

The NSF-ADVANCE Program and the Recruitment and Retention of Women Engineering Faculty at New Mexico State University

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Recruitment and retention of women engineering faculty has become an increasingly important issue as baby boomers hired in the 1970s and early 1980s have begun to retire. In general, higher education has difficulty competing with the lucrative salaries, benefits, and working conditions offered by industry, which is especially the case with engineering. Concern for the professorate has led to a number of programmatic efforts at the National Science Foundation (NSF) to improve access to the professorate by minorities such as the Alliance for Graduate Education and the Professorate program and the Bridges to the Doctorate program that is an add-on to the highly successful Louis Stokes Alliance for Minority Participation Program. To increase women's participation in the professorate, the NSF developed the ADVANCE: Institutional Transformation Program, which intends to increase the recruitment, retention, and advancement of women within academia.

Women engineering faculty like women faculty in other science areas are more likely than their male counterparts to have feelings of isolation⁷, to experience a negative professional climate^{3,9} and to face the conundrum of being part of a dual career couple⁹. To complicate matters, women are generally less likely than men to negotiate on important issues such as start-up packages², which means that they may be subsequently less likely to have the resources and supports necessary as a new faculty member to establish the research agenda required for promotion and tenure. As graduate students and early career faculty members, women are less likely to receive the kind of mentoring that is essential to provide a firm foundation on which to base a faculty career¹². Finally, lifecourse issues (i.e., marriage and childbearing) pose constraints upon women faculty while simultaneously conveying advantages to their male peers⁴.

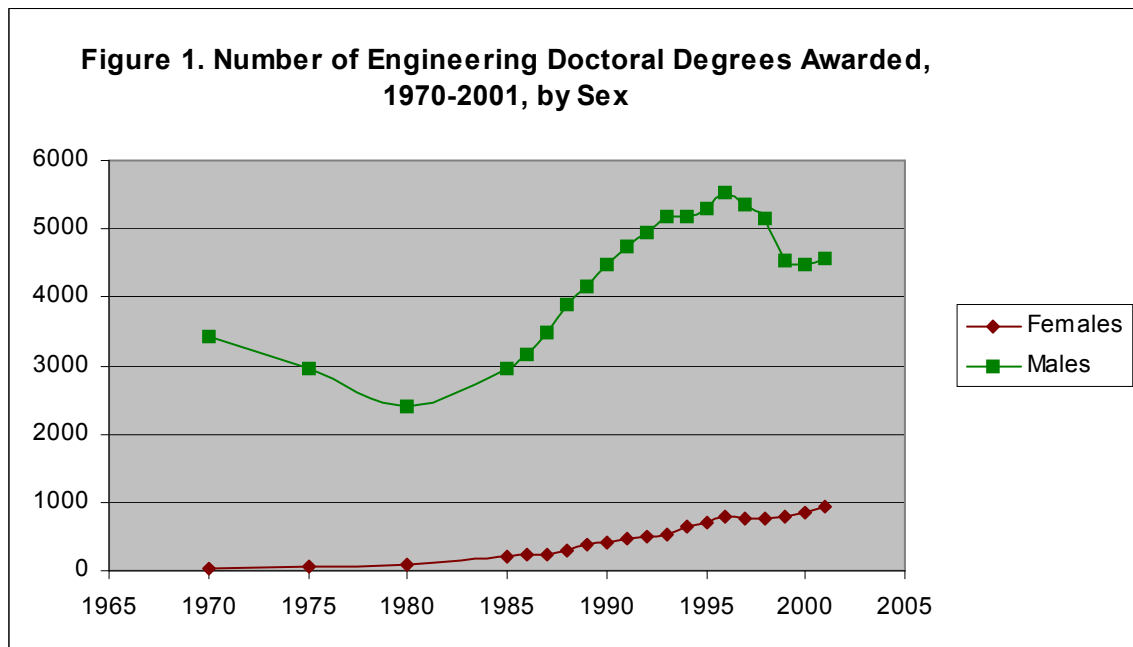
The NMSU ADVANCE Program, funded by the National Science Foundation in 2002, has initiated a number of steps to increase the recruitment and retention of women engineering faculty. At New Mexico State University (NMSU) a mentoring program, advancement training for department heads, and awards to travel to conferences help to reduce the sense of isolation and improve the climate for women. In addition, careful work with search committees, targeted, active recruitment strategies, and enhanced start-up packages provide concrete support for engineering departments' recruitment of women.

Within the context of the literature about recruitment and retention practices that increase faculty diversity, this paper will provide an overview of the steps that the NMSU ADVANCE Program has taken to date to increase the recruitment and retention of women engineering faculty. Short-term indicators of success will be presented but the early "failures" will also be discussed as instructive for others seeking to implement the strategies that are outlined in this paper. The

barriers that have been encountered will also be discussed as well as suggestions for how to surmount these challenges.

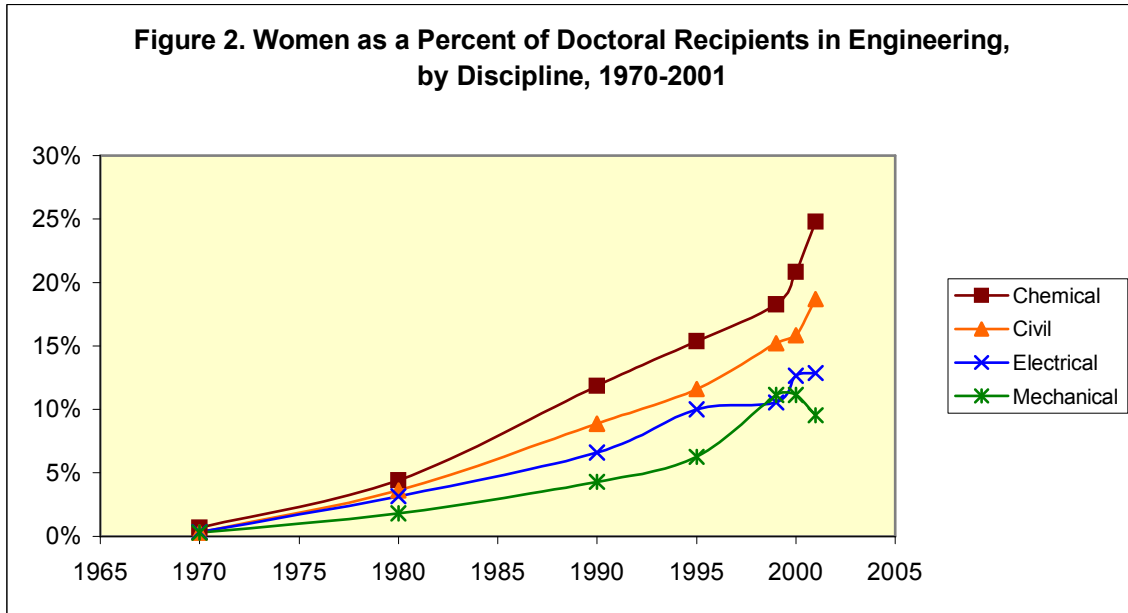
National Context

Women's representation in engineering at all educational levels has increased since the 1972 Title IX amendments to the Educational Opportunity Act. Several factors have operated to increase women's participation rates in engineering, including the removal of overt barriers to women's participation (a direct result of this) and increasing industrial and government pressure on educational institutions to provide a diverse workforce. The graphs in the figures, below, illustrate the changes over the past few decades in women's representation among doctoral recipients of engineering degrees.



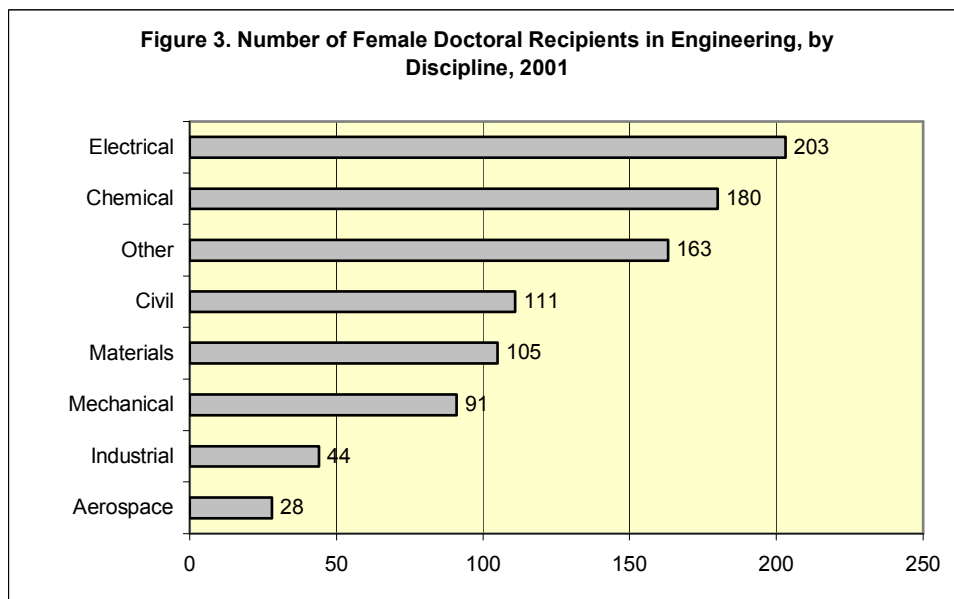
Sources: National Science Board, 2002 and National Science Foundation, 2004.

Figure 1 shows that the number of doctoral degrees in engineering awarded to women has grown slowly but steadily since the mere handful awarded in 1970. By 2001, the most recent year for which data were available, nearly 1,000 doctoral degrees were awarded to women in engineering. Figure 1 also indicates the growth in Ph.D.s to men but the recent drop-off in the numbers of doctoral degrees awarded to men in engineering is also evident.

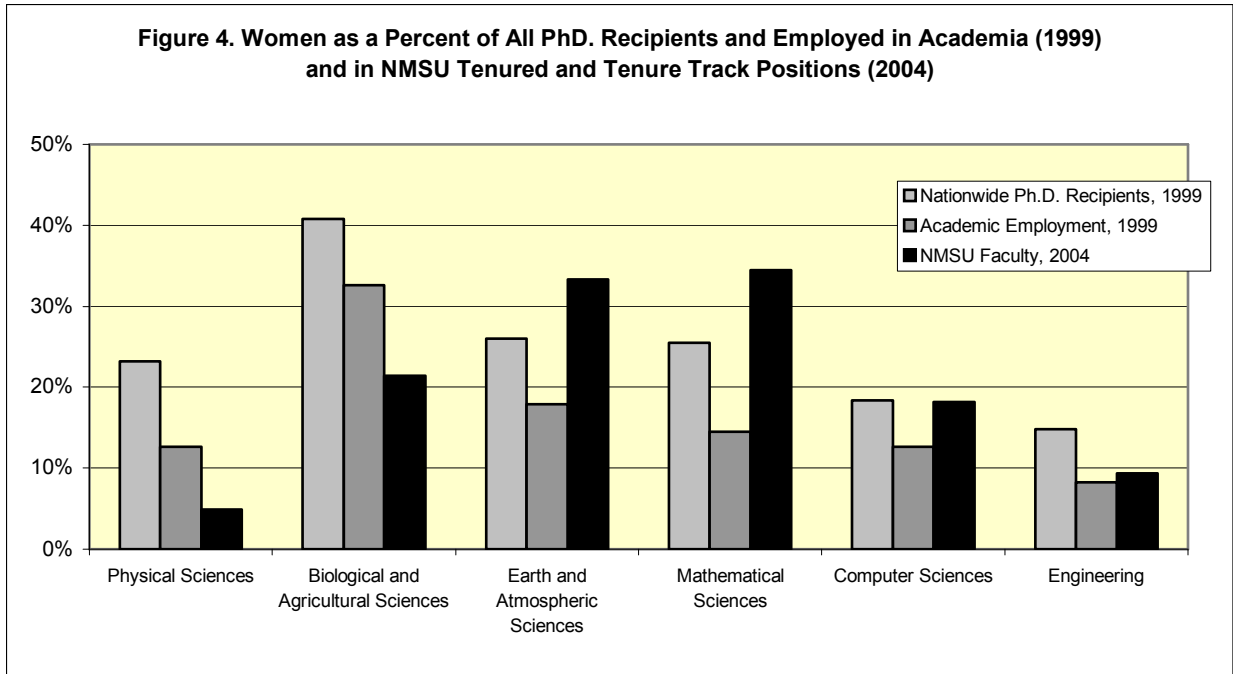


Sources: National Science Board 2002 and National Science Foundation 2004.

Women’s representation among Ph.D. recipients in engineering mirrors their representation at the lower degree levels. Figure 2 indicates the growth in women’s representation among recipients of doctoral degrees in four of the key engineering fields, showing women’s rise to nearly 25% of all chemical engineering degrees, but still less than one in five of all those receiving degrees in three other key areas of engineering: civil, mechanical and electrical engineering. Of course, because of the size of electrical engineering as a discipline, this is the field with the most doctoral degrees to women, as shown in Figure 3.



Source: National Science Foundation, 2004.



Source: National Science Board 2002

Finally, Figure 4 provides a general overview of the “pipeline” for academic employment nationwide and how NMSU’s faculty fits within this context. Women’s share of doctoral degrees is lower in engineering than in any of the other science fields. Across all fields, women were less likely to be employed in academia than their representation among doctoral recipients would suggest, a problem that has been particularly acute at elite institutions¹⁵. Women account for less than 10% of engineering faculty nationwide and NMSU’s employment of women is on par with U.S. academic engineering in general.

Overview of Engineering Faculty at NMSU: 2001 and 2004

NMSU is the public land-grant institution for the State of New Mexico. Located in Las Cruces, NM, the institution has 19,000 undergraduate students and 2,800 graduate students. Engineering and science formed the core of the institution at its founding in 1898 and continue to house the majority of doctoral programs at the Carnegie Doctoral/Research University-Extensive institution. In recent years phenomenal growth in programs in the College of Education and the College of Health and Social Services has put strains on institutional resources, posing important challenges for the College of Engineering which has seen relatively flat (or declining) enrollments in the past decade. The university is a short drive from the U.S./Mexico border with the large maquiladora industry in Juarez, Mexico and the scientific and engineering complex of White Sands Missile Range, therefore, the College of Engineering plays a key role in leading the technical labor force in the southern New Mexico region.

NMSU is a minority-serving (specifically, Hispanic-serving) institution at which Hispanics, American Indians, and African Americans account for about one half of the students. Within the College of Engineering, members of these under represented groups account for more than half of the students. Like many colleges of engineering nationwide, the college continues to struggle with gender equity issues, with women accounting for 17% of undergraduate and 19% of

graduate students in engineering. The College has never had a “women in engineering” program but the new dean is hopeful that the ADVANCE program will be able to continue to assist the college with efforts to recruit and retain more female students (even though this is not a specific focus of the ADVANCE program). NMSU’s science and engineering faculty is predominantly white, with white males accounting for 66% of faculty and white females accounting for 13%. Minority faculty are scarce, with Hispanic and Asian women accounting for just 5% of STEM faculty and Hispanic, Asian, and Black men accounting for 16% of STEM faculty. In a state with 10% American Indian population, there is only one STEM American Indian faculty member (just recruited in 2004). Among faculty and administrators, alike, there is a clear understanding that increasing diversity among faculty is essential to NMSU’s land grant mission.

As a minority-serving institution, NMSU has long had programming in place to address ethnic disparity and “diversity” has traditionally been defined in terms of “ethnic diversity,” with little attention to gender. Two important federally funded programs have been important within the College of Engineering: the Louis Stokes Alliance for Minority Participation Program is in its third five-year funding cycle and the New Mexico Alliance for Graduate Education and the Professoriate program is completing its first 5-year cycle with a possibility of renewal. In addition, there is a university-wide Minority Recruitment and Retention Committee and three ethnic programs offices (Chicano Programs, Black Programs, and American Indian Programs) led by professional directors with staff to provide a range of supports to students and outreach related to ethnic diversity. Efforts that focus on gender equity have not, until ADVANCE, occupied the attention of the institution. For example, there is no women’s center on campus (the one that closed in 1998 had been staffed by a part-time work study student rather than a professional as with the ethnic programs offices) and until the new dean in the College of Arts and Sciences arrived, the Women’s Studies academic program was run by a part-time director (a faculty member) who was given a one-course per year release to do so. In short, NMSU, like many other institutions, has a history of programming that focused on either gender or ethnicity without being attentive to the intersections of both.

Therefore, it was imperative that the ADVANCE program work hard to bridge these gaps and insure that the program respond to the unique issues faced by women of color. The ADVANCE program works closely with the Hispanic Faculty/Staff Caucus and to a limited extent with the ethnic programs offices on programming. The “Minority Recruitment and Retention Committee” has been replaced with a “Diversity Committee,” which will consider gender alongside ethnicity in developing strategies to improve diversity of faculty at NMSU.

At NMSU, the status and position of men and women in science and engineering in general, and engineering in particular is quite different. Men are more likely than women to be at the “top” of the academic hierarchy in tenured, full professor, department head and other high-level administrative positions. Figures 5a and 5b show women’s representation in the College of Engineering at NMSU.

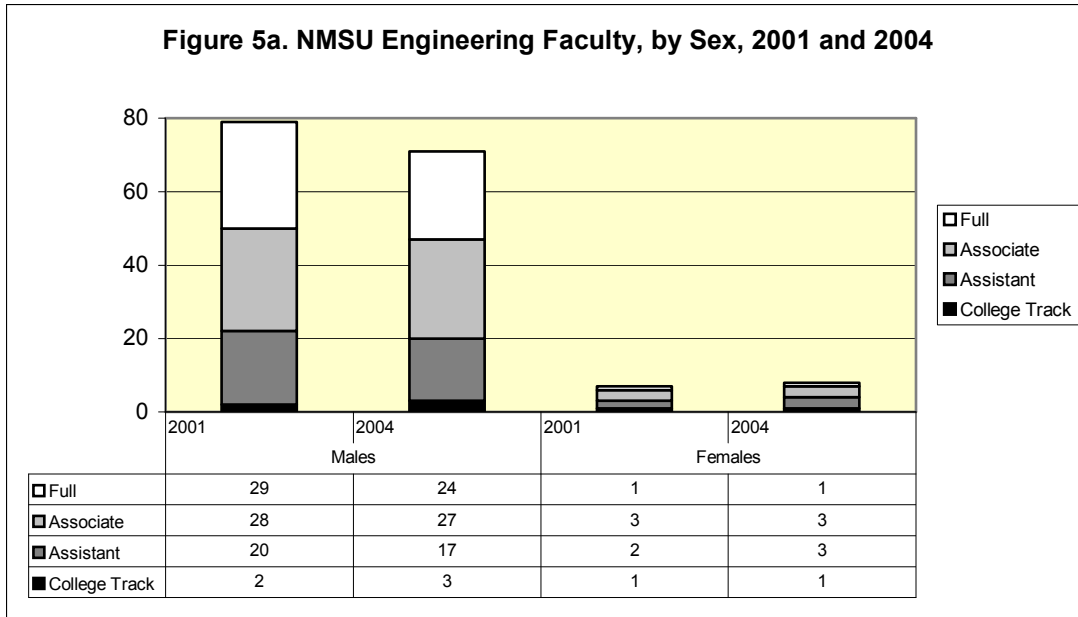
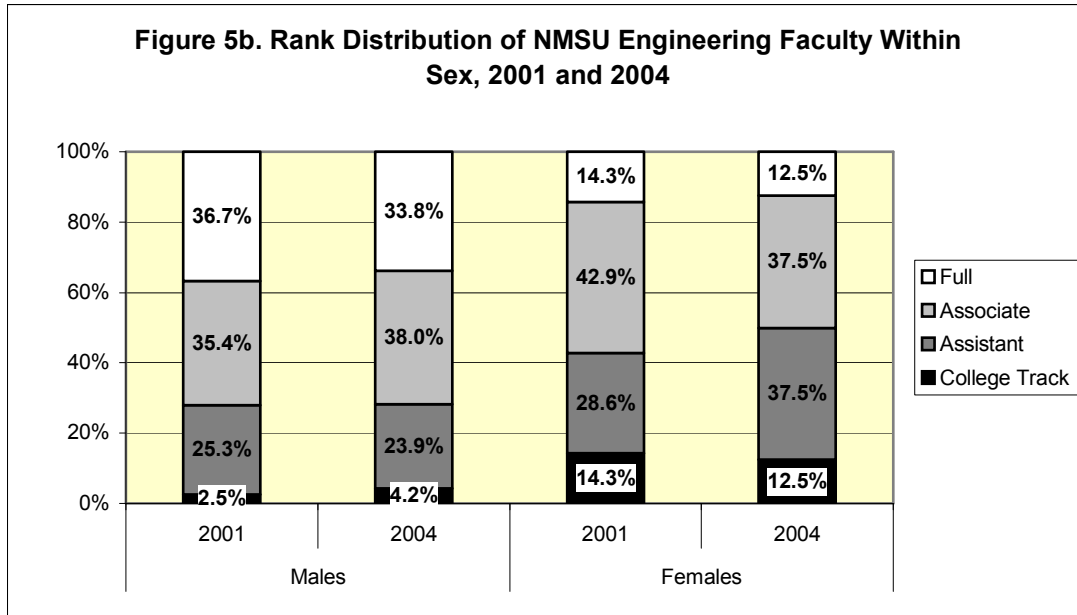


Figure 5a shows the numbers of women and men faculty by rank within NMSU’s College of Engineering in 2001 (prior to the ADVANCE grant) and in 2004, three years after the ADVANCE grant has been in place. Figure 5b shows these same data, but with percentages computed within sex to show more clearly how men and women are distributed differently among the ranks within the College. The College, unlike other colleges at NMSU (most notably, the College of Arts and Sciences) has very few college track faculty members (only 4 in 2004 with one female). Even with the large “wave” of retirements in the 1999-2001 period, more than a third of engineering male faculty are in the highest level—Full Professor—with only one of the eight females at that rank.

College track faculty are responsible solely for teaching and service but not research. They are non-tenure track, but relatively permanent employees of the institution. While the College of Engineering has few of these faculty, other colleges like the College of Arts and Sciences make extensive use of these lower-paid, less prestigious, and more focused teachers who teach an average of four classes per semester. While most of these faculty are women (two-thirds) in science and engineering institution-wide, in the College of Engineering one of the four college track faculty members is a woman.



Recruitment

One common concern raised by faculty in science and engineering when they are asked to recruit a diverse pool of candidates is “there are no women and minorities out there!” Of course, this is an erroneous statement: based on the current data, there are quite a few doctoral degreed women and minorities “out there.” Instead, colleges and universities have been encouraged by diversity experts (e.g., Moody 2004) to use more active rather than the previously common passive recruitment strategies. Of course, in many engineering disciplines, the challenge of candidate availability is more persistent than in the life, natural and mathematical sciences fields, as shown in Figure 4.

Passive recruitment consists of the “old” style of placing an advertisement in the usual disciplinary publication and then waiting for the applicants to send in their materials for review. The only active strategy that some search committees might have used was to call up their acquaintances at other universities and ask if they had any good candidates.

There are many problems with these traditional methods of recruitment when it comes to attracting a diverse pool of applicants. First, people’s social networks tend to be rather homogeneous. So, if a person calls upon people they already know and ask for candidate recommendations, they are likely to attract people that are already like themselves⁶. Second, because their numbers within engineering are quite small, minorities and women in engineering have numerous experiences based on their “token” status³. Tokens find themselves the center of attention in settings in which they are marked “different” from the majority⁶. Without necessarily labeling them as such, engineering women are well aware of how this token status can result in subtle forms of discrimination that impact their work lives and success³. Hence, such candidates are likely to investigate carefully any prospective jobs to look for hints about departmental climate, especially the climate for diversity. Finally, related to these first two issues, women receive less mentoring in engineering doctoral programs than do men⁹. This

means that when they are on the job market, they receive less information about the search and interview process and less guidance about specific jobs that might be suitable once they have completed the Ph.D.

Best Practices in Recruitment

Faculty diversity experts^{5,8} have compiled lists of best practices in recruitment, which include:

- 1) Outreach: Advertise in specialized publications that are read by minorities and women; participate in employment fairs at organizational conferences including those at conferences at which large numbers of women (e.g., Society of Women Engineers) or minorities attend.
- 2) Contact colleagues at other institutions and ask if they have any women or minority candidates completing doctoral degrees in the next few years.
- 3) Ensure minority and women faculty recruits are offered comparable salary and start-up to non-minority men.
- 4) Coach and monitor search committees.
- 5) Monitor the recruiting and hiring processes to ensure that they are transparent.
- 6) Provide dual career couples assistance.
- 7) Provide sufficient financial resources and support for the search, including target of opportunity grants.
- 8) Pay attention to lifestyle concerns of interviewees.
- 9) Cluster hiring: hire more than one woman at a time.
- 10) Hire at the associate rather than the assistant professor level.

Experts agree that it is imperative to begin recruitment of under represented groups early, that is, even before they have completed the doctoral degree using the outreach strategies mentioned above. Active recruitment strategies yield more diverse pools. Also, it should be recognized that when faculty diversity is a goal, recruitment needs to become an on-going process with long-term strategies (such as outreach) rather than the traditional one-year search process that is customary.

Recruitment Strategies Used by NMSU ADVANCE

The ADVANCE Program at NMSU has worked with departments and the institution in implementing many of the above strategies in addition to providing help on outreach (Strategy #1). The ADVANCE Program has partnered with the New Mexico Alliance for Graduate Education and the Professorate (NM-AGEP) to have a presence at conferences attended by women and minority graduate students. The program also sponsored advertising of all openings across many science and engineering fields at NMSU in publications like *Science*, *AWIS Magazine*, and the *Hispanic Outlook in Higher Education*. (AWIS is the Association for Women in Science.) In 2003, for example, the NMSU ADVANCE Program sponsored a diversity luncheon at the American Society of Mechanical Engineers, participated in a half-day panel on diversity (which included Joseph Bordogna, Deputy Director of the NSF), and supported engineering faculty members' attendance at this session as part of their conference attendance. Based on reports from search committee chairs, including those in the College of Engineering, these strategies did yield larger and more diverse pools.

Before discussing the other strategies used by ADVANCE, it is important to note that the work of ADVANCE has been fully supported by the College of Engineering Dean's Office, an essential part of any diversity program. The Dean plays a vital role in making clear to faculty within the college that diversity is an important goal and that they will be held accountable for diversity goals. Specific mechanisms are still evolving with the new dean at NMSU, but he has made clear that he is a staunch supporter of diversity at all levels in the college.

Workshops and coaching of individual departments and search committees (Strategy #4) have taught engineering faculty about how to actively recruit women candidates at each stage of the hiring process. Workshops at which search committee chairs and members from different colleges and departments met each other were also valuable in conveying "best practices" within the institution, especially in navigating the often-complex bureaucratic hiring processes and how best to work with members of the Personnel Department (which has been recently renamed "Human Resources"). The ADVANCE Program has also provided more targeted support, at departmental request (sometimes after a recommendation by the Dean), such as that which was provided in recent searches by mechanical engineering and now in progress by industrial engineering. In both cases, members of the ADVANCE Program staff were invited to meet with members of the search committees and to assist in all phases of the search (Strategy #4) including assisting with making arrangements for candidates' visits (Strategy #8).

At the earliest stage, job ads are now crafted and disseminated to attract a diverse pool of candidates. More faculty are beginning to use the long-term outreach strategies, which are unlikely to result in immediate hires, but will lay the groundwork for later hires. Then, after the ad has been made public, faculty are now calling colleagues and more actively seeking women candidates (Strategy #2). In the current year, the new dean of the college made personal contacts with more senior women to encourage their applications for two department head openings within the college (Strategies #2 and 10).

As candidates come to campus, the ADVANCE program has worked closely with the engineering programs to pay attention to setting up visits that included time with ADVANCE Program personnel and time with other scholars on campus in related areas (Strategy #8). Establishing time with people outside the department, especially people who are not on the search committee, is important because it provides candidates an opportunity to ask someone the "tough" questions that they may feel uncomfortable asking members of the search committee. For example, it is not legal for search committees to ask questions about marital and family status, yet sensitivity to the lifestyles of candidates (Strategy #8) necessitates that such information be ascertained. On the one hand, publications like the dual career brochure recently co-produced by the ADVANCE Programs at NMSU and the University of Texas at El Paso provide one avenue for making sure that candidates are aware of this information without having to ask. On the other hand, by meeting with ADVANCE personnel and others identified by ADVANCE, candidates are able to ask these questions without being concerned about how the search committee will react. Because faculty members still make gendered judgments related to work and family that disadvantage women and advantage men, it is vital that female candidates have a "safe" way of securing lifestyle-related information^{1, 3, 14}.

The ADVANCE Program at NMSU has worked diligently on establishing a dual career couples assistance program at NMSU (Strategy #6). Indeed, so far two engineering male faculty have benefited from these efforts: the program enabled retention of a male faculty member in one department and recruitment of another in a second department. The evidence suggests, however, that these programs will be vital to recruiting women in engineering because so many engineering women—40 percent according to the National Research Council—are married to men who are also engineering faculty.

Last but not least, an important facet of the NMSU ADVANCE program is the use of start-up package enhancement awards to attract female candidates. This feature was incorporated into our program because science and engineering department heads had reported their difficulty in recruiting women and minorities because of the small start-up packages offered by NMSU as compared to our peer institutions. Prior to implementing this feature, we surveyed departments and analyzed institutional data to determine whether or not women were being offered equitable start-up packages, including starting salaries (Strategy #3). We also did this as a way to ensure that the departments used the ADVANCE funds as a true enhancement and did not use these funds to replace funds that would normally have been allocated by the department and college (Strategy #5).

In short, the ADVANCE Program has provided professional development of faculty and administrators in the College of Engineering on best practices in recruitment. The Program has also enabled the College of Engineering to have access to important networks of women engineers—pools of candidates—via ADVANCE participation in professional organizations like the Society of Women Engineers, Women in Engineering Programs and Advocates Network, the New Mexico Network for Women in Science and Engineering, NM-AGEP, and the other 18 ADVANCE Programs nationwide. Finally, ADVANCE has provided concrete logistical and financial support for searches and recruitment of women to engineering positions at NMSU at a critical moment in time.

Best Practices for Retention

Like recruitment, experts offer a number of strategies useful in retaining women and minority faculty members. From the standpoint of programs like ADVANCE, as opposed to specific actions department heads and faculty can take⁸, the following is a subset of such actions:

- 1) Develop a formal mentoring program.
- 2) Provide mentor training.
- 3) Career development workshops
- 4) Provide on campus child-care facilities.
- 5) Allow family leave.
- 6) Ensure leadership positions for women and minorities.
- 7) Develop department heads' administrative skills.
- 8) "Sponsor community-building events for new hires and pre-tenure faculty." (p. 118)⁸
- 9) "Develop a campus culture that is working to level the academic playing field, value multicultural diversity, and build community." (p. 118)⁸

Retention Strategies used by NMSU ADVANCE

The ADVANCE Program at NMSU has undertaken many of these recommended strategies. Foremost, the program has implemented a formal mentoring program for both male and female faculty in the sciences and engineering including mentor training (Strategies #1 and #2). The mentoring program includes a number of community-building events (Strategy #8). In addition, a Faculty Development Committee, supported by the program and comprised of science and engineering faculty members, sponsors a series of career development workshops each year (Strategy #3). The program has also provided training aimed at bringing department heads together to better understand their role as mentors to faculty, administer their departments, and to deal with interpersonal conflicts that arise within their departments (Strategy #7). A new initiative, the ADVANCING Leaders Program provides training to department heads and emerging leaders at NMSU while building communal bonds among these leaders (Strategies #3, #7, #8, and #9). Finally, via the constellation of these strategies, the ADVANCE program as a whole is working with faculty and administrators at NMSU to develop a campus culture of equity (Strategy #9).

The ADVANCE Program has also worked closely with the College of Engineering Dean's Office to educate the deans and department heads about gender equity. With support from the ADVANCE Program, the new dean of the engineering college has made a commitment to gender equity in a number of concrete ways:

1. Appointed two women to chair their departments (on an interim basis) within the college.
2. Attended a conference held by the NSF Engineering Directorate and the ADVANCE program.
3. Is currently participating in a dissemination project funded by the National Science Foundation to produce publications titled "A Dean's Guide to Diversity" and a "Department Head's Guide to Diversity."
4. Has hired a full-time program coordinator to handle K-12 outreach, including specific outreach to girls.

The mentoring program is a centerpiece of the retention effort at NMSU. As mentioned earlier, women are less likely than men in academia to receive mentoring as they progress through graduate school and then assume jobs in academia or industry¹². Women's Studies programs and university commissions on the status of women have long recommended formal mentoring programs to bridge this gap, therefore, many mentoring programs are offered to women only and come to be seen as associated only with women. There are a number of inter-related pitfalls of this point of view. First, men faculty then come to see such a program as an "entitlement" for women as something from which they (as men) are unfairly excluded¹³. Second, as such gender-segregated mentoring programs develop, women are often given ample opportunities to interact in a context where gender is a salient topic of discussion, but men never find themselves needing to confront gender as an issue that has affected their lives, thereby maintaining the oft-cited problem of the invisibility of gender for men. Finally, without men's involvement, especially new faculty men, such a program replicates a "fix the women" approach to gender equity. That is, the underlying idea is that women will advance within the institution only as a result of special seminars and attention to help them fit in better.

Because ADVANCE must institutionalize changes, it was imperative that mentoring become “normative” and not exceptional at NMSU. We had to avoid the pitfall that mentoring would be seen as an appropriate remedy to make up for women’s deficiencies, and, instead, that it came to be seen as a regular, routine part of the academic process. To do so, we ensure that all faculty have access to the program, that new faculty are not merely invited to participate but are partnered with a mentor as a matter of course, and that mentors and mentees receive training on how best to perform these roles. In addition, the program recognizes that both mentors and mentees “get” something out of the relationship: it’s not just about teaching a new faculty member the “ropes” at NMSU, but maintaining the connection between more senior faculty—who may have lost sight of what it was like to be a new faculty member—and a new generation of faculty members. The program emphasizes that this kind of participation is of value to the institution by providing a very modest (\$150) stipend to all mentors and mentees in the program on an annual basis.

There are a few other key features of the ADVANCE mentoring program. First, even though a number of observers have suggested that team mentoring has many advantages, at NMSU, with the heavy teaching loads and competing time demands, we have found that one-on-one pairings are an important building block of the program. The Program Director works with two senior faculty to establish pairings, taking into account all of the criteria and desires expressed by both mentors and mentees on program application forms or discussed with the Program Coordinator. Annual surveys of the pairs have found that most pairs meet at least 3-4 times or more each semester.

These pairings are across departments with an attempt to pair mentees with someone from their own college. Occasionally, however, pairings are made across college lines so that we can best use the talents of the senior faculty who volunteer. Prior to the ADVANCE program, a wave of faculty retirements combined with intense hiring led to an imbalance in the numbers of faculty at each rank—i.e., full professors are “scarce.” Besides providing a context for this larger mentoring program, the ADVANCE Program has been working with departments to establish their own smaller-scale programs so junior faculty receive the college-specific promotion and tenure guidance necessary for success even if the faculty member has been paired with someone outside the college of engineering. Related to this point: there are some mentors with multiple mentees and some mentees with multiple mentors.

Another feature of the program are luncheons—in addition to the training sessions at the start of each academic year—that are held at least twice each semester. At some of these luncheons, special speakers are invited or the luncheon is used as an opportunity for mentoring program participants to simply share information with one another about issues such as how to collaborate on research. These occasions provide a context in which wider community-building can occur. But rather than being a sex-segregated community (as would be the case if we implemented team mentoring exclusively or if we restricted the mentoring program to women), this is an inclusive community in which new and more senior faculty, men and women, come together to share information and meet one another.

Finally, the mentoring program does not focus only on integrating assistant professors into the academic community. All-too-often mentoring programs focus on having a senior professor

guide a junior professor towards promotion and tenure but then fail to deal with the even more complex issue of promotion from associate to full professor. The NMSU ADVANCE Program includes many participants who are associate professors mentoring an assistant professor and who, themselves, are being mentored by a full professor. In addition, faculty and department heads who indicated a desire to explore opportunities and issues associated with moving to an administrative career path have been partnered with key university administrators as mentors.

The new ADVANCING Leaders Program has a mentoring component modeled on this successful mentoring program. The ADVANCING Leaders Program, which was inaugurated this past academic year, brings together faculty members from each of the six academic colleges plus the NMSU Library to develop leadership skills and bonds as a cohort. Each participant has been partnered with a mentor, usually an associate dean or other administrator, to learn more about the issues university administrators experience.

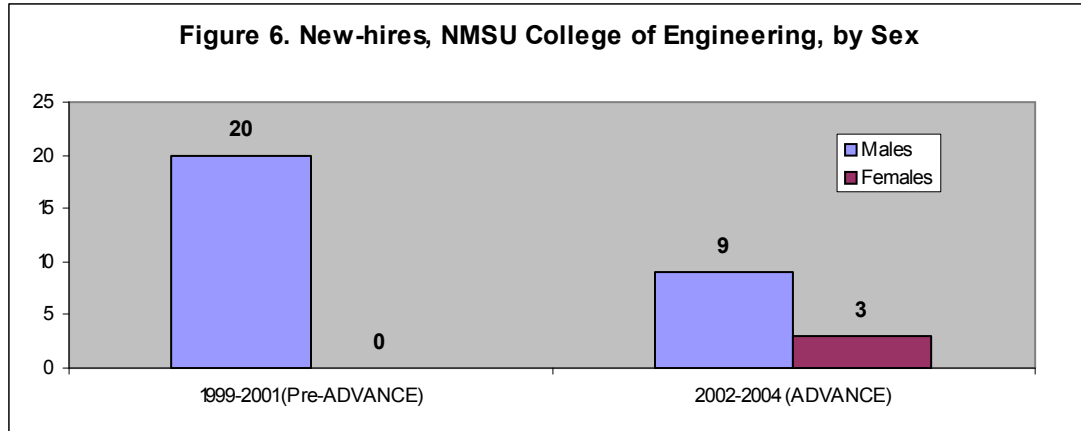
Both the ADVANCING Leaders program as well as the participation of mid-career faculty in the mentoring program seeks to reduce the isolation and uncertainty mid-career faculty often experience. When faculty are on the tenure track, they often keep their nose to the grindstone and work hard to earn tenure and promotion, only to find that once they have achieved these significant goals, they need to set new goals and determine strategies for demonstrating the leadership qualities that are considered paramount in full professors. By focusing on this transition, the NMSU ADVANCE Program hopes to reduce the rate at which productive associate professors leave our institution. Indeed, in looking at the women faculty who have left the institution (in all science and engineering fields) between 2002-2004, only one of the six was an assistant professor and two of the remaining five were moving “up” to positions as dean or associate dean elsewhere.

Beyond the mentoring and ADVANCING Leaders programs, ADVANCE sponsors career development workshops for all faculty, including a series of workshops (two each year) on the promotion and tenure process, which have been co-sponsored with the Provost’s Office and the Hispanic Faculty/Staff Caucus. Attendance averages over 40 faculty members from all academic disciplines on campus with fairly even participation among women and men. Such workshops demystify the process and provide faculty members with a chance to connect with those from other departments and colleges to forge a sense of community.

Yet another workshop series was established for department heads. Prior to ADVANCE, there was no university-wide training for department heads. In many cases, new department heads found themselves responsible for a host of tasks for which they were ill-prepared, with no formal training at the institution. While department heads within colleges often meet regularly, it was rare that department heads from different colleges would have an opportunity to interact with each other. ADVANCE’s workshops have changed this, enabling department heads to come together to share ideas and best practices on topics such as the department head’s role as a mentor, how to evaluate faculty on research, teaching and service, etc. Training on conflict resolution has been provided to department heads. Again, besides the skills training, these workshops have attempted to change the culture of the institution by forging a sense of community among the department heads.

Results: Recruitment

After three years, the ADVANCE Program has had some successes and has learned some important lessons about recruiting women to our university. First, Figure 6 documents the success in recruiting women during the first three years of the program.



In the three years prior to the ADVANCE Program, the College of Engineering hired 20 new faculty members (18 assistant and two associate professors) but no women. The first three years of ADVANCE coincided at a time of moderate hiring activity in the College of Engineering, during which women accounted for one fourth of the twelve new faculty members. In each case, women candidates received start-up enhancement awards from the grant, which had a significant impact upon the candidate's decision to come to NMSU. In one case, a candidate held two competitive offers in her hand and, based on negotiations with the ADVANCE program director, who pledged an additional level of start-up support beyond that which was requested by the candidate's department head, accepted the NMSU offer.

The coaching strategies (Strategy #4) were quite intense for searches conducted by the Department of Mechanical Engineering in the 2003-04 academic year. In the fall of that year, the ADVANCE Program worked one-on-one with the department head and search committee chairs to help them attract a diverse pool. Four women were interviewed for the department's positions and two of these four were made offers of employment. The ADVANCE Program Director met individually with each candidate for at least one hour; the ADVANCE Program Coordinator arranged to have dinner with the candidate plus one or two other engineering women faculty members; and the Program Director attended each seminar given by the candidates. Candidates were generally positive in their attitudes towards the institution and saw the value of the ADVANCE Program, given that they would be the first tenure-track woman in the mechanical engineering department.

However, the department was quite "late" in making its offers to these candidates, so they "lost" these candidates. One candidate would have come had the department made the offer early enough for her husband to accept an offer of employment in the area. ADVANCE program personnel made a number of inquiries to the department search committees, but were told that the process was stalled for one reason or another. Because job candidates contacted ADVANCE Program personnel, we were able to learn that the departmental search committee chairs had not

done an adequate job of maintaining contact with these candidates. In the absence of information about the progress of NMSU's searches, then, these candidates took advantage of other opportunities.

We have learned from this case that the ADVANCE program needs to provide additional guidance to departments that are experiencing difficulties in the later phases of the search process. It is essential for the departments to understand that late offers to women and minority candidates are not going to be successful due to the high demand for these candidates relative to their numbers in doctoral pools each year. It is also essential that search committees do a far better job of keeping candidates informed about the progress of the search because candidates do not assume that "no news is good news," rather, candidates take no news as bad news!

The Department of Industrial Engineering is currently searching for a new faculty member and both electrical and mechanical engineering are searching for department heads. The industrial engineering search committee has been working closely with the ADVANCE Program, which supported industrial engineering faculty attendance at a conference for the purpose of recruitment. The industrial engineering pool of applicants contains about 35% females, far above women's representation in the national pool and the department search committee is in the process of identifying a short list.

Results: Retention

Are the community-building strategies working? This is a difficult question to answer, given that the program has been in place for such a short time. On the one hand, all three of the newly hired women faculty have been retained by the college of engineering, likewise, all of the men who have been hired in this same period have also been retained. Prior to ADVANCE, 10 of the 29 men hired between 1995-2001 left the institution prior to earning tenure (34%) but none of the four women hired during that period left prior to being awarded tenure. In addition, two women within the college were granted tenure. Two women faculty have left the college since the start of the ADVANCE Program. In one case, the faculty member left NMSU to become an associate dean at another university while the other candidate was recruited away by another institution with a lucrative start-up package and salary.

Exit interviews of faculty members who left the institution and interviews about retention with department heads indicate that the issues that the women who left engineering faced were quite similar to those faced by other productive mid-career faculty (men and women) across the science and engineering fields at NMSU. Specifically, it can be quite difficult to secure funds to retool or improve laboratories that may become "dated" as faculty progress through their careers. Hence, mid-career faculty who remain productive within their fields are attractive recruits for other institutions. In terms of gender, as all engineering schools face the challenge of diversifying the faculty, "cherry picking" of such faculty poses special challenges for institutions.

On the other hand, beyond this preliminary assessment, because of how the ADVANCE Program is operating to improve the climate of the institution for all faculty, it is too soon to discern any real programmatic impact upon faculty retention. Instead, it remains to be seen whether the

community building activities that we are sponsoring at multiple levels will result in increased faculty retention or not. As discussed above, community building is a cornerstone of the mentoring program, the professional development workshops, the department head workshops, and the new ADVANCING Leaders program.

The ADVANCE Program constantly evaluates our efforts using both internal and external evaluators. Workshops and the mentoring program are evaluated annually so that continuous improvements can be made. In addition, we employ external evaluators who visit campus, conduct interviews and focus groups, and report on the program. In the most recent program year, 2004, we had a required third-year National Science Foundation Site Visit, during which a team of six scholars knowledgeable about gender equity in academia plus the ADVANCE Program Officer and her assistant visited campus for two days. All of these evaluations have been exceptionally praiseworthy of the program, especially of the mentoring program.

Faculty who have participated in the mentoring program have a high rate of persistence in the program. While our mentoring group events are more often attended by female faculty members, at least one in three attendees is a male. Since the inception of the program 19 engineering faculty have participated in the mentoring program: 12 men, 18% of the 68 current male tenured and tenure track faculty and 7 of the 8 women. In the past year, one of the 8 women left NMSU, so 6 of the 7 women are now active in the mentoring program. Mentors and mentees are forging research partnerships, including an interesting collaboration among four women from four different engineering disciplines, all of whom were involved in simulation research. Indeed, one male associate professor mentoring program participant indicated that he was interested in the mentoring program so that he could get “a more stable and sensible approach to research.”

Satisfaction with the program is evident in comments such as:

“I had a very good mentor who knows what I need and gave me help for my first year as a professor. Many thanks for this program.” (Male engineering assistant professor.)

“I really feel comfortable with my mentor and I would prefer to continue with her. The fact that she is also a female makes it easier to talk about my personal situation in a male-dominated field. My mentor is not in engineering and this makes it easier to share our problems and experiences more openly.” (Female engineering assistant professor)

Again, however, while participants may find the program beneficial, whether the goal of retention is achieved remains to be seen. In addition, faculty members who aspire to careers in administration, such as deans, often need to leave the institution to further these career goals, so in some cases, a “loss” for NMSU is actually a “gain” at the national level for women’s status in engineering.

Conclusions

The ADVANCE Program has had a significant impact upon the NMSU College of Engineering in the first three years of the program. The program enabled the college to successfully recruit three women faculty members following a three-year period in which women had accounted for none of the twenty new faculty members hired by the college.

ADVANCE has also provided the faculty within the College of Engineering with a high-quality mentoring program that has led to productive research collaborations. Indeed, one of the mentoring pairs has received a \$162,000 externally funded grant based on the research partnership that was forged by the program. The ADVANCE program hopes that more such outcomes will occur as a result of the connections that are made within the context of the mentoring program.

Professional development opportunities have also been provided by the ADVANCE Program. These opportunities provide career guidance, leadership development, and skills building to faculty and administrators at all levels at NMSU. In addition, each of these activities embraces development of a diverse community of scholars as a fundamental goal to reduce faculty isolation, thereby increasing the likelihood of faculty retention at NMSU.

While it is clear that the efforts by ADVANCE in the area of recruitment have shown early success, such success in terms of faculty retention is difficult to measure at this time. Our many external and internal evaluations, which enable us to engage in continuous quality improvement of our program, indicate that the program is well received and appreciated by many faculty in the science and engineering fields at NMSU.

In the meantime, we are told often by faculty members that “ADVANCE is making a difference.” Faculty are meeting each other, they are forging collaborative relationships and their sense of isolation is being reduced by the program’s activities. These are all important interim goals and we have many indications that the long-term programmatic goals will be achieved.

References

1. American Association of University Women. *Tenure Denied: Cases of Sex Discrimination in Academia*. Washington, DC: American Association of University Women, 2004.
2. Babcock, L. & S. Laschever. *Women Don't Ask: Negotiation and the Gender Divide*. Princeton, NJ: Princeton University Press, 2003.
3. Frehill, L.M. “Subtle Sexism in Engineering” in Benokraitis, Nijole (ed.) *Subtle Sexism: Current Practices and Prospects for Change*. Newbury Park, CA: Sage, 1997.
4. Jacobs, J. A. & S. E. Winslow. The academic life course, time pressures and gender inequality. *Community, Work and Family* 7 (2), 2004, 143-161.
5. Johnson, L. “Diversity and Hiring.” Workshop presented at New Mexico State University, 2002.

6. Kanter, R. M. *Men and women of the corporation*. New York: Basic, 1977.
7. Massachusetts Institute of Technology. "Report of the Committee on the Status of Women in the Schools of Science, 1999.
8. Moody, J. *Faculty Diversity: Problems and Solutions*. New York, NY: RoutledgeFalmer, 2004.
9. National Research Council, Committee on the Status of Women in Science and Engineering. *Survey of Female Engineering Faculty*, 1999.
10. National Science Foundation. *Women, Minorities, and Persons with Disabilities in Science and Engineering, 2003*. Arlington, VA: National Science Foundation, 2004.
11. National Science Board. *Science and Engineering Indicators, 2002*. Washington, DC: U.S. Government Printing Office, 2003.
12. Preston, A. *Leaving Science: Occupational Exit from Scientific Careers*. New York, NY: Russell Sage Foundation, 2004.
13. Stephan, C. personal communication, February, 2002.
14. Valian, V.V. *Why So Slow? The Advancement of Women*. Cambridge, MA: MIT Press, 1998.
15. Wilson, R. Where the elite teach, it's still a man's world. *Chronicle of Higher Education*. December 3, 2004.

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