

# **Institutional Transformation at North Dakota State University**

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## **Abstract**

Since 2001, NSF awarded 32 institutions three or five year ADVANCE Institutional Transformation awards. The goal of these awards is to increase the participation of women in the scientific and engineering workforce through the increased representation and advancement of women in academic scientific and engineering careers. A total of 221 institutions have applied for these grants.

In summer of 2002, a group of faculty and administrators, who were concerned about the status of women faculty, at North Dakota State University came together to prepare a proposal for the ADVANCE IT program. In order to increase the participation of women at all faculty ranks, by changing institutional culture and practices, this ad hoc committee collected and analyzed institutional data and conducted several surveys to document the present climate and understand institutional barriers to women's success. The committee researched extensively relevant literature and best practices developed and/or adopted by ADVANCE institutions. The committee met monthly to discuss goals and strategies for achieving institutional transformation through recruiting, retaining, and advancing women, particularly in the traditional science and engineering disciplines at NDSU.

In this paper we will discuss how climate at NDSU changed between 2002 and 2007. We will describe the initiatives that were implemented at NDSU as a result of an ad hoc committee's active role in evaluating conditions and programs to enhance the status of women. We will also discuss the effect of the NSF ADVANCE program in NDSU's institutional transformation even though NDSU has not received an ADVANCE grant.

## **Introduction**

In summer of 2002, a group of faculty and administrators (FORWARD—Focus on Resources for Women's Advancement, Recruitment/Retention, and Development) who were concerned about the status of women faculty at North Dakota State University (NDSU) came together to prepare a proposal for the NSF ADVANCE Institutional Transformation (IT) program. In order to increase the participation of women at all faculty ranks by changing institutional culture and practices, this ad hoc committee collected and analyzed institutional data, and conducted several surveys to document the present climate and understand institutional barriers to women's success. The committee extensively researched relevant literature and best practices developed and/or adopted by ADVANCE institutions. The committee met monthly to discuss goals and strategies for

achieving institutional transformation through recruiting, retaining, and advancing women, particularly in the traditional science and engineering disciplines at NDSU.

In this paper we will discuss the changes FORWARD initiated at NDSU between 2002 and 2007. We will describe the initiatives that were implemented at NDSU as a result of FORWARD's active role in evaluating conditions and programs to enhance the status of women. We also will discuss the effect of the NSF ADVANCE program on NDSU's institutional transformation, despite not receiving an ADVANCE grant, as well as some of the obstacles we faced while implementing our initiatives. Our goal is to provide helpful suggestions to institutions seeking transformation, suggesting that even institutions not seeking NSF ADVANCE funding could benefit from awareness of that program's guidelines—guidelines that effectively pave a path for institutional change.

### **NSF ADVANCE Institutional Transformation Program**

The goal of the National Science Foundation's ADVANCE program is to increase the participation of women in all academic faculty ranks and administrative positions. This is a foundation-wide program that provides funding for comprehensive and sustainable institution-wide transformation of practices, policies, and climate in relation to an institution's ability to recruit, retain, and advance women faculty in science and engineering.

Since its inception, NSF has awarded a total of 32 ADVANCE IT awards. The first round of the program in 2001 had seventy-six applications, and nine institutions were awarded grants. In 2003, for the second round of the program, seventy institutions applied, and ten received an award. The third round of the program funded nine institutions out of seventy-three applications in 2006. Typically awards are for five years, with large award sizes of about \$3.75 million per year. The last funding cycle was in 2007, and NSF expects to announce the fourth round institutions in spring of 2008.

The program solicitation specifies key components of a research proposal and the kind of institutional transformation NSF seeks to fund. The institutional transformation is required to be data-driven and expected to increase the participation of women faculty in science and engineering disciplines. Proposals are expected to build on existing research findings as well as ADVANCE funded institutions' results. A vital element of the program is continuous monitoring and assessment of activities. A comprehensive management plan and a clear commitment from the administration are necessary for the kind of results-oriented permanent institutional transformation NSF is interested in funding. Finally, ADVANCE funded institutions are expected to serve as exemplars for other institutions that seek to increase representation of science and engineering women faculty. As such, NSF challenges proposers to develop a dissemination plan that not only contributes to the research base but widely shares best practices.

### **History of NDSU FORWARD**

Currently, at NDSU, FORWARD provides the momentum for addressing challenges regarding female science and engineering faculty. The precursor to the FORWARD group was the "ADVANCE project group" established in 2002 by the Dean of Engineering & Architecture for the purpose of writing a proposal to NSF's ADVANCE IT program. While preparing the grant proposal, we realized that the scope of the problem was larger than expected. We also recognized

the need to examine existing data, gather experiential information from women faculty, and identify useful but previously uncollected data related to the issue. We explored the literature in gender and organizational life as a resource for developing our first ADVANCE proposal, and at that time we adopted FORWARD as our name.

The FORWARD group included the Provost, the deans of Science & Math and Engineering & Architecture, faculty from each college, including two women department chairs, the Director of Women's Studies, the Director for Equity and Diversity, and staff from the Office of the Vice President for Research, Creative Activity, and Technology Transfer. While our proposal was not funded (2005), we wanted to sustain the momentum and the sense of community we had gained while collaborating on the project. Vowing to continue our work, we developed a strategic plan. Under the auspices of FORWARD, we continued working to offer and implement data-driven solutions to institutional challenges that limit NDSU's ability to recruit, retain, and advance women faculty.

## **Challenges**

Early on, FORWARD identified five challenges that NDSU faces in recruiting, retaining, and advancing science and engineering women faculty. These challenges were identified through a number of climate surveys and analyses of institutional data, and literature in gender and organizational life.

First, NDSU has a chilly climate for women faculty, and there is a significant difference in the climate men and women experience. Williams' (2004) findings that systematic gender bias and stereotyping create an unwelcome climate for women, describes the climate for some at NDSU. Women faculty at NDSU are significantly less satisfied than their male counterparts in areas of climate, nature of work, and balance of career and family. Areas associated with greater attrition of women faculty include stress based on subtle or overt discrimination, work-related stress, stress due to time pressure, lack of personal time, difficulties in departmental communication, conflict with a direct supervisor and conflict within the department, and other reasons, including climate-oriented explanations such as isolation and being ignored.

The second challenge we face is that there are too few women in science and engineering applicant pools. Even though we interview a greater percentage of women faculty applicants than are in initial pools, and generally hire at a higher percentage, we still do not approach hiring the percentage of women available in the pipeline.

NDSU's third challenge is that retention of women faculty is low in science and engineering disciplines and overall. Although the numbers of women have increased at the assistant level, NDSU has not consistently retained these women. However, NDSU is poised to promote a large number of women (science and engineering, and all fields) in the next five years if we can improve our retention rate. Additionally, there is dramatic imbalance of tenured men to women, which creates gendered departments within a gendered institution (Acker 1992) and leaves some women feeling isolated and vulnerable.

A fourth challenge is the limited number of women advancing to full professor ranks in the science and engineering disciplines and overall. Despite years of increasing success in hiring women as assistant professors, the number of women full professors has not increased significantly. The over-representation of male faculty at the highest ranks reinforces the concept

of a gendered institution and contributes to differences in the perception of climate for women faculty and for women faculty of color.

Finally, there are few women in academic leadership roles at NDSU. The limited number of women in major administrative positions has huge implications because there are few female role models for women faculty interested in career advancement. This lack may contribute to a climate in which talented women faculty leave because they do not see potential for career growth at NDSU.

### **FORWARD and Institutional Transformation Efforts at NDSU**

Despite these significant challenges, FORWARD members have moved from seeing ourselves as a group seeking funds from an institutional transformation grant to a group actively working toward institutional transformation. Despite not being funded for our ADVANCE grant application in 2006, FORWARD employed strategies provided by NSF funding guidelines to set into motion changes that have had an impact on the broader institutional climate. The ADVANCE program solicitation helped us initiate and plan for change by requiring us to carefully consider the following components:

1. Employ evidence of data driven decision-making
2. Develop a program built upon existing research findings and past ADVANCE institution results
3. Commit to continuous monitoring and assessment
4. Adopt a comprehensive management plan
5. Demonstrate a clear commitment from administration

As we began to collect data, develop relationships with upper administration, and devise a comprehensive management plan, it became clear to us and to NDSU administrators that many of our goals required institutional will, and commitment to success. We were able to separate those activities leading to change that required outside funding (usually research and new programs) from those that simply required policy changes or reallocations of present resources and attention. By developing a strategic plan for those changes that were possible, and sharing that plan with administrators, we were able to achieve the following:

1. Conducted research on the effects of institutional policies and practices:
  - Initiated systematic institutional data collection and analyses related to gender on the NSF's 12 indicators.
  - Conducted several research studies on gender and current/recently resigned NDSU faculty.
  - Planned, wrote, and submitted an NSF ADVANCE proposal in 2005.
2. Worked to improve the campus climate for women:
  - Held a teleconference for NDSU deans and department chairs/heads on gender-related issues on campus. Three NSF-funded ADVANCE institutions participated.
  - Participated in interviews for all upper administrative searches, providing feedback to search committee chairs.

- Developed a comprehensive faculty extended leave policy and began to formalize and standardize family leave procedures.
  - Held weekly meetings between the President and key members of the FORWARD group.
  - Recommended and developed training for all search committee chairs.
3. Worked to improve institutional structure:
- Conducted a childcare needs assessment study resulting in recent administrative provision of additional childcare facilities for faculty and staff parents.
  - Launched a pilot lactation facility and collaborated with Facilities Management to install diaper changing stations in every building on campus.
  - Created a project website (<http://www.ndsu.edu/FORWARD>).

These activities resulted in the adaptation or creation of several important institutional practices. The two Deans in the FORWARD group meet regularly with the women faculty in their respective colleges and are now providing extra monies to bring an additional woman who is among the top 10 job applicants for on-campus interviews. Since 2006, the Provost has required search committee chair training and this year began to require a diverse candidate pool before moving forward with interviews. The institution will begin systematic online exit surveys and interviews with an outside consultant of all faculty leaving the institution.

FORWARD's work and the attention it has brought to issues important to women faculty at NDSU correlates with the change that has occurred in the percentage of women tenured faculty. Between 1992-93 and 2000-01, eight years during which we might expect a cohort of women to have become tenured and promoted, there were still only 18 associate and 7 full professors, representing no change at the upper ranks. However, between 2000-01 and 2007-08 the number of associate professors more than doubled in science and engineering departments (Table 1).

Women Faculty	1992-93			2000-01			2007-08		
	Assistant	Associate	Full	Assistant	Associate	Full	Assistant	Associate	Full
Science and Engineering	10	2	2	16	3	3	32	8	4
ALL	41	18	7	50	18	7	72	30	9

Table 1. Number of women faculty

Between 2002 and 2007, the percentage of tenured women faculty has nearly doubled—risen from 4.5% to 8.9%, which may be attributed in part to FORWARD's work. Although this percentage of tenured women placed NDSU the second lowest in AAUP's 2006 Faculty Gender Equity Indicators study, several science and engineering departments (computer science, mathematics and engineering departments—industrial and manufacturing, agricultural and biosystems) now report a higher percentage of women faculty than the national average as summarized in Table 2 (Gibbons, 2006; Nelson, 2005).

Science and Engineering Departments	Percent Women Faculty	
	National	NDSU
Civil Engineering	12.6	7.7
Electrical Engineering	9.8	6.3
Mechanical Engineering	8.5	8.3
Industrial & Manufacturing Engineering	15.9	22.2
Agricultural & BioSystems Engineering	12.0	12.5
Chemistry	12.1	6.0
Mathematics	8.3	20.0
Computer Science	10.6	22.2
Physics	6.6	0.0
Sociology	35.8	33.3
Psychology	33.5	20.0
Biological Sciences	20.2	18.8

Table 2. Comparison of percent women in science and engineering departments at NDSU and nationally

### Using ADVANCE Program Guidelines as a Framework for Effective Change

As early as 2002, FORWARD began working toward our initial Institutional Transformation grant application. Although we worked together toward a single goal, we quickly realized that the ADVANCE program solicitation laid a framework for not only requesting funding, but for institutional change beyond the grant proposal. This framework offers potentially useful strategies for other institutions seeking institutional change leading to the recruitment, retention, promotion, and advancement of women faculty. Here is how these requirements shaped FORWARD's ability to affect change at NDSU.

#### *Data driven decision-making*

The ADVANCE program's focus on data driven institutional decision-making offers a model for universities interested in institutional change. For NDSU FORWARD, collecting institutional data enabled us to describe the challenges women faced on our campus and develop programs to meet our specific challenges. Committing to collecting and sharing data for decision-making was the first step in meeting the other four ADVANCE program requirements. For example, we were able to capture a big picture of the institution, climate, and equity through our ability to compile data from a rich variety of sources: through institutional mechanisms, through our own studies and surveys, and from instruments developed outside the institution—for example, the COACHE survey.

Much of the information we began compiling was already being collected by other groups on campus; FORWARD simply brought these data together. Our Office of Equity and Diversity collected information on pools and hiring; the Provost's Office gathered data on tenure and promotion; the Office of Institutional Research and Analysis compiled information on salary equity and commissioned outside studies such as COACHE; and the President's Diversity Council collected climate survey data. Despite the fact that our institution already collected a wide range of information relating to equity and diversity, that information was not housed

together, nor analyzed in relation to other data in order to provide a range of perspectives on the same problems. Using these data together we became more aware of some of the information our campus was not collecting: 1. Undertaking systematic exit interviews with faculty who had left the institution about their experiences; 2. Studying allocations of space for labs, and time at rank data (from NSF's 12 indicators toolkit). We undertook our own qualitative study, hiring an outside researcher to interview faculty who voluntarily separated from the institution over the last five years, and creating our own survey on climate and satisfaction for both faculty who remained at NDSU and those who had left.

The ADVANCE program's requirement for data collection and solutions based on said data helped FORWARD begin to act as a clearinghouse on campus, compiling and disseminating information on gender in the institution. The importance of data and FORWARD's ability to collect it, allowed FORWARD to shape many discussions of gender issues on campus. Moreover, a working knowledge of those data put FORWARD in a position to assert an active agenda for change through suggesting programs and policies that responded to specific, local problems; developing opportunities for reverse mentoring through having the information and credibility to be heard by upper administrators working on these problems; and maintaining relationships with other units on campus who need and want the information we have collected, compiled, and analyzed.

### *Use existing research and past ADVANCE institution results*

In addition to collecting extensive data on our own university's particular situation, the ADVANCE program's requirement that proposed solutions show an awareness of previous work at ADVANCE institutions and existing research enabled us to make two very important moves that increased the credibility of FORWARD's work on our campus. 1. We were able to compare local statistics and data to national numbers and contextualize the severity of the problems our institution faced. For example, when the 2006 AAUP study on Gender Equity placed our institution second from the bottom of doctoral granting institutions in tenured women, our university took notice. We were able to quickly build upon this notice by offering other comparative data, to describe the gendered nature of our institutional structure. 2. We were able to offer potential (but data driven) solutions to problems, because we were so immersed in the literature of other ADVANCE programs. For example, at one meeting with the university's president, members of the FORWARD team were suddenly asked what they proposed as a university response to recruiting, retaining and advancing women in science and engineering and across campus. We were able to articulate a range of solutions offered at other institutions facing similar problems and readily follow up the meeting with specific examples gleaned from the research being carried out at ADVANCE institutions.

The research undertaken at other ADVANCE institutions is carefully documented and well-disseminated for easy access by institutions such as ours seeking institutional transformation. This information is useful far beyond seeking a grant for transformation, as it can help institutions by offering a well-researched path toward change.

### *Continuous monitoring and assessment*

After beginning to explore institutional transformation based upon data, it became clear that our university needed to develop processes for continuous monitoring and assessment. Although NDSU has not been awarded an ADVANCE grant, the university has recognized the need to collect information on institutional change and the success of a variety of new policies and practices by monitoring the 12 categories of the NSF indicators. The Office of Equity and Diversity has taken on this task, as well as the work of formalizing the collection of information on hiring pools, interviewing, and hiring. Moreover, we have institutionalized the importance of regular exit interviews for employees voluntarily separating from the institution to help us retain better data on faculty retention.

### *A comprehensive management program*

The fourth NSF requirement is that proposals need a comprehensive management program, logically because if management is not thought through, good ideas do not see the light of day. The first time NDSU submitted its ADVANCE IT proposal, we had not considered thoroughly how the program would operate day-to-day. Therefore, since submitting the first proposal, we spent considerable time formulating how we would implement and facilitate a more comprehensive plan. We did so by developing a strategic plan for FORWARD, including both goals that need funding and goals that could be reached without it. As we contemplated each goal, we thought through how, who, and when they would be implemented. ADVANCE institution management plans were instructive, as were helpful in-depth discussions with upper administration. This exercise helped create a management plan for our recent proposal, but it also helped us maintain momentum for institutional change that does not need external funding to continue. We recommend other institutions undergo a similar process to develop their management plans.

### *A clear commitment from administration*

NSF ADVANCE suggests that applicants for its grants demonstrate a clear commitment from administration. This demonstration is essential in that NSF undoubtedly does not want to invest its money into a program that could not sustain itself without a full commitment from its leaders. NDSU worked on obtaining such commitments in a variety of ways. First, the impetus for applying for an ADVANCE grant in 2002 came from one of the co-authors of this essay. She heard about the grant program at a WEPAN conference, and asked the Dean of Engineering & Architecture to consider gathering a group of people to begin discussing the possibility of drafting a proposal. The initial group included these two individuals in addition to the Dean of Science and Math, the Director of Women's Studies, and several other women faculty members in science and engineering. After meeting over the course of a year in preparation for our first grant submission, both deans were committed fully to increasing participation of women faculty in their colleges, playing an active role in proposal development.

Second, FORWARD decided that another way to gain a clear commitment was to involve the Provost/Vice President of Academic Affairs in our efforts. The Provost at NDSU is a scientist, and showed immediate interest in the project. He participated in conference calls with NSF ADVANCE, assisted in our institutional data collection, and regularly met with the FORWARD



team to keep abreast of our discussions. In the process of drafting our proposal, his participation was critical as he helped set reasonable goals and made financial commitments as we proceeded (e.g., commitments on sustainability, commitments for non-science/engineering faculty).

The Provost's involvement not only made him commit to the project, but he also conveyed updates about our work to the President's Cabinet. As a result, the President wanted to learn more about what we were doing; meetings between FORWARD members and the President yielded a strong commitment from the President. These commitments are especially important when seeking unfunded institutional change. Creating a dialogue with administrators concerning the gender-related issues women face on campus is essential in solving gendered problems. But beginning this dialogue requires that each of the other four points are covered, for it would have been very difficult for us to secure upper administrative support without having done our research: compiled institutional data, studied best practices from ADVANCE institutions, offered a comprehensive management program, and focused on data-driven solutions. All of these factors helped our team develop the credibility to promote specific kinds of change at the institutional level.

We recommend other institutions follow a similar path in gaining a clear commitment from their upper administration. It is important to include administrators from the start, encouraging their active engagement, and, as stated above, creating strong relationships through reverse mentoring. It is essential that groups working for change adopt a model of working with the system to create change, and not against it. In this manner, full support from all appropriate administrators ensures workability of your initiatives in the short term and sustainability in the long term.

### **Surviving Inevitable Pitfalls**

The changes FORWARD has initiated over the last six years have not occurred without some obstacles. First, whereas data-driven research possessed credibility, particularly with administrators, individual members of the university community often had counter-experiences that disputed the data. In other words, in campus discussions when FORWARD members presented research results or lead discussions about the November 2007 Chronicle article, faculty in certain departments argued, for example, "I don't experience that in my department," or "This article ignores the good work in my department." Some individuals critiqued the Chronicle and FORWARD's methods of data collection.

FORWARD's response to the skeptics has been one of caution. We urge individuals to consider that even if the climate or proportion of women faculty is good in their departments, it does not mean that everyone on campus has the same experience. Both qualitative and quantitative data collected internally, as well as external survey data and investigative articles suggest that NDSU faces challenges. Although it is good that some individuals perceive their situation to not reflect the data, it is not wise to ignore the voices of women who are experiencing difficulties.

The second challenge FORWARD faced was incidences of "horizontal violence." According to Funk (2004), horizontal violence occurs when members of disenfranchised groups attack each other. Initially, when the President of the university asked that the three of us meet with him to discuss FORWARD's efforts, some women faculty members were angered, claiming that we did

not represent all women faculty. Unfortunately, at that point, he decided to temporarily cease our weekly meetings. Later, when one of FORWARD's members did not find her name as project leader in an early draft of the proposal, she lashed out at group members who were on the writing team. At the latter stages of the grant writing process, other individuals wondered why we were not working for the benefit of all NDSU women, including staff, why non-science and engineering women were not included in the proposal, or why they were not asked to be on FORWARD.

Although members of FORWARD expected some disagreement within the campus community about how to solve the problems identified through analysis of institutional data, we were surprised (and honestly, a bit hurt) that the most vocal critics of our efforts were other women. However, when we consider Funk's argument about horizontal violence, that it is a way in which disenfranchised groups can express their anger and dismay at their powerless situation against those who are not in positions of power over them, this behavior becomes less surprising. For example, women who have felt consistently unheard or unrepresented by male colleagues may feel doubly hurt if they feel the same invisibility with their female colleagues. But because there is no perceived power difference, they may be more likely to express anger, and perhaps misdirected anger, at other women. Powerlessness can lead to isolation and intense, angry responses. A way of responding to these situations is to try to understand that this behavior is expected, rather than unexpected, and working to better share information and include as many people as possible to begin to diffuse misdirected anger.

The final challenge we continue to face is that, although FORWARD has stimulated much change on campus, there is a limit to what we can do without additional resources. The changes that have occurred cost little money (e.g., changing tables, extension of childcare facilities), have been policies in which there has been little political and no monetary cost, or have consisted of meetings to bring awareness to and discussion of the issues. Whereas all of these changes have been beneficial, there has been little to no financial burden on the university as a result. We agree wholeheartedly in the aim of the ADVANCE institutional transformation program, that having significant resources to address changes in structure is key to full and complete transformation.

## **Conclusion**

NDSU FORWARD presents a unique case study for other institutions desiring to improve their recruitment, retention, and advancement of women faculty, particularly, but not exclusively in science and engineering, and without the aim of substantial grant funding. Using the key components that NSF ADVANCE seeks in its proposals, FORWARD has worked since 2002 to make improvements for all faculty women on campus. As a result, changes in policy, attitude, and outlook have begun to take place. Our hopes are twofold: we hope the process we have outlined in this paper can be helpful to institutions just beginning the process of self-examination and reflection, and, selfishly, we hope to earn the status of NSF ADVANCE institution so that we can make even more meaningful changes at NDSU.

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