

AC 2010-1512: NDSU ADVANCE FORWARD: ENHANCING RECRUITMENT, RETENTION, AND ADVANCEMENT OF WOMEN FACULTY IN ENGINEERING AT NORTH DAKOTA STATE UNIVERSITY

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NDSU Advance FORWARD: Challenges and Recommendations to Enhancing Recruitment, Retention, and Advancement of Faculty

Abstract

The NDSU Advance FORWARD project, funded by the National Science Foundation ADVANCE Institutional Transformation program in 2008, seeks to develop and implement a comprehensive research-driven strategy to increase participation of women in all science and engineering faculty and academic administrative positions. Advance FORWARD (Focus on Resources for Women's Advancement, Recruitment/Retention, and Development) builds on the earlier work of North Dakota State University's self-initiated FORWARD committee, a group of faculty and administrators who came together in 2002 out of a shared concern about the slow advancement of women faculty in science and engineering departments. Specifically, Advance FORWARD strives to improve the climate across campus, enhance faculty recruitment efforts, increase faculty retention and advancement, and open leadership opportunities. In this paper we discuss various challenges that we have encountered while implementing our programs and offer recommendations so that other institutions interested in developing similar programs can avoid the same pitfalls. In order to provide a context for our recommendations, we provide background on our institution, describe key initiatives that have been implemented to date, and summarize baseline data.

Introduction

Since its inception in 2001, 37 institutions across the country have received a National Science Foundation ADVANCE Institutional Transformational Award. The goal of the NSF ADVANCE program is to increase participation of women in academic science and engineering careers. The North Dakota State University Advance FORWARD (Focus on Resources for Women's Advancement, Recruitment/Retention, and Development) project, funded by NSF in 2008, seeks to develop and implement a comprehensive research-driven strategy to increase participation of women in all faculty and academic administrative positions. As NSF funding is limited to science and engineering, the institution provides funds for faculty not in science and engineering disciplines.

Universities often maintain processes that unfairly disadvantage women and minorities, which is contrary to "principles of social equity rooted both in democratic ideology"¹ and contrary to the ideal that scientific careers "be open to talent."² Over the last thirty years, research on the nature of organizations^{3,4,5} provides convincing evidence that assumptions about the neutrality of organizational structures and dynamics have obscured mechanisms that systematically limit women. Organizations are, in fact, *gendered* to the extent that they pattern "advantage and disadvantage, exploitation and control, action and emotion, meaning and identity," in terms of distinctions between "male and female, masculine and feminine."⁶ Acknowledgement of such gender-based organizational patterns is essential to understanding the historical and persistent ways women have been disadvantaged in university departments.⁷⁻¹² In addition, institutional patterns are further complicated by the intersection of gender and race, which, acting in consort, doubly jeopardize the advancement for women of color in the sciences.¹³ Therefore, it is critical

to identify and redesign factors shaping the multiple university contexts that limit women's achievement.^{14,15} Our view is that institutions can and must be transformed to create more inclusive work situations in which both women and men achieve their full potential. We seek institutional transformation like that described by the American Council on Education¹⁶ — a transformation that: “(1) alters the culture of the institution by changing select, underlying assumptions and institutional behaviors, processes, and products; (2) is deep and pervasive, affecting the whole institution; (3) is intentional; and (4) occurs over time.” Therefore, North Dakota State University Advance FORWARD's approach to such institutional transformation involves multiple interventions which take into account (1) the effects of institutional policies and practices; (2) campus climate, reflecting attitudes and behaviors that diminish women's advancement; and (3) knowledge and skills for success in teaching, research, and leadership.

Institutional Context

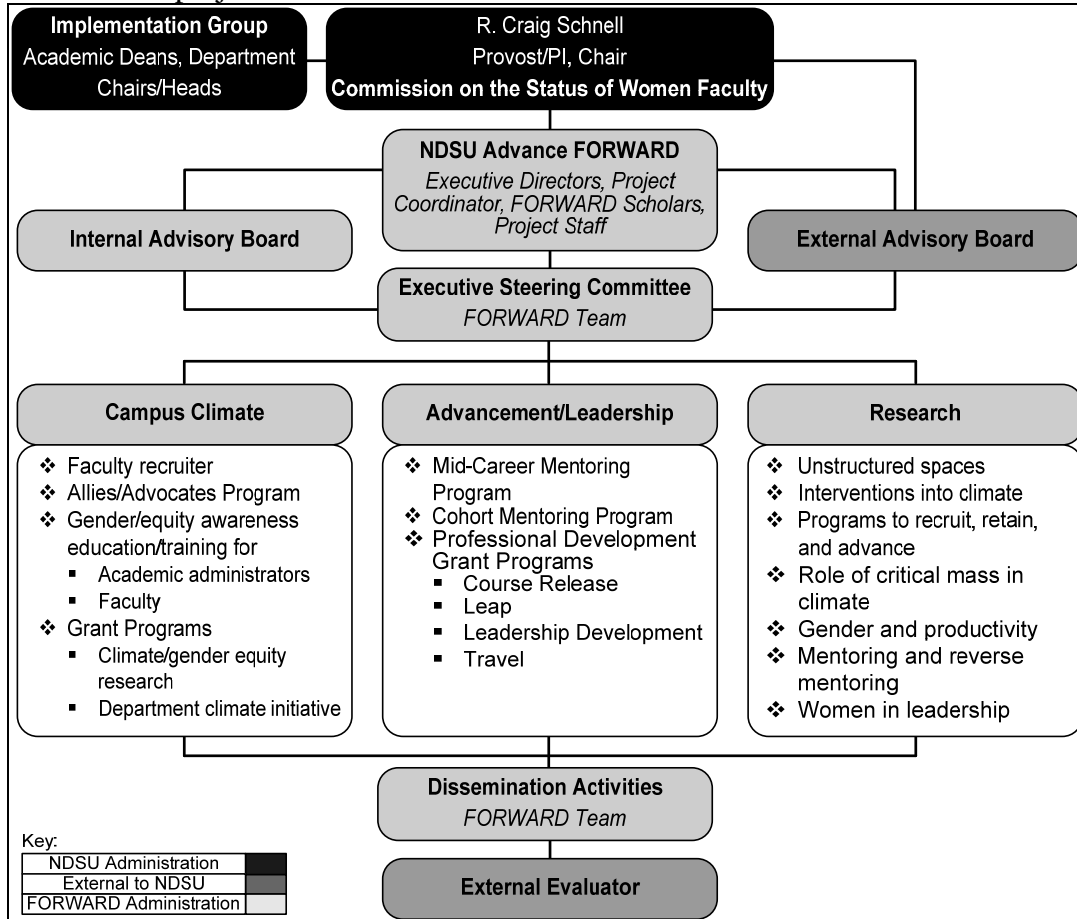
North Dakota State University, a progressive, public, land grant university in the upper great plains, has been undergoing dramatic institutional transformation since the late nineties. The institution has moved from a Carnegie-classified Research Intensive University to a Research Extensive University. This move accompanied new doctoral programs that advanced research and extramural funding. Further, North Dakota State University's efforts have resulted in record enrollments for ten consecutive years, and the number of graduate students has nearly doubled in eight years. Research expenditures have increased 108% in only six years, significantly outpacing the national average. According to the NSF data on academic research and development expenditures, North Dakota State University is one of the fastest growing research universities in the northern Great Plains region (2005).

The institution, with around 550 ranked faculty in seven academic colleges, serves over 14,000 undergraduate and graduate students. The undergraduate student population is 47% women. Nine undergraduate programs in engineering are offered and 9.2% of the degrees are awarded to female students. Prior to NSF funding, between 2002 and 2007, the percentage of tenured women faculty had risen from 4.5% to 8.9% – an increase partially attributable to North Dakota State University's self-initiated FORWARD committee. Still, this percentage of tenured women placed North Dakota State University the second lowest in AAUP's 2006 Faculty Gender Equity Indicators study.¹⁷

In 2002, when a group of faculty and administrators (the FORWARD committee) came together to prepare a proposal for the NSF ADVANCE North Dakota State Institutional Transformation (IT) program, representation of women faculty in engineering was limited to two newly hired assistant professors. In six years, the number of women faculty in engineering increased to nine (two full professors, two associate professors, and five assistant professors). In fact, several engineering departments (mechanical engineering, industrial and manufacturing, agricultural and biosystems) have a higher percentage of women faculty than the national average¹⁸. The increase in representation of women faculty is not limited to engineering: institution-wide the percentage of tenured women has risen to 15.9% in 2008 – a significant increase in the representation of women faculty by any measure. This increase correlates with FORWARD's work leading to NSF funding, institutional efforts going back to late nineties, and the funding from the NSF ADVANCE program.

The North Dakota State University Advance FORWARD project (Figure 1) was developed in response to 1) research on the campus climate conducted at North Dakota State University over the past several years; 2) extensive compilation and analysis of North Dakota State institutional data on the recruitment and retention of women faculty, and 3) the obvious scarcity of women in academic administrative roles. The research results and institutional data are available on the FORWARD web site along with the complete proposal.

Figure 1. Major Components of the North Dakota State University Advance FORWARD project.



To address the research findings and analysis of institutional data, the North Dakota State University Advance FORWARD has five specific goals:

1. Improve the climate across the campus;
2. Enhance recruitment of women faculty by employing targeted recruitment strategies;
3. Increase retention of women faculty through the probationary period and the promotion/tenure process;
4. Promote/advance women associate professors; hire women at advanced rank to build a critical mass of senior women in all departments;

5. Create leadership opportunities by promoting and hiring women into academic leadership positions.

Initiatives

The Advance FORWARD project features three major components consisting of a multitude of programs to engage most everyone: 1) Campus Climate, 2) Advancement/Leadership, and 3) Research. The Advance FORWARD organizational structure summarized in Figure 1 reflects the relationship of these three components to the overall project. To achieve the project goals, the campus climate and advancement/ leadership components provide professional development and mentoring for junior and senior women faculty, workshops for academic administrators and faculty on climate issues, and the development of male faculty as advocates and allies. Within all three of these components there are specific, funded incentives to support change efforts. The research component is a particularly significant aspect of the project designed to assess if and how the incentives and programs lead to the achievement of the goals and, ultimately, to institutional transformation.^{19, 20}

In addition to designing an evaluation plan and collecting and analyzing baseline data, we began work on several key initiatives. These are the establishment of the Advocates and Allies program, the Commission on the Status of Faculty Women, cohort mentoring program for junior faculty, academic administrator training program, and grant programs.

Commission on the Status of Women Faculty. In spring of 2009 the Provost initiated the Commission on the Status of Women Faculty and appointed eight faculty members to serve on the Commission. The Commission monitors measures of change and proposes policies to support the institution's Advance FORWARD's goals. Commission members has organized themselves; framed tasks for the group; and discussed travel grants and the inclusion of childcare expenses, family leave policies. The Commission reviewed search policies and practices with attention to progressive policy adjustments that would support attracting, retaining, and advancing women throughout the ranks. The Commission's organizational efforts resulted in the creation of several work groups (subcommittees) to focus on policy research and strategies for improving women faculty's positions on campus. These work groups include: PTE (Promotion, Tenure and Evaluation) Processes and Policies, Internal Appointment Processes and Policies, Search Processes and Policies, Family Leave Policies and Department Equity Award. The Commission has completed its review of internal appointments and has recommended that policies and protocols in place for external searches are followed for internal searches. Further, the Commission has recommended that appointments without searches are avoided entirely.

Advocates and Allies Program. The NSF ADVANCE grant proposal identified an "Allies" program as an innovative way to garner support for North Dakota State institutional transformation from male faculty. In the fall of 2008, an initial steering committee, working from the grant proposal, suggested that the program be called "Advocates and Allies" as a way to distinguish members who will receive a stipend, meet more frequently, and do on-campus training (Advocates) from those who will not receive a stipend but who will attend training, attend other campus events, and function as allies for faculty women within their departments and colleges (Allies). Following a call for applications for faculty men interested in serving as advocates, eight

senior men were appointed as Advocates in spring of 2009. The Advocates worked to clarify their role, identify what they would need from a trainer (someone to train Advocates to be trainers of allies) and select future readings as part of their training. The Advocates piloted two trainings for Allies during fall 2009.

Mentoring Cohorts for Junior Faculty. In fall of 2009, we initiated the cohort mentoring program developed as part of the North Dakota State University Advance FORWARD project. The University has decided to replace its one-to-one mentoring program with cohort mentoring program for all junior faculty on campus. Therefore, the cohort mentoring component of the project is being consolidated with the campus-wide first-year faculty program sponsored by the Provost. Each cohort group includes four junior faculty and two senior faculty serving as mentors. Cohorts are same sex, as studies have shown that women strongly prefer other women as their mentors,^{21,22} and same gender relationships provide women with more psychosocial support.²³

Several training opportunities have been provided for faculty mentors and those mentored concerning issues, roles, opportunities, and goal setting. Research suggests that good mentoring is enhanced when the parties involved have training^{24,25} and contracts outlining roles and responsibilities.

Grant Programs. We initiated several funding programs to increase research productivity of women faculty and hence their potential for advancement. In collaboration with The Office of Research, we started the *Leap Grant Program* in fall of 2008. Leap Grants provides significant funds to increase the potential for women faculty at North Dakota State University to acquire external funding. To date, five assistant professor women and four associate professor women in science and engineering have received funds from this program. The *Course Release Program* offers a one-semester, one-time teaching release for women faculty to increase their research productivity. To date, ten assistant professor women in science and engineering have received teaching releases through this program. The *External Mentor Travel Grant Program* provides funds to offset costs of meeting with a mentor who is not at North Dakota State University to establish and maintain relationships with relevant professionals outside the institution. While the cohort mentoring program provides mentors from within North Dakota State University, the travel grants encourage as well as provide funds to seek mentors outside the institution. To date, 36 women faculty have received funds through the travel grant program. The *Leadership Development Program* provides funds to send senior women faculty to a national leadership development program of their choice. To date, three women faculty have used funds from this program to attend leadership training. Finally, the *Climate and Gender Equity Grant Program* provides funds to interdisciplinary research teams. The goal of this program is to engage faculty members in research on gender, and demonstrate the value of research on gender to a gendered institution. This program is open to both women and men faculty, and to date three research teams have been funded.

Administrator Training Programs. We have initiated a sequence of training opportunities for department chairs. The initial training session included a presentation about the NSF 12 indicators using North Dakota State University data, followed by two small group discussion sessions to engage the department chairs in institutional transformation and gain a better

understanding of their professional development needs. Chairs were asked first to identify best departmental practices that have improved climate, recruitment, retention, promotion and advancement of women faculty. Then, in different small groups they were asked to think about one thing departments could do to lead the institution toward success in meeting each of the five North Dakota State University Advance FORWARD goals. Chairs discussed their biggest frustrations in trying to meet these goals, the kinds of information and resources that would help departments meet these goals, the people from departments with best practices they would like to hear from and what other information would help (speakers, handouts, presentations, materials, case studies). Similarly designed sessions featuring nationally known researchers (Dana Britton, Mark Chesler, Mary Deanne Sorcinelli, Virginia Valian, etc.) provided crucial information on topics such as gender schemas, unconscious bias, faculty mentoring, and searching for excellence and diversity.

Although the Advance FORWARD project is still in early implementation stages, we have developed instruments to evaluate each of our programs. Further, we have been using an event evaluation form that has been especially useful in gathering timely feedback on our programs and activities.

Baseline Data Collection

The NSF ADVANCE program expects annual collection and reporting of institutional data, referred to as NSF 12 Indicators, on faculty representation in all academic ranks and administrative positions, tenure and promotion outcomes, etc. We compiled institutional data on the NSF 12 Indicators, both the baseline data collected during and immediately after we applied for the ADVANCE grant (2007-2008) and from the first year of grant activities (2008-2009).

There has been some progress between the academic years 2007-08 and 2008-09 in terms of increasing the percentage of women in each of ranks in science and engineering disciplines: the percentage of assistant professors who are women increased from 31.4% (33) to 35.2% (43); the percentage of associate professors who are women increased from 8.6% (7) to 12.8% (10); and the percentage of women in full professor positions increased from 4.2% (4) to 5.9% (6).

During years 2006-2008, eight women and 25 men in the science and engineering departments came up for tenure. The percentage of positive tenure decisions for women in these departments was 87.5%, and for the men, it was 92%. During the same time period, the percentage of positive promotion to full professor decisions for both men and women was 100%.

Women faculty during the years 2006-2008 have left the university (voluntarily, non-retirement) in larger percentages, while their male counterparts have left in smaller percentages than their representation. Further, during these years women were over-represented in non-tenure track positions and underrepresented in tenured and tenure track positions. In other words, women faculty leave the university at a greater rate than do men faculty; furthermore, a greater percentage of non-tenured women (vs. tenured) leave.

The percentage of leadership positions being held by women within the University is 15.3% compared to women holding 25.4% of all tenured and tenure-track positions. Women, therefore,

are underrepresented in all leadership positions, including the president, vice presidents, assistant/associate vice presidents, the provost, deans, associate deans, department chairs or heads, tenured full professors, and faculty on tenure and promotion committees.

The University has conducted a salary study every year for at least the past ten years. One part of the faculty salary study tests to see if there are any statistically significant differences between men's and women's salaries. Although no statistically significant gender differences have been found, the current salary study does not consider years in rank. Efforts are in place to consider years in rank in future salary studies.

In order to measure change in faculty perceptions and attitudes, in December 2008/January 2009 we conducted a Faculty Work/Life survey. The response rate of completed surveys faculty in a tenured or tenure-track position was 42%. Preliminary analysis of faculty data point to statistically significant gender differences in several areas:²⁶

- Hiring Process: Higher proportions of women who are tenured or tenure-track compared to men are hired as assistant professors and "other" (such as adjunct lecturers, graduate assistants, and post docs), and smaller proportions of women compared to men hired as associate and full professors.
- Tenure Process: Discontent in the tenure process for female respondents centered on the fit between the way they do research and the way it is evaluated for tenure, information about assistance available to pre-tenure/promotion faculty, and not receiving reduced teaching responsibilities so they could build their research program.
- Professional Activities: Female respondents would prefer to spend more of their time doing research than they currently do, and less time on teaching, service, and administrative activities. Many female respondents have an interest in taking on a formal leadership position at North Dakota State University. While 37% of respondents overall said that there are barriers to taking on such a position, 51% of women said there are barriers compared to 24% of men.
- Women Faculty: Regarding recruitment, climate, and leadership statements relating to faculty who are women, many respondents chose not to answer these questions. Respondents are split regarding the adequacy of the number of women faculty in their department. A larger proportion of men compared to women agree strongly that the climate for women in their department is good.
- Space and Resource Needs: Faculty who are men agreed less than faculty who are women that they have sufficient office space. Conversely, faculty who are women agreed less than faculty who are men that they have enough office support and that they have colleagues on campus who do similar research. Tenured faculty agreed less than their tenure track colleagues that they receive enough internal funding to conduct their research and that they have colleagues or peers who give them career advice or guidance when they need it.

We will conduct the Faculty Work/Life Survey again in years three and five of the North Dakota State University Advance FORWARD project so that we can track changes in faculty attitudes and perceptions as well as evaluate the impact of FORWARD programming on faculty attitudes and perceptions.

Challenges and Recommendations

The NSF ADVANCE IT program solicitation specifies key components of a research proposal and the kind of institutional transformation NSF seeks to fund. Despite not having an NSF ADVANCE award until 2008, we found employing strategies provided by NSF funding guidelines to be useful. The following components of the ADVANCE program solicitation are useful in initiating and planning for institutional transformation.²⁷

- Develop a program built upon existing research findings and past ADVANCE institution results. Information on and materials developed by ADVANCE institutions are easily accessible from the ADVANCE portal maintained by Virginia Tech (www.portal.advance.vt.edu/).
- Employ data driven decision-making.
- Commit to continuous monitoring and assessment.
- Adopt a comprehensive management plan.
- Ensure commitment from administration.

The changes we have initiated since 2002 have not occurred without some obstacles. In a previous paper we discussed challenges we faced prior to receiving an NSF ADVANCE IT award and offered suggestions to overcome those challenges.²⁷ Despite the obstacles we continue to face, we have identified some significant lessons learned during the implementation of the North Dakota State University Advance FORWARD project. They will inform our work as the project continues and may be helpful to other institutions interested in institutional transformation:

- **Utilize materials developed by ADVANCE institutions.** The web sites for individual ADVANCE awardee institutions are exceptionally helpful and the ability to access them through the ADVANCE portal makes these sites easily accessible. Many ADVANCE institutions have developed excellent training materials and bibliographies on a wide range of topics as well as point to appropriate trainers and speakers. Utilizing and adopting materials developed by ADVANCE institutions helped us save significant time.
- **Be flexible in assigning project activities and responsibilities.** We found that hiring the right people can take time. Several of those on our project group accepted additional assignments/responsibilities for the short term. As a result, we were able to move the project activities and efforts along while searching for the right people for our project. We also learned that it is useful to be flexible with organizational placement and expected duties for newly created positions.
- **Strategize and develop consistent message to address resistance.** It is useful to spend time strategizing about how to address resistance before institutional transformation efforts gain visibility on campus and specific implementation begins. Developing and providing consistent messages to offer in response to any articulated resistance is crucial.
- **Coordinate activities with other campus programs.** To avoid overwhelming the campus community, especially women faculty and academic administrators with too many activities, we found it useful to coordinate efforts for programming. This also proved to be effective in increasing visibility of the project and attendance by the wider campus community. Joint programming with well established campus programs such as pedagogical luncheons, peer review of teaching, and the university-wide mentoring program helped introduce our goals and programs to a wider campus community.

- **Hire external evaluators with experience in higher education.** We learned early on the importance of having external evaluators with both experience in and understanding of higher education, particularly in research, whose expertise and style are both directly relevant to our goals and our institution. We have also developed a deeper appreciation for the need to balance good internal data collection with external analysis and perspective.
- **Utilize campus resources for faculty data collection.** Accurate and complete collection of the NSF 12 Indicator data, while important, is time consuming. It is crucial to have a system in place for regular collecting, checking, and reporting these data. We found working closely with offices of Institutional Research, Human Resources, Academic Affairs, and Deans to be extremely helpful.
- **Be aware of resistance from faculty not in engineering and sciences.** We have experienced pressure to open all grant programs to all women faculty even though some of our grant programs were specifically developed to address the needs of science and engineering faculty. We found it useful to highlight the research and evaluation components of our project and discuss the purpose of each of our grant programs to demonstrate how non- science and engineering research is not compatible with NSF funding requirements.
- **Engage administrators early.** We have experienced firsthand the ways in which the influence and power of major administrators such as vice presidents and academic deans can facilitate the work of our project – or impede it. We found it useful to ask Deans to bring with them a distinguished professor or a senior faculty member from their college to the FORWARD invited speakers. Similarly, we found it useful to ask chairs to bring a senior faculty member from their departments to the workshops we have for them.
- **Pay attention to eager supporters.** Early on we observed that mostly the same groups of faculty and administrators attended our events. While developing strategies to broaden participation in our events, we found it useful to focus our efforts on those who supported our project goals and were eager to learn and participate.
- **Maintain personal interactions.** We found that personal emails and phone calls are more effective than listservs for engaging faculty and administrators in the project activities. Our group members have made efforts to stop by the offices of faculty to give their colleagues copies of funding announcements, etc. People seem to pay more attention to these one-to-one efforts.
- **Invite researchers to give presentations, offer workshops.** We found inviting well-known researchers to give campus talks on faculty development to be especially effective in increasing campus credibility and visibility of the project.

Finally, we have gained an appreciation for celebrating small wins and working with a supportive team. Institutional transformation efforts that enhance faculty recruitment, retention, and advancement will face resistance – some of which may not be easily visible. Such resistance, while an indication of success, may be draining.

Conclusions

The NSF funded NDSU Advance FORWARD project strives to improve the climate across campus, enhance faculty recruitment efforts, increase faculty retention and advancement, and open leadership opportunities. Key elements include an Allies and Advocates program to engage senior male faculty in institutional transformation, a Commission on the Status of Women Faculty to actively improve institutional policies, and a variety of mentoring programs and professional development opportunities to support faculty and administrators. In this paper we discussed challenges we have encountered while implementing our programs and offered recommendations so that other institutions interested in developing similar programs could avoid the same pitfalls. The processes we have outlined in this paper can be helpful to institutions interested in enhancing their faculty-related processes in climate, recruitment and retention.

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