineering | 62 | 85 | 72.94 % |
| National Technical Institute for the Deaf | 87 | 147 | 59.18 % |
| Office of the President | 1 | 1 | 100.00 % |
| Provost | 3 | 6 | 50.00 % |
| Student Affairs | 0 | 1 | 0.00 % |
| Overall | 535 | 808 | 66.29 % |

Survey Data – Statistical Analysis Methodology: The responses to each question on climate survey were analyzed by gender. Questions with numeric or Likert scale answers compared mean responses for males and females using a two-sample t-test. Questions with categorical response options compared proportions of males and females in each category using a chi-square test.

Survey Data – Benchmarking Methodology: The results of the RIT Work Life survey were benchmarked against climate survey results from other ADVANCE schools. The purposes of this benchmarking are to (1) determine whether problems with the work-life environment at RIT are unique to us or common to other institutions, (2) identify elements of the work-life environment at RIT that are strengths relative to other ADVANCE schools, and (3) identify actions taken at other schools to address issues similar to those found at RIT (this work is ongoing). In the creation of the RIT Work-Life survey, instruments developed at other ADVANCE schools – in particular, the University of Michigan and University of Wisconsin-Madison – were used for reference. These schools’ results were then used for benchmarking.

Salary Study – Statistical Analysis Methodology: A modeling effort was undertaken to evaluate the following research question, “What is the allocation of resources for science and engineering faculty?” A series of linear regression models were developed using male faculty data then fitted to all faculty. Chi Square comparisons were run to see if female faculty tended to have more below the predicted salary than male faculty. Comparisons were generated for the entire population, by rank, by college, and by rank within college. Salary equity analysis was generated using available variables such as time in rank, college, terminal degree, gender, ethnicity, and length of service.

Results

Distribution of Science and Engineering Faculty: In 2008, 29.82% of all T TT faculty at RIT were women while non T TT faculty had a higher representation at 40.67%. From 2001 – 2010 as shown in Figure 3, the percentage of female STEM T TT faculty has stayed relatively flat, with the numbers of female faculty members slowly increasing over most subsequent years. At 22.78% female STEM T TT faculty, RIT is significantly lower than the 30.10% represented by the 2006 average of doctoral scientists and engineers employed in U.S. four-year colleges and Universities [1]. There is also variability in the representation of women faculty members between STEM departments with 18.42% (7/38) of academic STEM units in 2010 including no female T TT faculty and 55.26% (21/38) including a representation below 20% which is often referred to as a critical mass threshold.

Recruitment of STEM T TT Faculty: For the period 2007-2010, the percentage of female TT hires was 22.08% (Figure 4). We have seen a general upward trend over that period from a low in 2005 of 8.33% (ratio of female to total hires or 1/12) to a high in 2010 of 55.56% (5/9). As shown in Figure 4, for the same time period, the percentage of female applicants for STEM TT positions was 18.70% which is significantly below the national pool of doctorates awarded to women in respective STEM fields of 26.6% [2].

Advancement of STEM T TT Faculty: From 2006 - 2010, females made up 25.62% (31/120) of the T TT rank promotions and 20.93% (18/86) of the tenure approvals for STEM departments. There was no significant difference in the tenure denial rate for that same period for women and men faculty, with 6.25% for females (1 denied out of 16) and 9.8% for males (5 denied out of 51).

Female and male faculty within the most heavily populated STEM colleges at RIT tend to spend equivalent time in rank as an assistant professor before being promoted to associate professor with 5.59 years on average for females and 5.69 years for males according to 2006-2010 data (Table 5).

Figure 3. STEM T TT Assistant, Associate, and Full Female Number and %, 2001-2010

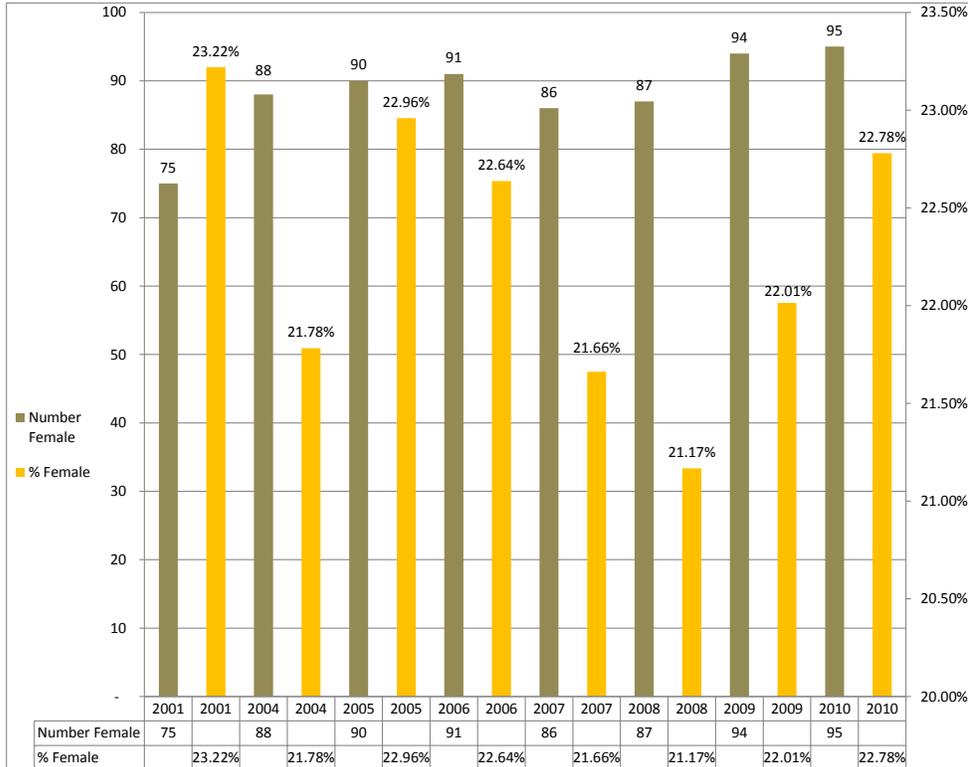


Figure 4. Percentages of STEM TT Female Applicants and Hires, July 2007 – Sep. 2010

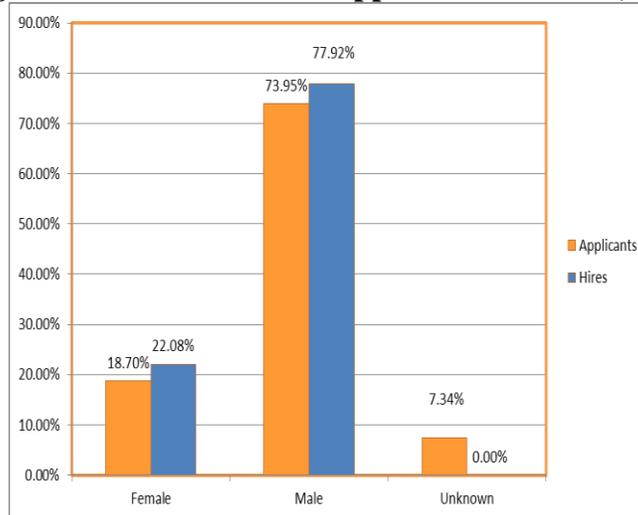


Table 5. Average Time in Rank (TIR) of Assistant Professor for Faculty Promoted to Associate Professors within the Largest STEM Colleges at RIT (2006-2010)

| STEM College | Female Avg. TIR (faculty count) | Male Avg. TIR (faculty count) | College Avg. TIR (faculty count) |
|--|--|--|---|
| College of Applied Science and Technology ¹ | - (0) | 4.60 (11) | 4.60 (11) |
| College of Science | 5.51 (6) | 5.76 (12) | 5.67 (18) |
| Golisano College of Computing & Info Sciences | 5.60 (11) | 6.48 (19) | 6.15 (30) |
| Kate Gleason College of Engineering | 6.00 (1) | 5.39 (11) | 5.44 (12) |
| Average across included colleges | 5.59 (18) | 5.72 (53) | 5.69 (71) |

¹ Data listed is for faculty from CAST STEM departments only.

However, tenure track acceleration or tenure credit upon hire was less prevalent among female STEM T TT Assistant Professor hires as compared with their male cohort. Based on an arduous task of reviewing 63 faculty start-up letters from 2005-2008, of the 46 Assistant Professors hired (37 men and 9 women), 16% (or 6/37) of males received some credit toward tenure while 0% (0/9) of females received credit.

Regarding time in rank analysis for STEM T TT Associate Professors, Tables 6a and 6b are created based on October 2010 time in rank data for Associate professors hired at assistant or associate ranks on or after 7/1/1999, respectively. Data is unavailable prior to this date due to a record system conversion issue. The representation of women among this faculty rank is 21.31% (26/122), closely matching the overall representation of women in the STEM T TT faculty. In comparing Tables 6a and 6b, it is clear that most (80% or 8/10) female Associate Professors were hired at the Assistant Professor rank. From 2004-2009, only 10% (or 2/20) of female faculty hired were given the rank of Associate or Full at the time of hire as compared with 24.39% (or 20/82) of male new hires. In the future, the data represented here will inform time in rank comparisons between female and male associate professors, however due to the limited data available no conclusions can be drawn at this time.

Studying faculty attrition at RIT reveals higher levels of leaving for women as compared with men. Table 7 includes results from analyses for T TT faculty (at all ranks) hired in each calendar year from 2002-2009. The table lists how many are still employed at RIT as of October 2010 (all termination reasons considered except deceased). During this time period, of the 87 female faculty hired, 27.59% (or 24/87) left as compared with 14.37% (25/174) of male faculty. The attrition rate for AALANA (African American, Latina American, and Native American) faculty hired over the same period was 26.53% (13/49) which is considerably higher than that for non-AALANA faculty of 16.98% (36/212).

Table 6a. Time in Rank of STEM T TT Associate Professor among those Hired (on or after 7/1/99) as Assistant Professor (October 2010)

| Time (years) in Rank | Female Count (% of women) | Male Count (% of men) | Total Count (% of total) |
|-----------------------------|--------------------------------------|----------------------------------|-------------------------------------|
| 0 to less than 3 years | 7 | 25 | 32 |
| | (87.50%) | (83.33%) | (84.21%) |
| 3 to less than 6 years | 1 | 5 | 6 |
| | (12.50%) | (16.67%) | (15.79%) |
| 6 to less than 9 years | 0 | 0 | 0 |
| 9 to less than 12 years | 0 | 0 | 0 |
| 15 years and longer in rank | 0 | 0 | 0 |
| Total | 8 (100%) | 30 (100%) | 38 (100%) |

Table 6b. Time in Rank of STEM T TT Associate Professor among those Hired (on or after 7/1/99) as Associate Professor (October 2010)

| Time (years) in Rank | Female Count (% of women) | Male Count (% of men) | Total Count (% of total) |
|-----------------------------|--------------------------------------|----------------------------------|-------------------------------------|
| 0 to less than 3 years | 1 | 12 | 13 |
| | (50.00%) | (57.14%) | (56.52%) |
| 3 to less than 6 years | 1 | 5 | 6 |
| | (50.00%) | (23.81%) | (26.09%) |
| 6 to less than 9 years | 0 | 4 | 4 |
| | (0%) | (19.05%) | (17.39%) |
| 9 to less than 12 years | 0 | 0 | 0 |
| 15 years and longer in rank | 0 | 0 | 0 |
| Total | 2 (100%) | 21 (100%) | 23 (100%) |

Gender Distribution of STEM Faculty in Leadership Positions: Of the 709 leadership committee positions identified in our study, 33.43% (237) are held by females. This closely matches the percentage of all female faculty at RIT which is 33.2% (2010, STEM and Non-STEM, T TT and non T TT). In 2010, 22.92% (11/48) of the STEM leadership titles were held by women faculty which aligns with their representation within this population (Figure 5). However, women hold just 24.74% of leadership titles at RIT which is significantly below their representation overall.

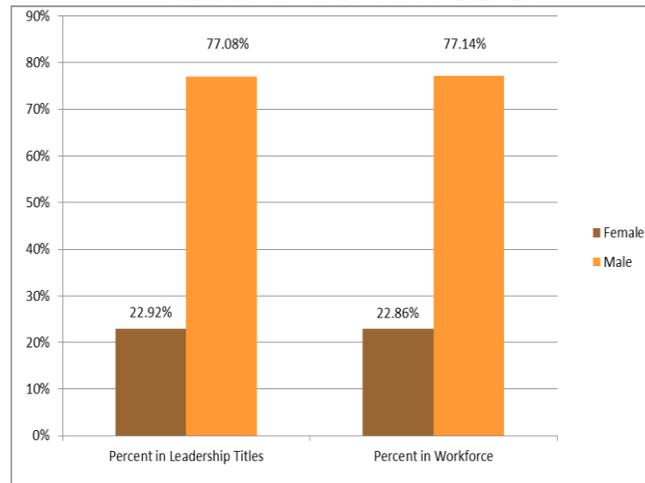
Resources Allocation for STEM Faculty by Gender: An initial study of salaries of men and women faculty was conducted by RIT Human Resources based on salary averages by rank and gender. Upon comparison for each rank across genders, unexplained differences were observed (Figure 6a). RIT Institutional Research and Policy Studies created a more detailed model with additional controls such as department, degree earned, years in rank, terminal degree, and ethnicity. A series of linear regression models were developed, using male faculty data, and then fitted to all faculty. Chi Square comparisons were run to see if female faculty tended to have

more actual salary values below the predicted salary than male faculty. Comparisons were generated for the entire population, by rank, by college, and by rank within each college. For each college and/or rank, there were individuals for whom actual salary differed from predicted salary by more than what would be expected due to normal variation, based on the variables used in the models. A separate compression salary analysis was also conducted at this time.

Table 7. Gender and Racial Breakdown of T TT Faculty (at all ranks) Hired in each Calendar Year from 2002-2009 with Number Still Employed at RIT as of October 2010 (all termination reasons considered except deceased)

| Calendar Year Hired | Female | | | Male | | | AALANA | | | Non-AALANA | | |
|---------------------|-------------|-------------|-------------------------------------|-------------|-------------|----------------------------------|-------------|-------------|-------------------------------------|-------------|-------------|-------------------------------------|
| | Total Hires | Total Terms | % of hires no longer at RIT 10-1-10 | Total Hires | Total Terms | % of hires no longer at RIT 1-10 | Total Hires | Total Terms | % of hires no longer at RIT 10-1-10 | Total Hires | Total Terms | % of hires no longer at RIT 10-1-10 |
| 2002 | 14 | 6 | 42.86% | 26 | 8 | 30.77% | 8 | 6 | 75.00% | 32 | 8 | 25.00% |
| 2003 | 19 | 8 | 42.11% | 22 | 5 | 22.73% | 10 | 2 | 20.00% | 31 | 11 | 35.48% |
| 2004 | 6 | 1 | 16.67% | 23 | 2 | 8.70% | 5 | 2 | 40.00% | 24 | 1 | 4.17% |
| 2005 | 3 | 1 | 33.33% | 16 | 4 | 25.00% | 3 | 2 | 66.67% | 16 | 3 | 18.75% |
| 2006 | 15 | 4 | 26.67% | 12 | 1 | 8.33% | 7 | 1 | 14.29% | 20 | 4 | 20.00% |
| 2007 | 7 | 2 | 28.57% | 22 | 3 | 13.64% | 3 | | 0.00% | 26 | 5 | 19.23% |
| 2008 | 7 | 1 | 14.29% | 31 | 1 | 3.23% | 6 | | 0.00% | 32 | 2 | 6.25% |
| 2009 | 16 | 1 | 6.25% | 22 | 1 | 4.55% | 7 | | 0.00% | 31 | 2 | 6.45% |
| Total 02-09 | 87 | 24 | 27.59% | 174 | 25 | 14.37% | 49 | 13 | 26.53% | 212 | 36 | 16.98% |

Figure 5. Percent of T TT STEM Faculty Holding Leadership Titles and Percent in Workforce as of October 2010



Results were disseminated to the Provost and Deans to begin reviewing any potential areas of inequity. Where identified, initial faculty salary adjustments occurred in the fall of 2010 with RIT allocating 0.5% pool of salary dollars to begin correcting compression and gender related salary issues. Figures 6a and 6b report average salary (normalized to 9.5 months/year) by rank and gender for STEM T TT faculty before (Figure 6a) and after (Figure 6b) the salary adjustments were made in fall 2010. As a result of salary adjustments, the gender average salary

gap was reduced for assistant female professors from 4.86% to 4.14% and for female associate professors from 5.99% to 3.17%. In the case of full professors, the gap actually widened from 5.97% to 7.79%.

Figure 6a. Average STEM T TT Faculty Salary by Gender and Rank, Oct. 2009

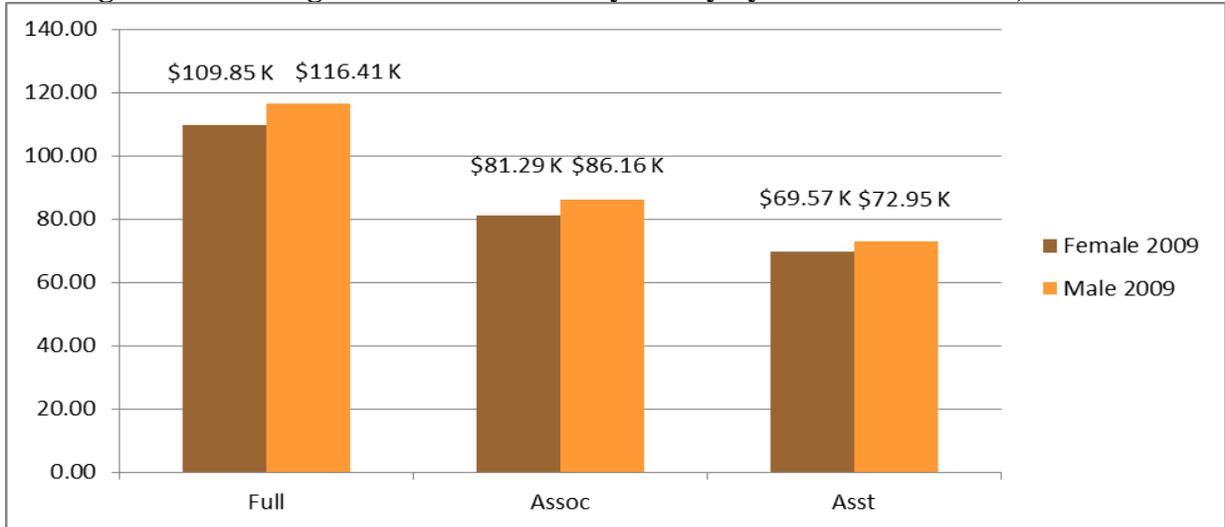
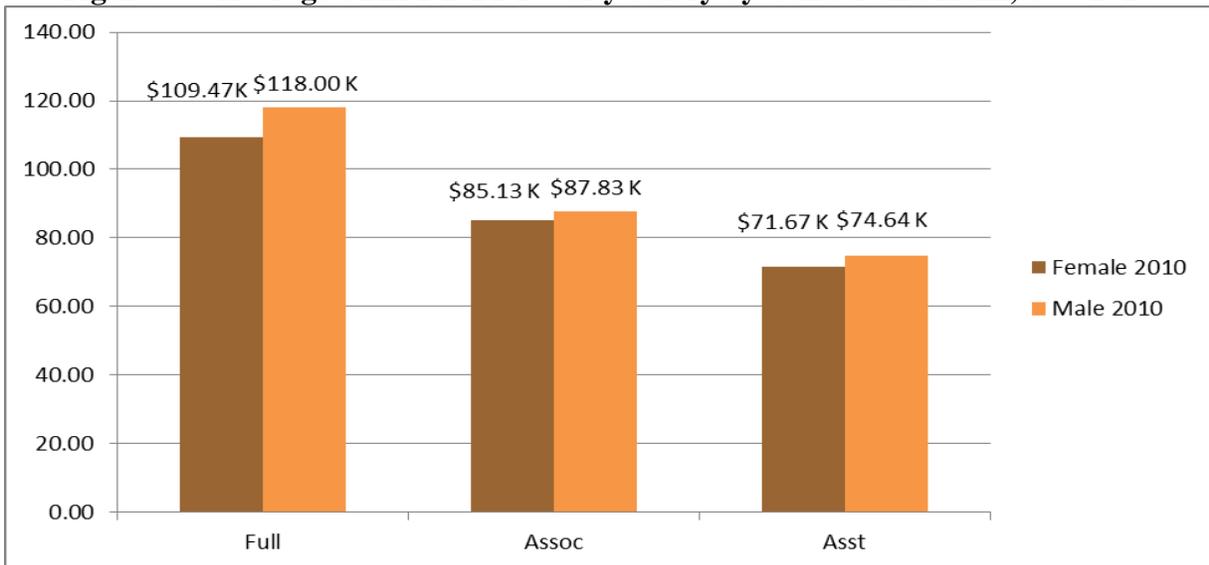


Figure 6b. Average STEM T TT Faculty Salary by Gender and Rank, Oct. 2010



In addition, a study of space allocation and start-up packages of newly hired faculty by gender were attempted; however, data was too difficult to assemble given the current systems.

Results from “RIT Faculty Career Life Survey”: Climate survey statistical results are listed on the project website (<http://nsfadvance.rit.edu/>) and include: All Responses by Gender, Non-STEM and STEM Responses by Gender, All Responses by Ethnicity, All Responses by Rank, and Quantitative Summary (n>5) of Open-Ended Responses .

Barriers to the Recruitment and Advancement of Women STEM T TT Faculty at RIT: The climate survey results, in conjunction with the objective data review and benchmarking information, lead us to believe that important barriers to the recruitment and advancement of women at RIT include career navigation, climate, and flexibility/options for managing the work/life balance.

Career Navigation: In negotiations, female survey responses indicate more effort while male responses indicate more satisfaction. The 2009 climate survey results are similar to those found during the 2002-03 focus groups.

- During initial contract negotiation, females indicate more effort ($p < 0.01$) in pursuing credit towards tenure than males, while males indicate more satisfaction with rank and salary ($p < 0.05$) and summer salary ($p < 0.05$).
- Since initial contract negotiation, females indicate more effort ($p < 0.01$) in pursuing course release than males, while males indicate more satisfaction with rank and salary ($p < 0.05$) and summer salary ($p < 0.05$).

The seemingly higher success of males in negotiations is supported by our objective data review:

- In the period from 2004 through 2009, 24% of males were hired above the assistant professor level compared to 10% of females.
- In 2008, 15% of males hired at the assistant professor level received some credit toward tenure, compared to 0% of females. With no central database, this data was difficult to assemble and it is based on annual review of the 2008 offer letter summary spreadsheet.

The seemingly higher success of males in negotiations is supported by our objective data review:

- In the period from 2004 through 2009, 24% of males were hired above the assistant professor level compared to 10% of females.
- Based on manual review of faculty start-up letters from 2005-2008, 16% of males hired at the assistant professor level received some credit toward tenure, compared to 0% of females. With no central database, this data was difficult to assemble.

Whether by choice, luck or skillful negotiation, males spend their time differently than females, often better aligning themselves for career advancement.

- Males report spending more time in scholarship/research ($p < 0.05$) and service to their discipline ($p < 0.05$), and less in teaching than the females ($p < 0.01$).
- A higher percentage of males (60.5%) than females (51.6%) have been asked to serve in a leadership role at RIT ($p < 0.05$).
- Males are more satisfied with their distribution of time, scholarship, long range career plans, and position overall ($p < 0.001$, $p < 0.05$, $p < 0.05$, and $p < 0.05$) than the females.

With regard to tenure,

- 84% of female respondents and 90% of male respondents feel that neither sex gets preferential treatment during the tenure process (16% of females feel that males get preferential treatment, while 8% of males feel that females get preferential treatment).
- On the 2002-03 climate survey, 65% of female as compared with 54% of male faculty respondents did not agree that the tenure process was fair for all.

A larger percentage of women are more proactively seeking advice from mentors as compared to their male peers and therefore demonstrating self-agency.

- 30% of female faculty report having a mentor, compared to 18% of male faculty ($p < 0.01$).
- Among survey responses, 60% of females and 35% of males do ($p < 0.0001$) view support for mentoring junior faculty to be of significant value in improving the overall quality of faculty work/life balance at RIT.

The objective data review and salary study revealed several differences along gender lines:

- 32% of female T TT STEM faculty do not have a terminal degree (compared to 22% of the male faculty), thus limiting their chances for advancement.
- Women T TT faculty overall hold just 24.74% of leadership titles at RIT which is significantly below their overall representation of 29.82% (2008).
- For each college and/or rank, there were individuals for whom actual salary differed from predicted salary by more than what would be expected due to normal variation, based on the variables used in the models. The deans and Provost reviewed the individual data to determine what, if any, action needed to be taken. For reporting purposes, average salary by rank and gender for T TT STEM faculty are presented for 2009 and 2010 which coincide with the periods before and after the salary study and adjustment process (Figures 6a, 6b).

We hypothesize that women's self-agency and negotiation skills, coupled with a lack of "sponsorship" from more seasoned faculty and/or administration, hinder the success of female faculty in obtaining more advantageous starting packages, assignments, compensation, and work plans [8,13-15].

Climate: Male responses indicate a more positive department view than female responses.

- Males' view of their department on a whole is more friendly ($p < 0.05$), diverse ($p < 0.01$), respectful ($p < 0.01$), and non-sexist ($p < 0.0001$) than females' view of their department.
 - By looking at the distributions of responses, we can see that 66% of females view the department as friendly, compared to 74% of males.
 - 49% of females and 62% of males consider their department to be diverse.
 - 61% of females and 65% of males view their department as respectful.
 - The department is viewed as non-sexist by 62% of females and 81% of males. Conversely, 18% of female respondents and 6% of male respondents feel the campus tends toward being sexist which is an improvement from the 2002-03 climate survey of 34% of female and 15-20% of male respondents.
- Males agree more strongly than females that they are free to pursue their research without risk to their tenure ($p < 0.01$).
 - In the distributions of responses, 58% of females and 70% of males agree that they are free to pursue their research without risk to their tenure (of which 28% of females and 41% of males strongly agree).
- A higher percentage of females (15%) than males (2.5%) indicate receiving unwanted sexual attention ($p < 0.0001$).

- A higher percentage of females than males feel that the other sex gets preferential treatment as described in Table 8.

Table 8. Preferential Treatment Survey Response Breakdown by Gender

| Area | % Females Who Feel That Men Get Preferential Treatment | % Males Who Feel That Women Get Preferential Treatment |
|--------------------|--|--|
| Promotion | 22% | 9% |
| Tenure | 16% | 8% |
| Career Advice | 27% | 15% |
| Career Advancement | 41% | 12% |
| Compensation | 62% | 9% |

In addition, the objective data review revealed that female faculty are more isolated and more likely to leave RIT than male faculty.

- Since 1995 the number of women T TT STEM faculty has nearly tripled although the representation has increased slowly from 15.9% in 1995 to 22.8% in 2010.
- The representation of women T TT STEM faculty has remained relatively unchanged since 2001, ranging from 23.2% in 2001 to 22.78% in 2010 which are significantly lower than the 30.10% represented by the 2006 average of doctoral scientists and engineers employed in U.S. four-year colleges and Universities [1].
- There is also variability in the representation of women faculty members between STEM departments with 18.42% (7/38) of academic STEM units in 2010 including no female T TT faculty, 15.79% (6/38) with only one, and 55.26% (21/38) including a representation below 20% which is often referred to as a critical mass threshold.
- The assistant professor turnover rate from 2002 - 2009 was 29% for females and 13% for males. Turnover rate is based on the number of assistant professors hired divided by the number of assistant professors leaving RIT (voluntary and involuntary) over a given time period.
- Overall T TT faculty attrition at RIT reveals higher levels of leaving for women faculty overall as compared with men based on hire data from 2002-2009. When determining how many are still employed at RIT as of October 2010 (all termination reasons considered except deceased), of the 87 female faculty hired, 27.59% (or 24/87) left as compared with 14.37% (25/174) of male faculty.

The literature shows that women’s view of the workplace in personal terms, as opposed to a more male process-oriented view, means that issues of connectedness, support, and interpersonal relations, are important to their success [5-8].

Flexibility/Options for Managing Work/Life Balance: Female responses indicate more stress, less satisfaction, and higher value in flexibility/options than male responses. The 2009 climate survey results are similar to those found during the 2002-03 focus groups.

- 58% of female respondents and 64% of male respondents think their colleagues are supportive of the work/life balance.
- Managing household responsibilities ($p < 0.0001$), child care issues ($p < 0.0001$), and health of family members ($p < 0.01$) were more stressful for females, on average, than for males.

- Among the responses, 36% of females and 16% of males indicated that managing household responsibilities is a source of significant stress.
- Child care issues are a source of significant stress for 34% of females and 14% of males.
- Health of family members is a source of significant stress for 25% of females and 16% of males.
- On average, males agree more strongly that they are satisfied with their work/life balance ($p < 0.05$).
 - Among the responses, 43% of females and 48% of males agree that they are satisfied with their work/life balance (of which 13% of females and 19% of males strongly agree).
 - 39% of females and 29% of males disagree that they are satisfied (of which 10% of females and 8% of males strongly disagree).
- Females agree more strongly, on average, that they often forego personal activities for professional responsibilities ($p < 0.05$) and that their career has been slowed by personal responsibilities ($p < 0.0001$).
 - Among the responses, 66% of females agreed that they often forego personal activities for professional responsibilities, compared to 47% of males.
 - 38% of female respondents and 26% of male respondents report that they forego professional activities for personal responsibilities.
 - 50% of females and 23% of males agreed that their career has been slowed by personal responsibilities.
- A higher percentage of females (34.6%) than males (16.2%) have considered time off for personal reasons ($p < 0.0001$).
- On average, females view assistance with employment for a spouse and increased clerical/administrative support to be of more value than males do (all p 's < 0.001).
 - Among the responses, 43% of females and 22% of males view assistance with employment for a spouse to be of significant value.
 - 49% of females and 30% of males consider increased clerical/administrative support to be of significant value.
- On average, females view all of the following to be of more value than males do (all p 's < 0.0001). Listed next to each policy or practice is the percentage among the responses who consider this to be of significant value.
 - More on site/near site child care: 40% of females and 17% of males
 - Child care with extended house: 42% of females and 12% of males
 - Subsidies/grants for child care: 45% of females and 15% of males
 - Part time faculty appointments: 29% of females and 10% of males
 - Enhanced tenure clock policies: 42% of females and 14% of males
 - Options for alternative work arrangements: 52% of females and 14% of males
 - Support for mentoring junior faculty: 60% of females and 35% of males
 - Award for outstanding female faculty: 34% of females and 11% of males

The objective data review showed that, although RIT has part-time faculty positions, few, if any, T TT STEM faculty have such a position.

- In 2009, 10 of the 545 STEM faculty were part-time, 9 of whom were non-T TT. In 2010, all of the STEM part-time faculty were non-T TT.

It is unclear if faculty are unaware that this option exists or are not taking advantage of it due to the ambiguity of its effect on tenure, promotion, status with the department, and eligibility for retirement. Among survey responses, 29% of females and 10% of males view part time faculty appointments and 52% of females and 14% of males view alternative work arrangements to be of significant value in improving the overall quality of faculty work/life balance at RIT.

Dual career employment issues are also relevant for many faculty at RIT and both genders report agreement with the need for more assistance with employment for spouse/partner, women report higher levels of agreement ($p < .001$). In order to address this issue, RIT is a member university within a regional consortium in upstate New York called HERC (available at http://www.unyherc.org/home/index.cfm?site_id=671) which provides a means of sharing information among members in order to attract outstanding faculty. One of the featured areas of HERC focuses on the dual career candidate. As was the case with part-time employment options, it is unclear if faculty are unaware that this network or are not taking advantage of it due to ambiguity or lack of usefulness. Even among universities with clear policies regarding dual-career placement assistance, only a minority post the information in a manner that is easily found [28].

Benchmarking with other institutions shows RIT lacks the following:

- Articulated methods to stop/extend the tenure clock
- Clear definition of maternity leave beyond a definition of the Family Medical Leave Act
- Institute-level formal mentoring program or framework for faculty

Policy benchmarking revealed that only three schools in our comparison cohort and including RIT did not have clearly articulated methods of “stopping the tenure clock” or extending time toward tenure. This policy was one that is often questioned and discussed during the interview stage for potential female faculty. Without a clear definition available in the policy, a potential faculty member may consider the school unsupportive toward family/health issues.

Observed differences were also noted for a clear definition of faculty maternity leave, although this difference was not as evident. Five of the schools evaluated, including RIT, did not have a readily available explanation of how maternity was handled beyond a definition of the Family Medical Leave Act. Three of the four ADVANCE schools had very specific information related to this, for example RPI has “one semester at full pay and another semester at half pay.”

RIT and one other were the only schools that did not have a formal mentoring program in place, although four of the twelve schools that do have mentoring programs identified on their website somewhere did not have a well-defined process available to the public.

Perhaps due to the lack of family friendly policies including dual-career considerations and a clearly articulated mentoring program in place at RIT, objective data review revealed that RIT is unable to attract a sufficient representation of women within faculty candidate pools for open STEM TT positions.

- For the period 2007 - 2010, the percentage of female applicants for STEM TT positions was 18.70% which is significantly below the national pool of doctorates awarded to women in respective STEM fields of 26.6% [2].

We conjecture that managing work/life balance through flexible work arrangements, available and convenient child care, and tenure clock adjustments, may lower stress and increase satisfaction, and potentially aid in the retention and recruitment of female (and male) faculty [9,20,24-26].

Success of Existing Structures at Addressing Barriers to the Recruitment and Advancement of Women Faculty at RIT: In response to a lack of adequate gender diversity at RIT, in 2007 when our current President began his tenure, several strategic goals were established to increase the representation of women students and T TT faculty on campus. Shortly afterwards, The President's Commission on Women was established based on a previous advisory board created by the past-President. The first charge of this renamed group with to provide recommendations to increase the representation of women undergraduate students at RIT. The commission consists of faculty, staff, administrators, and student representatives and possesses only an advisory role with no formal reporting structure outside of the President. In response to aggressive goals around women students, the RIT Office of Admissions created a more aggressive recruitment strategy for women.

For nearly ten years, the upper administration at RIT has embraced and resourced the need for diversity among students and faculty with a specific focus on the AALANA population. In 2002, the Office of Faculty Recruitment was created and has developed many programs since its inception including the nationally recognized Future Faculty Career Exploration Program designed to increase racial diversity among faculty hires [29]. Other programs have focused on hiring AALANA post-doctoral students and providing funding for current AALANA employees to obtain advanced degrees. Although the office's mission includes mention of "women professionals and faculty" as an intended target audience, none of the programs offered have targeted this population specifically. This may be attributed to resourcing issues. The Office of Faculty Recruitment also oversees and regulates Faculty Search Committee practices across campus and in this role there are measures in place to address both racial and gender diversity considerations.

Examples of existing or newly proposed structures designed to address barriers to the recruitment and advancement of women faculty at RIT which are identified in this study as career navigation, climate, and work/life balance include the following with a discussion on "success" where possible:

- The RIT Faculty Mentoring Network was proposed (2010) and under consideration for funding (2011) with peer-networking elements launched on a pilot scale in 2011. There is a perceived need for such a program on campus according to the 2009 climate survey where both women and men respondents identified value in supporting mentoring of junior faculty as a means of improving overall quality of faculty work/life balance at RIT. Women report significantly higher value in mentoring than men. Because the mentoring program is in its infancy, its effectiveness cannot be assessed at this time.
- Institutional membership in HERC has been obtained to assist dual-career faculty members. Based on climate survey results, both women and men see value in more assistance being offered to assist in spouse/partner employment. Women report significantly higher value in dual-career assistance than men.

- Part-time employment for faculty at RIT is available but not well-articulated or subscribed. Based on climate survey results, women see more value in part-time faculty appointments (39% vs. 10%) and alternative work arrangements (52% versus 14%) as compared with men in regards to improving the overall quality of work/life balance at RIT.
- Margaret's House was established in 1996 as a full-service child care center on campus. Open-ended feedback responses on the 2009 survey regarding Margaret's House were positive. However, based on climate survey results, women see more value in extended child-care hours (42% vs. 12%) and more on-site/near child care (40% versus 17%) as compared with men in regards to improving the overall quality of work/life balance.
- Faculty Exit Interview procedure and survey instrument created (2010) and under review by applicable governance structure will provide information regarding reasons behind faculty attrition.

Therefore, most of the "structures" with the exception of Margaret's House are relatively new and in some cases not yet vetted completely or funded. Accordingly, it is not possible to assess the success of the structures. Fully answering the final research question is ongoing and the answers to this question and the others will help shape a larger institutional transformation strategy for RIT.

Accomplishments and Recommended Practices

A full list of recommendations based on research findings from this study is accessible within the final project report (<http://nsfadvance.rit.edu/>). Below is an abbreviated listing and various items/practices developed through grant activities.

Items which were developed as a result of the grant and to be maintained going forward:

- Project website (<http://nsfadvance.rit.edu/>)
- Work/Life resources page (<http://finweb.rit.edu/humanresources/benefits/greatplace.html>).
- Collected highest degree data from all regular faculty; created method for employees to update their degree information at any time; and added degree data to new hire form.
- Populated faculty records with effective rank dates to allow time in rank analysis. Field to be populated for all rank changes going forward.

One-time benchmarking conducted during the grant period involved benchmarking certain benefits, policies and resources against other universities in the list of benchmark schools on the Human Resources website. This study found gaps in benefits and resources related to faculty exist in tenure clock extension, mentoring, and maternity leave.

Various new forms of analyses performed during the course of the grant:

- Created Faculty Exit Interview procedure and survey instrument (under review- Provost Office).
- Provided momentum into the development of a mentoring program initiative which is currently underway at the university and the investigation of a new applicant tracking system.
- Provost supported a multivariate analysis of faculty salary data by gender to determine if there were issues with pay by gender as well as compression issues.

- First ever comprehensive faculty career life survey was created and administered to faculty to begin obtaining information related to issues of dissatisfaction with T TT faculty.

The following items could continue to be performed annually if appropriate resources are assigned: time in rank with emphasis on time as assistant professor; promotion and tenure percentages by gender, including denials; percentage of STEM faculty by gender, college, and department; hires/applicants by gender for STEM faculty; offer and start-up package database; termination trends; and leadership gender breakdown.

Conclusion

The ADVANCE IT-Catalyst project, “Establishing the Foundation for Future Organizational Reform and Transformation at Rochester Institute of Technology” identified barriers to the recruitment and advancement of women STEM faculty. Climate survey results, in conjunction with the objective data review and benchmarking information, lead to the identification of barriers involving *career navigation*, *climate*, and *flexibility/options for managing the work/life balance*. Issues related to career navigation could be caused by women’s self-agency and negotiation skills, coupled with a lack of “sponsorship” from more seasoned faculty and/or administration, hinder the success of female faculty in obtaining more advantageous starting packages, assignments, compensation, and promotion. Climate issues are exacerbated by women’s view of the workplace in personal terms, as opposed to a more male process-oriented view, meaning that issues of connectedness, support, and interpersonal relations, are important to their success. Finally, managing work/life balance through flexible work arrangements, available and convenient child care, and tenure clock adjustments, may lower stress and increase satisfaction, and potentially aid in the retention of female (and male) faculty.

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