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Chapter 22

Strategic Career Development for STEM Women Faculty

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ABSTRACT

Women continue to be underrepresented in the academic fields of science, technology, engineering, and mathematics (STEM) relative to the proportion of doctoral degrees they earn. This also was the case in 2009 at Florida International University, where only 11% of the STEM tenure-line faculty were women. In this chapter, the rationale, implementation, and outcomes will be described for two strategic career development projects for STEM women faculty that were funded by the National Science Foundation; the Awareness, Commitment, and Empowerment project (2011-2016); and the FIU ADVANCE Institutional Transformation project (2016-2021). Also described will be the role that social media and digital formats played in developing and sustaining a sense of community among women faculty, as well as for doing research and evaluation.

INTRODUCTION

Florida International University, founded in 1965, is both a Hispanic-Serving Institution (HSI) and a Minority-Serving Institution (MSI) that is designated as a Very High Research University within the Carnegie classification. FIU is among the ten largest universities in the U.S. with 57,000 students. FIU's students are 61 percent Hispanic and 20 percent from other underrepresented groups (URGs). In 2009, about 11 percent of FIU's science, technology, engineering, and mathematics (STEM) tenure-line faculty were women. There was an increasing recognition among FIU's top administrators that having a qualified,

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diverse faculty would attract more women and URGs to the STEM professoriate, have a positive impact on student success, and better serve its diverse student body as well as the South Florida community.

In this chapter, the authors will describe the preparation, implementation, and outcomes associated with two projects, the Awareness, Commitment and Empowerment project (2011-2016) and the FIU ADVANCE Institutional Transformation project (2016-2021). Both projects were funded by the National Science Foundation ADVANCE grant program and were aimed at providing strategic career development opportunities for STEM women faculty. Specific programs addressed all aspects of the academic life cycle, including hiring, retention, promotion, and departmental and institutional climate. Deliberate attention to technology was not part of the original planning but proved to play a significant role throughout both projects. Throughout the chapter, the use of technology including digital and social media formats will be described as they became relevant within specific projects to facilitate education, networking, research, and internal and external communication.

BACKGROUND

In 2009, the authors Rose and Darici sought to lay the groundwork for a successful proposal to the National Science Foundation ADVANCE grant program to develop strategies to recruit and promote more women and minority STEM faculty. The Dean of the College of Arts & Sciences, Dr. Kenneth Furton [now Provost], agreed to their request for administrative support and funded Rose to conduct two projects to provide the pilot data for a grant proposal. The first project was the 2010 FIU Faculty Climate Survey. The Climate study identified specific concerns of STEM women that were useful in preparing the first NSF grant proposal. Compared to men, women reported experiencing less departmental respect and influence and more instances of gender discrimination, consistent with the body of research showing that women in academia face a ‘chilly climate’ and deeply entrenched inequities (e.g., Britton, 2016; Pedersen & Minnotte, 2016). Consequences of gender biases and inequities are high for women. Moss-Racusin, Sanzari, Caluori, & Rabasco (2018) summarized some of them as women being less likely to be cited than men (Lariviere, Ni, Gingras, Cronin, & Sugimoto, 2013), to receive less start-up support (Sege, Nykiel-Bub, & Selk, 2015), and to be invited less often to present colloquium talks at top universities (across six academic fields; Nittrouer et al., 2017). They also are judged as less competent, less deserving of mentoring, are paid less, and are less likely to receive valuable pre-doctoral mentoring (Milkman, Akinola, & Chugh, 2012). Others like Rivera (2017) found that hiring committees consider women candidates’ relationship status more than men. Last, job applications (Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012) and scientific abstracts (Knobloch-Westerwick, Glynn, & Huges, 2013) are judged more negatively when they are perceived to belong to women. Thébaud and Charles (2018) suggest that cultural stereotypes about qualities of men and women and the nature of STEM work can explain a lot of this gender discrimination.

To abate the effects of some of these inequities, the second internally-funded project was a one-day Leadership Institute for Women Faculty focused on career planning. The eighty women faculty that attended expressed very strong interest in improving their leadership skills, communication and assertiveness skills, and career development strategies. These findings formed the basis of one of the proposed projects.

STRATEGIC CAREER DEVELOPMENT FOR STEM WOMEN FACULTY

From 2011 to the present, FIU has conducted two strategic career development projects for STEM women faculty, the Awareness, Commitment and Empowerment (ACE) project (2011-2016) and the FIU ADVANCE Institutional Transformation project (2016-2021).

The ACE Project: 2011-2016

In 2011, Rose, Darici, and their collaborators were awarded a three-year grant from the NSF (extended to five years) to implement the Awareness, Commitment and Empowerment (ACE) Project. The project was a partnership between FIU and the University of Michigan (UMich). FIU proposed to adapt, implement, and disseminate some of the materials, tools, and practices that were effective in increasing the participation and advancement of women in the sciences at UMich. The ACE project had three goals, each with a corresponding project activity.

The Awareness goal was to educate faculty and administrators at FIU about the problems facing women in STEM. Interactive theater performances were used to engage faculty. The use of interactive educational theatre to illustrate gender and power dynamics within academic interactions was pioneered by UMich's Center for Research on Learning and Teaching (CRLT). The UMich CRLT players were brought to FIU annually for four years to present different sketches, including performances on tenure evaluations, faculty meetings, hiring, and mentoring. The sketches portrayed strained, subtly biased, and/or ambiguous interactions between men and women faculty or with job candidates and gave the audience members the opportunity to ask questions of the actors and to engage in discussion with one another. The interactive theater performances drew nearly two hundred faculty members, chairs, and deans from the arts, sciences, and engineering. According to post-performance evaluations, many FIU audience members were able to recognize hidden biases and prejudicial behaviors in themselves through experiencing these sketches.

The Commitment goal was to increase the hiring, retention, and promotion of STEM women at FIU. The first Commitment project, STRIDE, aimed at improving hiring practices. STRIDE workshops on best practices for hiring faculty were implemented for all STEM departments. The STRIDE Committee (Strategies and Tactics for Recruiting to Improve Diversity and Excellence) originated at UMich. A STRIDE Committee similarly was established at FIU that was comprised of ten STEM tenured professors (five women, five men). The committee then met biweekly for five years, typically up to sixteen times a year, to educate themselves about the social science evidence concerning gender bias in science and to develop and lead workshops for faculty serving on hiring committees. The STRIDE workshop presentations used findings and theories in psychological science and sociology to reveal participants' unconscious biases, discuss the importance of diversity, and present effective strategies for the proactive recruitment of women. Also provided were lists of fair practices in considering job candidates and tools for executing fair evaluations of and discussions about candidates.

Based on its success, the STRIDE hiring workshops were institutionalized at FIU. STEM faculty serving on search committees are required to attend a STRIDE presentation once every three years. More than four hundred faculty have attended since its inception. Typical faculty ratings of the usefulness of

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the workshop ranged from “useful” to “very useful” on a 5-point scale. Questions included: “Overall, what was most effective about the workshop?” Answers included: “research-based information on best practices,” “awareness about diversity,” “in-depth discussion of the existence of bias,” “good speakers,” and “The whole event was good. It made me think again about committees and effective ways to improve.”

The second Commitment program, the Faculty Mentor Program (FMP), was offered to all STEM faculty but was aimed specifically at improving the retention and promotion of women faculty, particularly in the early phase of their career. Key issues for assistant professors include understanding tenure policies and tenure clarity. They need to understand how various kinds of publications are weighted in the tenure decision, the impact factor of journals, the importance of grants and especially external funding, what kinds of service to the university and their profession are important, and what a teaching portfolio should look like at the end of five years. Tenure-earning faculty often need support to negotiate department politics, and frequently new tenure-track professors do not know how to balance teaching, service, scholarship, and family responsibilities. It is therefore critical that new, tenure-earning faculty have a mentor to help them negotiate the tenure process, build the portfolio leading up to tenure, and create the actual file. Research on mentoring also points to the importance of expanding mentoring beyond a dyadic hierarchical conception to include peer mentoring and networking (DeCastro, Sambuco, Ubel, Steward, & Jagsi, 2013).

Based on prior research, the FMP included one-on-one mentoring as well as networking events and structured skills-training presentations related to enhancing faculty productivity (Meschitti & Lawton Smith, 2017; Voytko et al, 2018). Every year, each mentee was matched with a mentor from outside her or his home department but in a related research area to the extent possible. The rationale for assigning a non-departmental mentor was twofold. First, non-departmental mentors do not play a role in mentees’ evaluations and this allows mentees to more freely express any concerns they may have. Second, cross-department matches might encourage interdisciplinary collaborations. Mentees met with their mentor in the fall semester to set goals for the year and continued to meet at least twice a semester. Extensive programming also occurred each year on topics such as Publishing in Peer-Reviewed Journals, Grant Writing, Tips to Tenure, and Summer Planning.

The third goal, Empowerment, was to help women faculty develop leadership skills using innovative workshops and networking. Social media was used to build the initial networks among women faculty that will be described later. These efforts culminated in establishing a final Empowerment networking event that we call Women Faculty Leadership Institute (WFLI). WFLI is a face-to-face, annual one-day event. Since inception, the workshop has provided strategies for career development and confidence-building techniques to encourage women to achieve promotions. There was a theme for each year, such as career planning, negotiation, or assertiveness and communication skills. For instance, “Assertiveness and Communication” was an interactive workshop focused primarily on strategies women could use to get what they want and combat the stigma associated with being an assertive woman. Researchers such as Rudman and her colleagues have shown that women are considered less competent but more likeable as their comparable men peers; however, in cases where women are viewed more assertive and equally agentic as men, they are evaluated as less likeable (Rudman, Moss-Racusin, Glick, & Phelan, 2012). Participants agreed that they would recommend this institute to other women faculty members and that the institute gave clear and concrete instructions and tips for advancing their careers and improving their leadership skills.

Uses of Technology to Support ACE

The use of technology in the ACE projects was not deliberate; however, the importance of its role emerged as our projects expanded. Technology is an important tool to boost motivation, extend knowledge, and disseminate skills in higher education. Technology in the form of online survey tools, mapping software, digital outlets, and social media became increasingly significant in supporting the ACE projects. For instance, the climate study was the authors' first foray into conducting digital research. At the time, FIU did not have any freely available, effective survey software. Our team selected Qualtrics Survey Software as being the best product at the time and purchased individual licenses for it. However, once adopted, the ongoing availability of the software became essential. As a side project, the ACE team negotiated a very low annual rate for a two-year, university-wide site license and a successful proposal was submitted to the FIU Technology Fee committee to fund it. The software was immediately popular with faculty and students and site license was renewed continuously. The Climate study provided valuable, easily quantified, and specific data that strengthened the grant proposals as well as requests for internal funding. As Evans and Mathur (2018) emphasized, the flexibility and speed of investigating important and timely questions were critical to this project and illustrated the importance of obtaining the most useful digital tools for research.

An online library accessible through a shared drive provided a valuable resource for STRIDE committee members. Previous research showed that e-resources encourage maximum use of the resource in more convenient and a less time-consuming manner and allow for simultaneous usage (Kalbande, Shinde & Ingle, 2013). Members are quick to add new publications as soon as they are available. Co-facilitators are able to access resources simultaneously when working on a presentation. The STRIDE website also includes a resource list with downloadable documents as well as a searchable database that faculty can use to see if their certification is up-to-date. The website is also used to enroll attendees in the workshop sessions via linkage to a Qualtrics survey where they can sign up for their preferred day and time.

FIU's Office of Analysis and Information Management (AIM) provided a useful tool for the STRIDE workshops: an interactive Faculty Residence map. The map shows where faculty live and is searchable by department; the general location of each faculty residence is shown. Often, faculty job candidates have questions such as where to live if they come to Miami or what schools are best. FIU's official instruction to search committees is that members should not ask questions about a candidate's personal life during the interview and should avoid or deflect comments the candidate makes about that. By providing candidates with a link to the map, search committees can provide relevant information without getting into the specifics of the candidate's personal situation.

Online survey tools also offered an important and streamlined method of evaluating the faculty satisfaction with both the STRIDE and Faculty Mentor workshops. Online survey tools are known to be equivalent to paper-pencil tests (Weigold, Weigold, & Russell, 2013). Therefore, online assessments were used to evaluate the effectiveness of each workshop and to obtain suggestions for improvements. The online tools enabled the quick production of evaluation reports that provided immediate feedback for the faculty facilitators. Desired changes can then be incorporated instantly into the next STRIDE presentation.

Social media was used to announce and document networking events such as the Women Faculty Leadership Institute. Lupton's (2014) study of hundreds of academics showed prevalent and sophisticated use of social media among faculty. Faculty members (90% of them using Twitter, 40% using Facebook) reported connecting and establishing networks within and outside academia as one of the important

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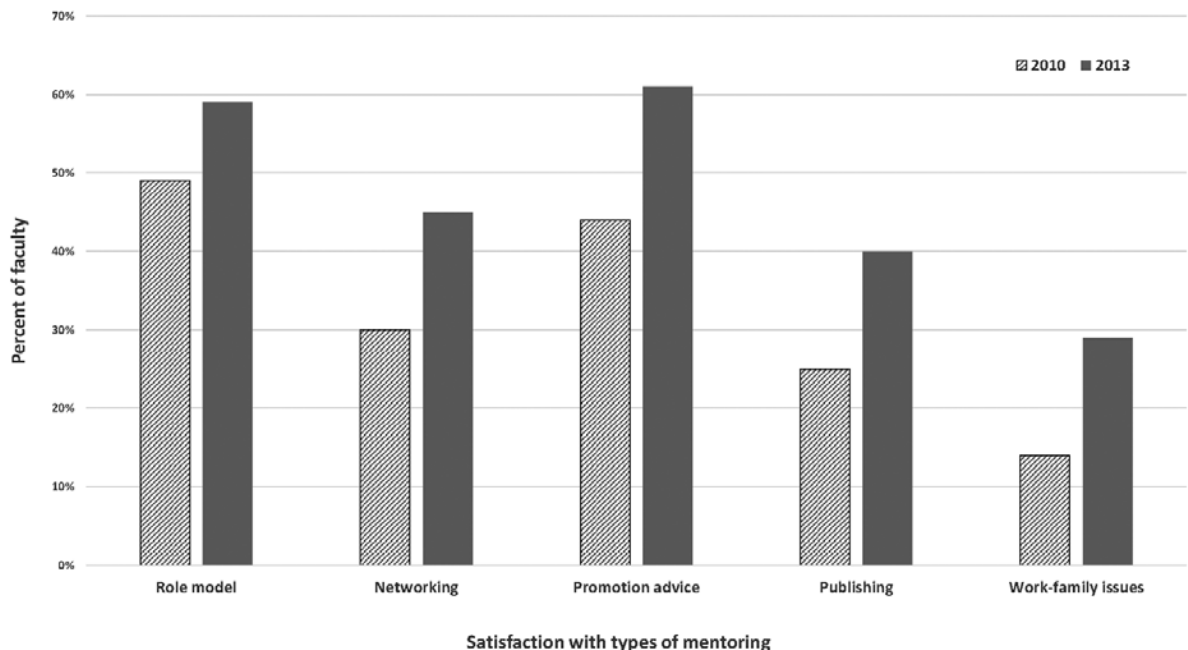
benefits of social media (Lupton, 2014). Similarly, social media were used to raise awareness prior to events, share narratives and photos via an academic unit Facebook account after events, and generate interest in upcoming events. Digital formats such as websites and online news media were used to promote STEM women's accomplishments. These formats served a community-building purpose to connect faculty throughout the academic year.

ACE Outcomes

Overall, the ACE project was successful at achieving the goals that were set. The Awareness activities produced improvement in university and college-level climate. Internal faculty climate surveys done in 2010 and 2013 revealed improvements in faculty satisfaction for both women and men, particularly in the area of college-level recognition of their work. The Commitment goal was met as well. The proportion of STEM women in tenure-line positions increased from 11 percent to 17 percent over the course of the grant. The Commitment goal also was met by the STRIDE workshops that educated more than three hundred faculty in best practices over the life of the project. Many search committees adopted the best practice of using an objective evaluation tool developed by UMich for rating candidates.

Likewise, in terms of commitment to retaining and promoting women, a comparison of the Faculty Climate Survey results from 2010 and 2013 indicated that faculty satisfaction with mentoring had increased greatly. As shown in Figure 1, improvements in mentoring included increases in the percentage of faculty that indicated very high or high satisfaction regarding five areas: having a FIU faculty mentor who served as a role model, promoted their career through networking, provided advice about advancement and promotion, gave guidance about publishing, and offered support concerning how to have work-life

Figure 1. A comparison of the percentage of Arts & Sciences faculty expressing high satisfaction with five areas of mentoring, 2010 and 2013



balance. Another interesting outcome was the development of interdisciplinary collaborations between several mentee-mentor pairs, including an organizational psychologist and a construction management professor; a chemist and a physicist; and a nutritionist and a child psychologist.

Based on these findings, the FMP was institutionalized as a university-wide program in 2016. During the first year, about sixty-four faculty participated in the program. By 2018, there were 168 participants. Women disproportionately participate in the FMP. Although women are about one-third of the tenure-line faculty, they generally comprise two-thirds of the FMP. This suggests that the program is meeting a critical professional development need for women faculty.

The *Empowerment* leadership activities were well-attended and appreciated by increasing numbers of women faculty. The Women Faculty Leadership Institute has grown in scope and size, with nearly one hundred people attending the 2018 conference. Additional topics have included Super Networking, Gender Bias in Teaching Evaluations, and Navigating the Gendered Leadership Labyrinth in Academe.

In sum, the ACE projects appeared to influence climate positively at the college and institutional level as planned. However, it became clear as the grant neared the end that more remained to be done. Climate survey results suggested that few improvements had occurred at the departmental level. Compared to men faculty, women in both 2010 and 2013 reported feeling less respected by the faculty in their departments and taken less seriously in departmental meetings. They also were more dissatisfied with how tenure and promotion was managed in their department and with the climate for women and minorities. They reported encountering unwritten rules or norms concerning how to interact with colleagues. Department climate contributed to low morale and also appeared to delay women from being promoted from associate to full professor. The Climate surveys also indicated that women faculty lacked opportunities for leadership. Few had been a department chair, a line position that often was a prerequisite for higher administrative roles. These findings suggested specific areas for next steps.

A Leap Forward: The Office to Advance Women, Equity and Diversity

Continuing concerns about departmental climate led Darici and Rose in 2014 to ask attendees of the Women Faculty Leadership Institute to work together in small groups to create lists of what they wanted to see happen at the university to improve the climate for women. A common suggestion among the groups was for FIU to have an office dedicated to promoting women faculty's issues. Subsequently, the Council for Women and Minority Faculty, chaired by Darici, proposed the idea of establishing such an office to Provost Kenneth G. Furton. The result was the formation of the Office to Advance Women, Equity & Diversity (AWED), founded in January 2016. Rose was named founding associate provost of the office.

The mission of the Office to Advance Women, Equity & Diversity is to build and offer effective programs that achieve and sustain faculty equity and diversity as an essential element of FIU's academic excellence. AWED's goals include: placing faculty diversity and gender balance into the center of consideration; expanding faculty mentoring to enhance professional training and progress; interdisciplinary networking; strategic planning for salary equity; policy analysis and development; and initiatives supporting faculty diversity and institutional climate.

One of the first undertakings under the AWED umbrella was to prepare an NSF ADVANCE Institutional Transformation grant proposal. The significant resources committed to AWED was cited as evidence of the administrative commitment at the highest levels to support these goals. The goal in preparing an Institutional Transformation grant proposal focused on attracting and hiring more women in STEM, particularly Hispanic-American and African-American women, to better reflect our student body.

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New digital dashboards created by FIU's Office of Analysis and Information Management (AIM) provided a fresh and easier means of mining demographic data about faculty and students. These learning analytics, defined as the "measurement, collection, analysis and reporting of data about learners and their contexts," have become increasingly important as a way to understand and optimize learning environments (Siemens & Gasevic, 2012, p. 1). FIU AIM dashboards revealed that of the 10,170 undergraduates in STEM departments in Fall 2015, 42 percent were women and 32 percent were women of color. However, this diversity was not reflected at the faculty level. Only 2 percent (N=4) FIU STEM faculty were underrepresented minority (URM) women.

Previous findings from the ACE suggested that projects to advance STEM women should focus on departmental issues. These findings guided the development of the Microclimate project. This project aimed at exploring how the demographics of specific departments might affect collegial friendship networks, departmental politics, and hiring and retention of women. Research indicates that women of color at predominantly White universities experience feelings of isolation, lack of mentoring, accent discrimination, tokenism, hypervisibility, high service loads, and pressure to represent their entire racial/ethnic group (Comer, Medina, Negroni, & Thomas, 2017; Dade, Tartakov, Hargrave, & Leigh, 2015; Navarro, Williams, & Ahmad, 2013; Turner, González, & Wood, 2008).

In contrast to the climate at other White universities and cities, the cultural diversity of FIU and Miami would seem to make it a desirable destination for faculty of color. Similar to FIU, Miami is 71% Hispanic, 18% American or Caribbean Black, 11% non-Hispanic White, 0.9% Asian (U.S. Census, 2017). There are many ethnically-based neighborhoods and schools and the urban area provides many opportunities for dual-career couples. Based on the cultural diversity of FIU and Miami, it seemed puzzling that there were not more URM women at FIU.

A closer look at faculty demographics provided some possible clues to the barriers to attracting and retaining women of color in STEM despite the many favorable factors at FIU and in the region. It was posited that the culturally diverse gender norms of the men STEM faculty might pose a previously unexplored barrier to the recruitment and retention of URM women. Although FIU's student body is mostly English-as-Second Language (ESL) Hispanic students, the tenure-line faculty as a whole across all disciplines is predominantly White (~80%). Within the STEM fields specifically, a majority of the faculty was male, foreign-born, ESL speakers. For example, at FIU from 2011-2016, 79 percent of new hires in Engineering were mostly from Asian, Middle Eastern or Eastern European countries. This closely mirrored the makeup of the existing faculty that was 85 percent foreign-born men. In one department, there was such a large representation of Iranian men faculty and doctoral students that Farsi was sometimes the language spoken in the department. Thus, an important project for the next grant became to explore the extent to which the cultural diversity of STEM men faculty and their gender-by-ethnic stereotypes might contribute in unidentified or unique ways to a chilly climate for women of color.

Additionally, a second project was proposed that would directly influence faculty interactions: the Bystander Leadership Program. Over the years, many faculty members that endorsed the goals of the ACE project expressed frustration that their newfound awareness about gender and race bias did not prepare them to take action. They reported that they did not know what to do when faced with departmental practices or colleagues that inadvertently undervalued or marginalized women or URM faculty. This suggested that behavioral skills training should be emphasized to provide both education and actual practice in implementing new responses to a variety of situations. At the time, evidence had emerged showing that active bystander intervention programs were being successful at reducing sexual assault on college campuses (Banyard, Moynihan, Cares, & Warner, 2014) and at reducing racial bias (Devine,

Forscher, Austin, & Cox, 2012; Pedersen, Paradies, Hartley, & Dunn, 2011). These evidence-based programs provided a model that appeared to be adaptable to develop programs for faculty aimed at reducing gender and race bias.

The Challenge of Institutional Transformation: 2016-2021

In 2016, FIU received an NSF ADVANCE Institutional Transformation grant for \$3.2M, with Rose as the lead author in collaboration with Darici, Provost Furton (PI), and the Deans of Arts, Sciences and Education, and Engineering and Computing, Michael Heithaus, and Ranu Jung, respectively. The goal proposed for FIU's ADVANCE proposal was to develop institutional structures, processes, and climate that builds an affirming and fair workplace for women and underrepresented groups. The five-year project is focused on increasing the number of STEM women, particularly Hispanic and Black women, as well as improving the institutional climate. Four objectives guide the work:

1. Attract, recruit, retain, and promote more women STEM faculty, particularly Hispanic and Black women;
2. Educate faculty about gender-by-ethnic biases and microclimates that affect the advancement of women;
3. Move faculty from insight to action to promote gender and race equity using the Bystander Leadership Program, an evidence-based bystander intervention program that focuses on skills training;
4. Outreach and networking through the Advance Florida Network, a joint steering committee and seminar series for women STEM faculty and postdoctoral fellows comprised of the Florida metropolitan research universities of FIU, University of Central Florida, and University of South Florida.

Theory of Change

The theory of diffusion of innovation guided the FIU ADVANCE proposal (Bentley, 2010; Rogers, 2003). The proposed activities were intended to create, through the process of intervention and subsequent diffusion, a faculty-based social system that acts proactively to advance women faculty within STEM as well as the larger FIU and Advance Florida Network communities. Diffusion is defined as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, p. 5). A number of diffusion studies have been done in various fields to investigate the patterns of adoption of an innovation or intervention. Dearing (2009) found that data from studies describing voluntary adoption decisions followed a mathematically consistent sigmoid pattern (the S-shaped curve) of adoption over time for interventions that are perceived to be consequential by potential adopters. He concluded that the literature of “diffusion of innovation” qualifies as a “theory for social change” (p. 4). The S-curve occurs due to the social influence of early adopters either by talking or by example-setting. However, it might take much more time for other potential adopters to follow the people in their networks; additionally, some people might never adopt the new idea or process that is put forward through the intervention. The time to adopt has also been a well-studied question in diffusion research that can depend on many factors like the structure of social ties in a social system (Dearing, 2009). Of interest here is the finding that the social systems that are most likely to respond quickly to innovation “are ones that have a culture of creativity and innovation, a relatively flat hierarchical system, and strong leadership that is committed to effecting change” (Sanson-Fisher, 2004, p. S56). These

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qualities fit the context of academic departments, suggesting that the theory is particularly appropriate to guide change within an academic institution.

Social networks are critical to the success of the diffusion of innovation (Barnett, 2016; Valente, 1996). The threshold model of diffusion posits that an individual engages in a behavior based on the proportion of people in the social system that are already engaged in that behavior (Granovetter, 1978). Theoretically, 40 percent is the proportion of a demographic that is required for full acceptance of change to begin (e.g., Main, 2018; Tolbert, Simmons, Andrews, & Rhea, 1995). At 40 percent participation, an accelerated rate of adoption of innovation occurs (e.g., Izraeli, 1983). Thus, 40 percent participation by STEM-SBS faculty in the Bystander Leadership Program was predicted to be the critical mass required to reach a “tipping point” that would create a wider diffusion of the values of diversity and inclusion.

Behavioral Change Projects

Three FIU ADVANCE projects focused on promoting behavioral change to create a more inclusive climate, including the Bystander Leadership Program, the Microclimate project and AWED Theater. Engaging people in new behaviors may be influential in changing their attitudes. Having participants adopt new behaviors in a peer-group setting, even temporarily, creates a climate of change. If early adopters of the new behaviors are enthusiastic, they further influence others to engage in the new behaviors. By engaging a significant percentage of key faculty to be adopters or “influencers,” it was expected that the rate of adoption would accelerate.

Bystander Leadership Program (Bystander)

Bystander is the signature program of FIU ADVANCE’s new initiatives. It was designed as an educational, interactive, behavioral skills training program for faculty. Bystander was intended to move faculty participants from “insight” to “action” to address observed or anticipated instances of gender and race bias and discrimination among faculty. The program raises awareness about the interplay between power, privilege, and bias often experienced by women and minorities. It also provides practice in using a toolkit of intervention responses and actions in response to situations of bias.

Research has shown that bystander intervention is enabled when individuals: (a) perceive there is a problem to be addressed (i.e., have insight and empathy) and (b) perceive they have the skills to act (Nelson, Dunn, & Paradies, 2011). FIU Bystander was modeled on successful evidence-based bystander intervention programs that have been used to reduce racism (e.g., Devine et al., 2012), gender bias (Devine et al., 2017), sexual assault and harassment (Banyard et al., 2014; Senn & Forrest, 2016), and school-based bullying programs (Polanin, Espelage, & Pigott, 2012).

To prepare the Bystander workshop, a team of eight faculty met biweekly for more than a year to discuss readings and develop, practice and evaluate workshop content. The workshop was designed to be an eight-hour, one day program involving two components: (1) insight or “consciousness-raising” and (2) action or active bystander intervention and prevention. The two components illustrate a five-step intervention model in which the first two steps, Notice and Interpret, represent the insight components and the last three steps represent the action steps of Lead, Decide (what to do) and Act. Throughout the day, participants practice response options based on a four-quadrant classification of intervention responses developed by (Bowes-Sperry & O’Leary-Kelly, 2005) to address observed and anticipated instances of bias derived from the Microclimate Project findings.

To take advantage of the digital resources, participants in the Bystander Leadership Program are asked to take an online Implicit Association Test (<https://implicit.harvard.edu/implicit/>, Greenwald, Nosek, & Banaji, 2016). The test reveals the power of cultural associations that lead to implicit biases prevalent in today's social interactions. The scientific rigor of the test and the high number of participants worldwide makes the claims about the nature of bias and the necessity of confronting it evident and acceptable to participants. Use of the online tool opens a dialogue that guides the faculty to try and adapt the intervention strategies offered in the rest of the workshop. Online tools are used as well to assess the effectiveness of the workshop; self-reports of participants' attitudes and behaviors are collected online without losing their interest and engagement. The option of online surveys offers a safe, quick, and engaging way to do a tedious and meticulous task (Ward, Clark, Zabriskie, & Morris, 2014). Each participant will complete an online pre-test before the workshop, a post-test immediately after the workshop, and a three-month follow-up survey. Short-term effects of the intervention workshop will be assessed by comparing pre-test and post-test results of participants and a control group that will take two surveys three months apart. A follow-up survey also will be given to participants three months after the workshop to assess the long-term impact of the intervention training. To ensure participation, a number of factors that increase participation in web-based surveys identified by Keusch (2015) were adopted, including using personally addressed emails and pre-notifications sent at carefully chosen times to invite participation, encouraging reminders, offering incentives for timely responding, and pacing reminders to avoid survey fatigue.

The Microclimate Project

The Microclimate project was designed to identify content that could be incorporated into the Bystander Leadership Program and AWED Theater. The Microclimate project was based on the theory and framework of intersectionality that has been used to understand the experience of URM women (Armstrong & Jovanovic, 2017; Charleston, Adserias, Lang, & Jackson, 2014; Shields, 2008). Intersectionality refers to the interconnections of race, class, and gender as they apply to a given individual or group and the overlapping and interdependent systems of discrimination or disadvantage they create (Bowleg, 2017; Shields, 2008).

The FIU ADVANCE Microclimate project introduced an innovation to the study of intersectionality by shifting focus to the study of the intersectionalities of the dominant (male) group and the systems of advantage or disadvantage they create. University departments around the nation are becoming increasingly diverse and international in their faculty composition (Alberts & Hazen, 2013). Much of what is known about the experience of URM women is based on their experience in STEM departments with predominantly White men faculty. However, new approaches are required to educate a globally multicultural male faculty about bias and climate issues affecting STEM URM women. The FIU project explored the intersectionality of the men STEM faculty, specifically how nationality, gender and race stereotypes might make departmental microclimates chilly for URM women.

The microclimate projects used qualitative measures for focus groups and interviews and will use quantitative methods for a future scheduled network analysis. The interviews and focus groups conducted by author Sanaz Farhangi uncovered personal stories that revealed patterns of connections, influence, information flow, and exchange of resources that hamper the advancement of women and URM women in STEM. These personal stories were adapted as case studies that were used for the instructional content of the Bystander Leadership Program.

AWED Theater

The AWED Interactive Theater Project utilized the Microclimate project results to develop new sketches focusing on culturally biased gender and race stereotypes that would be relevant to an international faculty body. The sketches are part of an active learning exercise, wherein faculty would view a scene and then participate in changing the narrative. AWED Theater is an integral part of the development of an affirming and respectful approach to education around sensitive topics such as ethnic and gender biases. Mr. Jeffrey Steiger, Creative Director for this project, was the founding director of the University of Michigan CRLT players, who pioneered the use of interactive theater to illustrate gender dynamics in STEM for ADVANCE programs. Steiger developed three new performances that address the multicultural, gender, and other biases identified from the Microclimate project. *On the Line* is a performance and workshop focused on a living case study that interactively engages participants on ways they can mitigate bias and equity in tenure and promotion practices. *Bystander Intervention* draws on principles of performance and research to explore bystander dynamics and mediation strategies in the context of micro (individual) and macro (departmental) communication, policies, and processes. *Cluster Hiring* is a workshop in development (available January 2019). Professional actors perform AWED Theater under the direction of Steiger. AWED Theater was presented at several universities in 2018 and is now available to other HSI, the Advance Florida Network and universities nationally.

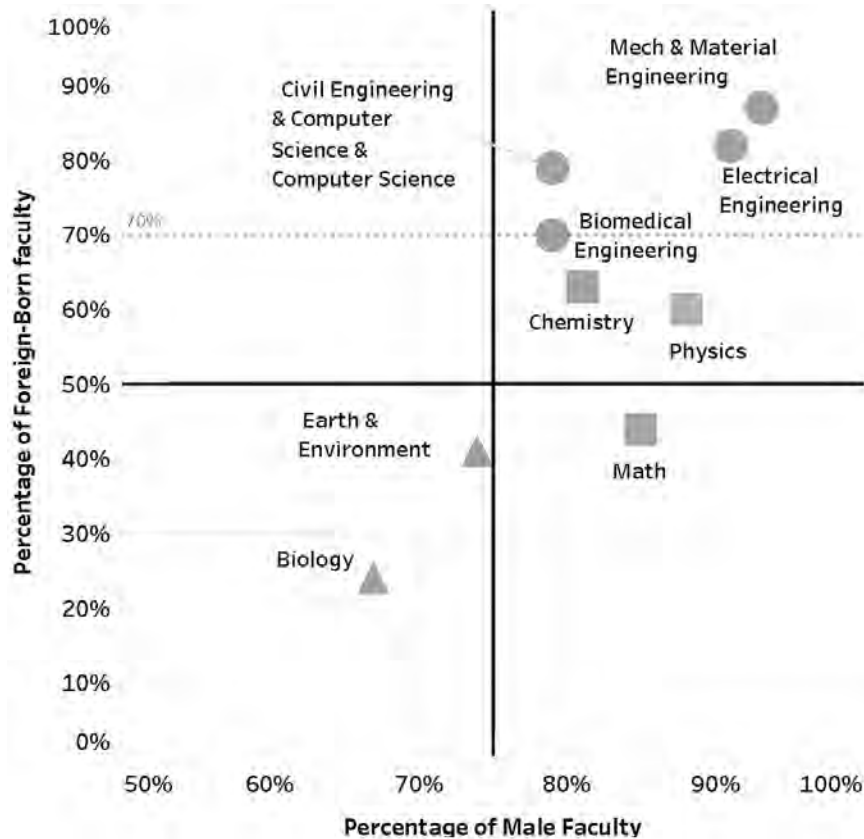
Early Findings and Outcomes

The Microclimate project resulted in two important findings. First, it provided information about the life experiences and personal stories of the faculty to use as case studies, theater sketches, and interactive scenarios. Although these stories have a lot in common with what previous research uncovered about the experience of women and underrepresented faculty, the familiar setting of them rings true to the participating FIU faculty. The fact that the stories actually took place at FIU first brought surprise and disbelief, and then led to a sense of urgency to take action to improve the workplace environment for everyone.

Secondly, the Microclimate project confirmed the initial conjecture about the different climates of STEM departments. Figure 2 schematically shows STEM departments have three types of climates that are associated with the percentage of foreign-born and male faculty in a department. The figure reflects that having more foreign-born men faculty within a department was associated with a lower proportion of women faculty. Group One departments (identified by a circle; top of upper right quadrant) with 70 percent or more foreign-born faculty had the lowest number of women. Group Two departments (identified by a square; mid-right quadrant) that were between 70 and 50 percent foreign-born men had a moderate number of women faculty. In contrast, Group Three departments (identified by a triangle; lower left quadrant) with fewer than 50 percent foreign-born men faculty had the most women faculty.

Interviews conducted with the men faculty in these departments inquired about four areas, including sensitivity and awareness regarding diversity issues, general ideas about race and gender issues, attitudes and beliefs about biases in STEM, and attitudes and beliefs about underrepresented students, especially doctoral students. Representative examples of faculty quotes from each of the three groups are presented in Table 1 below. Interview analysis of Group One faculty revealed that these departments' faculty showed little or no concern for diversity. They tended to consider gender and racial issues as a "U.S.-thing" that did not apply to them. As the representative quote from Group Two indicates, the faculty of the departments with 50-70% foreign born members were aware of equality issues but claimed to be "objective"

Figure 2. Percentage of men faculty and percentage of foreign-born faculty in STEM departments*
 *The three groupings of departments are identified with either a circle, square or triangle.



or “immune to prejudice” and that their science was “color/gender blind” even while lamenting their own minority status within the larger FIU community.

Group Three included the two departments with fewer than 50 percent foreign-born men faculty and also the most women faculty. These men showed more concern about diversity, accepted their biases and took initiative to address the inequalities as evident from the representative quote of a Hispanic male faculty member. Their women colleagues also reported fewer problems or acknowledged the department’s collective will and effort to overcome the inequalities.

Role plays and case studies based on the findings above were used in the Bystander Leadership workshops. Three pilot workshops with about twenty faculty each were held in Spring 2018. The official research component of Bystander was launched in Fall 2018. To date, two workshops involving a total of 44 STEM and SBS tenure-line faculty have been held. As discussed below, the response has been extremely positive. The vast majority of participants reported that the workshop increased their confidence about using intervention skills and strategies and said they were more likely to intervene in similar situations of bias based on participation in the workshop. An additional six workshops are scheduled for this academic year. The effectiveness of Bystander is being evaluated using pre- and post-test measures of behavior and attitudinal change as well as follow-up six months later. The control group will take the pre-test and the six-month follow-up.

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Table 1. Examples of faculty comments from STEM Groups One, Two and Three as presented in Figure 1

Group One Participant Comments: Departments with >70% of foreign-born men faculty
<p>Asian Male Professor</p> <ul style="list-style-type: none"> ● Race and Gender: “Race is not an important concept [in China]. In China, ‘women hold up half the sky.’ [In school] the women were not interested [in engineering].” ● Doctoral Students: “Chinese students will have higher chance [of being recruited], because I can communicate easier.” ● Recruiting U.S. Minority Students: “I have one U.S [Hispanic] student.... He can do a pretty good job, but he’s not as ambitious as other students.” ● Diversity: “My feeling is [having a role model] is not that important for undergraduate students.” <p>African Male Professor</p> <ul style="list-style-type: none"> ● Diversity: “[When] I came herethe chair at that time came to me and said, ‘Let’s make you an African American so that we have a chance to win an NSF.’ And since then, I am the African American in the department. I am retiring soon. They will have to find another one.” ● Doctoral Students: “In our department, [it] depends on who is the chair. When the chair was Chinese, we had a lot of Chinese graduate studentsin our department right now, we have three faculty member of Turkish descent....as a side effect of that, they usually have mainly Turkish students.”
Group Two Participant Comments: Departments with 50-70% foreign-born men faculty
<p>Asian Male Professor</p> <ul style="list-style-type: none"> ● Race: “The Asian male is the unspoken real minority because you are in a minority group but you are not really treated as a minority. You don’t get any benefit. I mean if you are a woman, you are underrepresented gender, if you are black, you are Hispanic, you’re underrepresented. If you are an Asian male, sorry!” ● Doctoral Students: “I can’t tell people to study hard or tell Hispanic students that if they don’t study they will be roofers.” ● Climate: “I mean we make racial jokes but nobody really discriminates. I mean, we are physicists, they sometimes say nasty things.”
Group Three Participant Comments: Departments with < 50% of foreign-born men faculty
<p>U.S. White Non-Hispanic Male Professor</p> <ul style="list-style-type: none"> ● Diversity: “We almost have no Hispanic people in our faculty so that’s kind of a good example of [our] challenge.” ● Hiring Biases: “It perpetuates itself, right? Because we are more comfortable with people like us that have the same English skills and all other things we kind of value and we like people with comparable backgrounds and experience. We have a traditional view of how people should have gone through their university training and all this stuff in general.” ● Recruiting U.S. Minority Students: “She is Hispanic but she is U.S. born, and so I hired her on an undergraduate Research [Assistantship] to help with some things around the lab and then ultimately she decided to come on for her Masters.”

ADVANCE FLORIDA NETWORK AND DIGITAL COMMUNICATION PLAN

The dissemination requirement for all NSF ADVANCE projects required a strong communication plan. All projects have a heavy reliance on digital and social media both for internal and external communication. In 2018, a dedicated public relations manager, Ms. Ashley Garcia, was hired to coordinate these efforts via news stories, networking, social media, and other web-based resources.

A digital communication and social media plan was especially critical to the success of the fourth goal of the grant, the development of the ADVANCE Florida Network (AFN), a network of STEM women among the three Florida metropolitan universities. The goal of the AFN is to encourage collaboration and the sharing of information and resources in the areas of recruitment, promotion, retention, and leadership for women across the three urban public research universities of South Florida, including FIU, University of Central Florida, and University of South Florida. Under the AFN program, women tenure-line STEM faculty and women Postdoctoral Associates can receive funding to offer research seminars at departments from one of the metropolitan universities other than their home institution.

The program has already made significant connections among female faculty, and the use of technology will stimulate further interest in the program through the development of a new website to highlight

the biographies and research of the STEM women at the three campuses. Apart from the actual visits, the majority of the AFN interaction is conducted online. The program's site contains all the information and paperwork pertinent to the program, such as application forms and visit procedures. A list of previous AFN awardees is also available on the website, including their home and host institutions, their area of expertise, and the topic of their presentation. This highlights and disseminates the participants' research and provides an opportunity for future applicants to learn more about the results of the program. Details of past trips are illustrative examples of what the AFN is looking for in applicants, and the provided contact information for awardees allows prospective applicants to ask questions and discuss the program with alumnae.

Furthermore, an ongoing project of the AFN, a directory of women tenure-line STEM professors and postdoctoral fellows at the three-member universities, will allow for even greater ease of collaboration. The directory may be used to look for mentors, research partners or examples of successful women in their particular field of interest, thus promoting career development at all stages of one's academic career.

The AFN has been very successful. More than twenty faculty have participated in campus exchanges so far. One participant applied for and received a grant her host had mentioned to her. Two others have submitted grant proposals with their hosts. Currently exploration is taking place on how to expand the AFN by having cross-university presentations via Blue Jeans or other digital formats. Such digital formats will also deepen the awardees' professional development, as a wider audience will increase visibility, feedback and discussion.

RECOMMENDATIONS

It would be beneficial for future faculty career development programs to be more intentional about how to use technology, particularly social media, than was the case here. The use of technology in the ACE and FIU ADVANCE projects was not deliberate; it simply became significant to meet specific needs. However, purposeful training in the use social media to promote women's careers would be an important area to include. For example, online science conversations can provide benefits to researchers if faculty know how to efficiently and effectively harness online resources (Bik & Goldstein, 2013). These methods could be part of a skills training workshop. Furthermore, scholars are increasingly using services such as Twitter as a communication platform. Academics interviewed by Priem and Costello (2010) reported that Twitter citations were different from traditional citations but still transmit scholarly impact. They were more conversational and more likely to cross traditional disciplinary boundaries. The professional impact of Twitter can be beneficial for scholars because sharing information is central to their work. In fact, Twitter was ranked in the top three services used by Semantic Web researchers to spread scientific information (Letierce, Passant, Decker, & Breslin, 2010). YouTube has screencasts, lectures and tutorials and some institutes such as MIT have their own channel. Scientific groups and fan pages also appear on Facebook. Recent research shows that higher education institutions rarely go beyond one-directional information dissemination (Kimmons, Veletsianos, & Woodward, 2017). This suggests that a more interactive and community-building approach, such as using Twitter, should be considered for advancing the cause of equity and diversity. It would be important to include more emphasis and education concerning the uses of social media in future career development projects.

FUTURE RESEARCH DIRECTIONS

There are several directions to expand practice especially regarding the use of digital technology. For instance, the AWED Theater performances may be useful and interesting to many other institutions because they are based on the actual experiences of faculty in a Hispanic-serving university. The performances are designed specifically to address the different intersecting identities of faculty and provide valuable opportunities to investigate the subtleties of faculty interactions. Having the theater performances available as an online interactive workshop also is under consideration. Using a software like Blue Jeans, online participants would be able to view live performances as well as interact with the performers and the audience.

The Bystander Leadership Program also has considerable value for dissemination and for future research. ADVANCE programs have had considerable success over the past decade using unconscious bias training such as STRIDE workshops and Equity Advisor programs. However, if the current research shows Bystander intervention training to be an effective, evidence-based program, it suggests that the next iteration of intervention may profitably focus on behavior change and skills training for STEM faculty to increase diversity and inclusion.

CONCLUSION

FIU's Strategic Career Development programs for women STEM faculty have resulted in a significant growth in the number of women in STEM. Now women comprise about 20 percent of the STEM tenure-line faculty, up from 11 percent in 2009. Additionally, the general satisfaction of faculty in all disciplines has increased. Ongoing programs are aimed at further reducing gender and race bias and promoting inclusion.

FIU ADVANCE also illustrates a practical model of how some aspects of faculty development can be facilitated using technology-enhanced environments. Technology is a highly effective tool in communication and community engagement. Various methods were used to ensure that the reach of ACE, FIU ADVANCE and AWED was as wide as possible. Social media is one important aspect of communication. AWED's Twitter feed delivers regular news and updates, actively engages with faculty members, internal FIU departments, and external offices and shares images from past events on Flickr. These platforms help raise awareness of the office's programs and resources. Current social media algorithms place a high premium on video content, and so the office is working on creating short videos that highlight some of its most important initiatives, such as the Bystander Leadership Program and AWED Theater.

Websites continue to play an important role for FIU's mentoring, empowerment and outreach activities by making downloadable documents easily available. FIU faculty members can access resources on mentoring, tenure, teaching and other subjects on their own schedule at the advance.fiu.edu website. An email newsletter is distributed once per semester so that those faculty members without social media platforms can also be part of the larger AWED network.

Additionally, technology is used to sustain important research goals. The ability to do research using online tools greatly enhances effective participant enrollment and tracking and provides welcome analytical tools. These will be beneficial for more complicated studies, such as the FIU ADVANCE

Social Network Study that will be launched next year. This study will analyze the complex web of daily collaborations and interactions among faculty. These interactions are complicated to report; however, the online step-by-step questioning and question matrices facilitate participants' thinking and accuracy.

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KEY TERMS AND DEFINITIONS

Bystander Intervention Program: A type of training to prepare bystanders that observe harmful situations to respond in a way that changes the situation for better.

Department Climate: Features and common patterns of dimensions of department life or its members' perceptions of attitudes toward these dimensions like collegiality, respect, and fairness.

Gender Bias in STEM: A difference in treatment and representation of women and men in the fields of science, technology, engineering, and mathematics based on gender stereotypes.

Institutional Transformation: A profound change within many levels of an institution that transforms its culture and procedures.

Intersectionality Theory: The interconnected nature of social categorizations such as race, class, and gender as they apply to a given individual or group, regarded as creating overlapping and interdependent systems of discrimination or disadvantage.

Microclimate: A different departmental microenvironment that can exist for faculty from under-represented groups.

Unconscious Bias: Forms of cultural stereotypes about certain groups that leads to unintentional beliefs and treatments towards these groups.