

A Characterization of Potential Women Engineering Administrators in Academia

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Abstract--Only 8% of all engineering faculty are women. Far less women in academia are in an engineering leadership or administrative role such as department chair, associate dean, dean, provost, and chancellor or president. The Women in Engineering Leadership Institute (WELI) was one of the programs funded by the National Science Foundations ADVANCE program to help advance women in academia in engineering and science to higher leadership and administrative roles. WELI successfully held three Leadership Institutes for engineering faculty women funded by their grant. The women selected to participate were tenured and held either the rank of associate or full professor. These women were then at a place in their career where they were potential administrators. Although the NSF funding was almost gone after three Institute Conferences and a Summit, the WELI leaders determined that there were many more potential women academic leaders in engineering that could benefit from the Institute. Therefore, in partnership with the Society of Women Engineers (SWE) and the Henry Luce Foundation, the WELI leaders were able to conduct a fourth Institute intertwined with the 2005 National SWE Conference. A major difference from the previous WELI conferences was that there was no funding available to pay for the travel, lodging, and the conference fees. Engineering Deans were solicited to sponsor the travel and SWE/WELI registration for qualified women faculty. An advantage of this requirement was that Deans showed visible support for a woman faculty member to learn more about leadership and administration.

Thirty-two women participated in the conference. Based on a pre-conference survey, a profile of these potential engineering leaders and administrators will be given. The women came to the institute to learn how to balance administration with teaching and research, how to network with women in similar positions, how to avoid excessive stress and workload, how to develop a Plan B for the end of an administrative stint, how to find leadership opportunities, and how to acquire better communication skills. The women described their three most important characteristics of good leadership and the two most important prior experiences a department chair should have. They were also asked how important it was to be a mentor or to have a mentee. Their views on these topics will be presented along with a summary of their demographics, including personality attributes. The basic demographics of these women are compared to the demographics of the participants in the previous WELI conference where the participants travel, lodging, and registration were all paid by the WELI NSF grant. In addition, the paper will show the women's view on the essential or specific elements of the results of efforts in the 1960s and 70s on behalf of women that affected women in engineering in academia and what efforts have fallen short in

terms of present needs and issues for women academics in engineering. The participants also identified a woman that they felt embodied the term leader.

A post-conference survey showed that the women who participated were pleased with the workshop, especially the networking opportunities and the negotiation skills session. Nearly 60% of the participants were more interested in leadership positions and close to 40% were more interested in both leadership and administrative positions. All would recommend the workshop to their colleagues.

This paper should be of interest to anyone working with engineering women faculty, women in engineering programs, and in particular to engineering women in academia who are or should be thinking about taking on a leadership or administration role in engineering academia.

Introduction

The scarcity of women engineering faculty is well documented. Not long ago, the number of women Deans among the 330 some colleges and schools of engineering could be counted on one hand. Now there are nearly 20 women deans in engineering, and this number is increasing every year. However, only 8% of all engineering faculty are women. Far less are in an engineering leadership or administrative role such as department chair, associate dean, dean, provost, and chancellor or president.

The Women in Engineering Leadership Institute (WELI) was originally formed by attendees of the 2000 Women in Engineering Leadership Conference, sponsored by the National Science Foundation. Participants at this conference engaged in leadership development activities specific to women in engineering. Following the conference, many were committed to seeing this development offered to more women. As shown on its website (WELI, 2006) was born with the following mission:

- To provide training, mentoring, and networking opportunities for women engineering faculty in academic leadership
- To provide programs to encourage women engineering PhD students to consider an academic career
- To serve as a clearinghouse for information and data related to women in academic leadership

WELI members began networking and encouraging women both inside and outside the Institute into upper administrative positions. The National Science Foundation (NSF) recognized the commitment of WELI to advancing the leadership of women in the science and engineering academic community by providing funding to support the efforts of WELI. The NSF funding was provided by the Advance Program and the Directorate of Engineering in August 2003 for a period of three years. In fall 2003, a two-hour WELI Workshop was held at the 2003 Society of Women Engineers (SWE) Conference in October in Alabama. See Table 1 (Vance, 2005). The purpose of the workshop of 18 participants was to explore leadership issues in academia for women engineering faculty (Vance, 2005). A four-day Leadership Conference led by women from four universities was held in Utah in November 2003 with 30 participants. The program included media training, legal issues, role of fund raising, and a department chairs panel as well

as a women engineering deans' panel (Vance, 2005). In May 2004, a four-day Leadership Summit was held with 75 participants. The purpose of the summit was to bring together leaders from various engineering organizations and industry to develop an action plan to increase the number of women engineering leaders in both industry and academia. A large part of the summit consisted of working sessions where groups identified nine blueprints for action including Cultural Change, Networking, Training, Mentoring, Incentives to Leadership, External Support, Recruiting, External Marketing, and Rewards and Awards (Vance, 2005). In October of 2004, a four-day Advanced Leadership Conference was held in New York. The purpose of this conference was to provide networking and advanced leadership training for women engineering academic leaders. Thirty-three participants were presented keynote speeches, leadership training, panels of deans and center directors, diversity training, diversity facilitated case studies, an institutional transformation panel, and a fundraising presentation (Vance, 2005).

Date	Event	Location
October 9-11, 2003	Workshop (SWE Conference)	Birmingham, AL
November 5-8, 2003	Leadership Conference	Snowbird, UT
May 2-5, 2004	Summit	Storrs, CT
October 7-10, 2004	Advanced Leadership Conference	Syracuse, NY
April 28-May 1, 2005	Leadership Conference	Cocoa Beach, FL
November 3-5, 2005	Workshop (SWE Conference)	Anaheim, CA

Table 1: WELI Events

At the end of April, 2005, a three-day Leadership Conference was held in Florida with 44 participants, 10 of whom were full professors and 34 were associate professors. The purpose of this conference was to provide networking and leadership training to women engineering faculty who were tenured and held the rank of at least associate professor. Presentations included keynote speeches, media training, department chairs panel, women engineering deans' panel, the role of fund raising and development in academic leadership, alternate leadership opportunities, and negotiation skills (Vance, 2005). This conference is detailed in another paper (Wahid, 2006).

At this point the WELI funding was basically depleted. However, through the sponsorship of SWE and the Henry Luce Foundation, a two-day WELI Workshop was held in conjunction with the 2005 SWE Conference in California. A WELI conference team of six engineering faculty women from six different universities worked with a very congenial SWE staff to make this workshop happen. Of the 38 people attending the workshop (32 participants plus an organization committee of 6), 13 were full professors and 25 were associate professors. The workshop program included a deans' panel and luncheon, media training, negotiation skills, legal issues, and an executive panel (Vance, 2005). Although parts of the conference were sponsored, because the WELI funding was gone, the participants had to fund their own transportation costs, registration for the SWE/WELI event, and housing. Letters were sent to the Deans of all engineering colleges and schools in the nation, urging them to support potential engineering women leaders from their institution. An advantage of this requirement was that Deans showed visible support for a woman faculty member to learn more about leadership and administration.

The deans were told that the costs of this training and networking conference were actually quite minimal relative to the costs of other leadership training conferences.

The value of the WELI Institutes depends largely on the unique networking made available by the attendees of the workshop. War stories and “I wish I had known then what I know now” observations are exchanged by the participants in the sessions as well as during the breaks. Much of the WELI workshops with the experts are interactive, especially in the negotiation workshop where to practice is to learn. In this way, the attendees not only gather information, but gain skills needed for leadership and administration. For more information on the actual programming of a WELI workshop, see Wahid (2006). The last two WELI events were similar in content and breakdown of participants by full professor and associate professor. The primary difference between the Florida and the California Conferences is that the faculty women who attended the Florida Conference had their transportation, conference registration, and lodging all provided by the NSF WELI grant. For the California conference the women faculty had to depend on their dean to provide the necessary funding. In this paper, we will look at who the potential women engineering faculty are that attended the SWE/WELI conference in California. We will also compare them with the women who attended the Florida conference.

Demographics of the SWE/WELI Workshop Participants

All of the participants were asked to complete a pre-conference survey. The survey included their expectations of the conference, demographic information, and assessment information on their view of themselves and others. A summary of these demographics was presented to the participants at the beginning of the workshop to make them feel at ease and to assist networking. The participants were very interested in this information and also found it amusing at times. Thirty of the 32 CA participants turned in pre-conference surveys. In a few cases, a participant did not complete all of the questions, so the sample size varies by question. The average age of the participants was 42.9. They were born in eleven different states and Washington, DC and in eight different foreign countries. In Table 2, we compare the SWE/CA participant demographics with those of the participants in the FL Conference (Wahid, 2006; Nie meier, 2005).

Demographic	FL Conference	CA Conference
Married (%Yes)	69.0	76.7
Have 1+ Children (% Yes)	72.1	63.3
Father Worked Full-Time (% Yes)	95.5	96.6
Mother Worked Full-Time (% Yes)	67.4	56.7
Attended Public High School (% Yes)	88.1	79.3
Received Tenure Within 10 Yrs (%)	88.6	80.0
Type of Institution (%)		
Primarily Teaching		6.9
Balanced Teaching-Research		51.7
Major Research Campus		41.4
Awarded an Educational Grant	58.1	33.3
Time Spent on Women/Girls Engr. Issues (%)	13.6	21.0

Table 2. Comparison of Participant Demographics between the FL and CA Participants

Although the demographics vary some, in general the groups are quite similar in their characteristics. The differences seem to be with a larger percentage of the CA group being married, fewer having children, fewer had a mother working full-time, fewer attended a public high school, and fewer had received their tenure within the past 10 years. A smaller percentage of the participants were from a major research campus, fewer had been awarded an educational grant, but this group spent a larger percentage of their time on women/girl engineering issues. Of the 23 married participants in the CA Conference, 14 (60.9%) were married to an engineer, scientist, or professor/lecturer.

Most of the participants at each of the conferences (89% and 87%) reported that mentoring was important or very important for career advancement in administration while 63% at FL and 57% at CA reported having no mentor. A larger percentage of the participants at CA (77%) were currently a mentor themselves than the participants at FL (59%). The percentage of participants at each conference interested in becoming a department chair was approximately the same (37% and 36%). Table 3 compares the career-related demographics of the Florida Conference participants with the California Conference participants. The largest difference was that 76.7% of the CA Conference were currently a mentor, while only 59.1% of the FL Conference were mentors. This higher percentage of mentors at CA is consistent with the higher percentage of their time spent on women/girl engineering issues.

Aspect	FL Conference	CA Conference
Mentoring Important/Very Important (%)	88.6	86.7
Have a mentor (% Yes/No)	37.2/62.8	43.3/56.7
Am Currently a Mentor (% Yes/No)	59.1/40.9	76.7/23.7
Interested in Becoming Dept. Chair:		
No	27.9	44.0
Unsure	34.9	20.0
Yes	37.2	36.0

Table 3. Comparison of Career-Related Demographics Between FL and CA Participants.

The participants at each conference were asked to rate themselves on 33 personal characteristics. They were asked to rate each characteristic on a scale from 1 to 5, with 1= Low and 5=High. Twenty-eight of the CA Conference participants gave this assessment. It is interesting to note that of the 33 characteristics, these faculty women, all with PhDs in engineering or a related field, rate themselves the highest on loyalty/commitment with an average rating of 4.29/5.0. Commitment is a consistent characteristic for anyone who has earned a PhD degree and especially for women who were a minority among the people earning such degrees. The three lowest rated characteristics were self-confidence (3.32), self-centeredness (2.96), and loneliness (2.44). While to have a low rating in self-centeredness and loneliness is a good thing, self-confidence is not a good thing. Only two of the women ranked themselves with a 5 in self-confidence and three gave themselves a 2. These engineering women faculty, who have achieved a PhD and a faculty position, still lack self-confidence. This is consistent with most research that has been done on women, especially engineering women (Brainard, 1998). It is also interesting to look at the next lowest set of rankings for these faculty women which included

sociability, spontaneity, patience, risk taking, and physical appearance. In physical appearance, only three women judged themselves to be a 5, but there were no ones and only two twos.

The participants described themselves positively (a 4.0 rank or better on average) in several areas: loyalty/commitment, independence, perseverance, compassion, resourcefulness, generosity, initiative, and adaptability. Intelligence/related aptitudes was close behind. The top characteristics for the FL Conference participants were loyal, ambitious, high achieving, with a high degree of autonomy and independence. They also saw themselves as compassionate, energetic, and possessing good interpersonal skills. Among these strong characteristics for the FL participants, autonomy was only ranked a 3.86 by the CA group and the characteristics of interpersonal skills, high achievement, energetic, and ambition were all ranked in the lower half of strong characteristics by the CA group. A listing of the characteristics and the average rank given by the CA participants is given in Table 4. Certainly to go for a PhD degree is in itself a risk-taking achievement and it takes considerable energy. For these women now, however, they did not consider themselves as energetic achievers. They also did not judge themselves to be strong leaders. Although the average rank was down the line, humor, fortunately, was a factor of four or five for 15 of the women.

Personal Characteristic	Average Rank	Personal Characteristic	Average Rank
Loyalty/commitment	4.29	Interpersonal skills	3.75
Independence	4.18	Achievement	3.75
Perseverance	4.14	Energy	3.71
Compassion	4.14	Ambition	3.68
Resourcefulness	4.11	Self-discipline	3.67
Generosity	4.07	Leadership	3.67
Initiative	4.00	Assertiveness	3.61
Adaptability	4.00	Humor	3.57
Intelligence/related aptitudes	3.93	Physical Appearance	3.5
Self-awareness	3.93	Risk Taking	3.46
Creativity	3.86	Patience	3.41
Autonomy	3.86	Spontaneity	3.39
Tolerance	3.86	Sociability	3.39
Perceptiveness	3.86	Self Confidence	3.32
Curiosity	3.85	Self-centeredness	2.96
Kindness	3.79	Loneliness	2.44
Intuition	3.78		

Table 4. Average Rank of Personal Characteristics by Participants with 5=High, 1=Low

Administration and Leadership Perspectives and Values

Since the WELI Conference was about promoting women into leadership positions, it seems reasonable that the participants were asked what they thought were the two most important prior experiences a department chair should have. The responses were very similar to those from the FL Conference (Vance, 2006). The primary categories were: management experience, academic experience with teaching, administrative experience, leadership experience, and have gone through the ranks. Additionally, the CA participants' primary categories included research experience with labs, mentoring experience, and good at working with people/negotiating. The participants were then asked of these important prior experiences, which were the most accessible and the least accessible. The accessible list given included: work with mentors in a

professional society, delegation, vision for the department, being fair, teaching experience with large courses, leading groups (various committees), mentoring experiences, leadership experience, organization and planning, promotion to full professor, assistant department head, demonstrated commitment, good listener, and graduate coordinator. The experiences needed by a department chair that are the least accessible to the women faculty were: conflict resolution, demonstrating a vision, supporter of faculty, ability to implement a vision, experience with tough decisions, demonstrated ability to resolve conflicts, training in dealing with budgets, negotiation skills without traditional politics, managing people, having a good vision, a good research track record, delegating, optimism, lack of emotion, good communication skills, course in Project management, and ability to gain consensus.

A follow-on department chair question was: if you were department chair, name two things that you'd do differently. The following items were given:

- Treat teaching, research, and service loads with equity, transparency, and flexibility
- Set aside time each week to get to know the faculty in the department
- Identify priorities for the department to work together on accomplishing
- Encourage tenure track faculty to develop a strategy for achieving tenure
- Develop a strategic plan to leverage complementary research strengths
- Develop an outreach program to local schools
- Formalize administration duties and give many to department members
- Seek incentive funding to hire women faculty

Sixty-two percent of the participants said that the single prior administrative experience that they would generally look for in candidates for positions at the Dean's level was to have been a department chair. This percentage is similar to the 69% that made this choice at the FL conference (Wahid, 2006; Niemeier, 2005). Twenty-one percent said the single administrative experience they would look for is to have been a Dean or Associate Dean. When asked which single prior administrative experience the members of their department generally would look for in candidates for positions at the Dean's level, the participants judged that 62.5% would want a department chair and 20.8% would look for a Dean or Associate Dean. These percentages are very close to their own choices. However, 16.7% said that the single key prior experience would be a strong research record.

The faculty women were asked to briefly describe two specific things they would like to get out of this WELI Conference. Five primary areas were selected: career advancement, leadership skills, conflict resolution/negotiation/managing people, communication skills/networking, and information on being a good and graceful chair/dean/provost. These areas are similar to the two main areas selected by the FL attendees: career advancement and development of leadership skills (Wahid, 2006; Niemeier, 2005). Balancing administration with teaching and research and time management were two additional areas of interest by several participants.

The attendees were asked what they thought were the three most important characteristics of good leadership. The primary characteristics named were: good communication/people skills/listener, honest/fair/ethical/strong values/integrity, ability to make and implement informed decisions and have a vision. These agreed well with the characteristics selected by the FL

faculty women (Wahid, 2006; Nie meier, 2005). Table 5 summarizes the leadership characteristics.

Identified by 9 or more Participants • Good communicator/Listener/People skills • Honest/Fair/Ethical/Strong Values/Consistency • Ability to make and implement informed decisions/Clear organized thinking • Has a vision
Identified by 3 to 8 Participants • Able to foster consensus/Build team • Organized/Flexible/Able to delegate • Thoughtful/Respectful • Work for good of organization, not self • Good memory
Identified by 2 or fewer Participants • Patience • Thick skin

Table 5. The Three Most Important Characteristics of Good Leadership

The faculty women were asked to rank how important they thought someone's research and teaching record is in career advancement in administration. A rank of 1=Very Important and a 5=Not Very Important. Table 6 shows the outcome of this ranking.

Ranking	% Participants
1=Very Important	30
2	43.3
3	20
4	6.7
5=Not Very Important	0

Table 6. How Important Someone's Research & Teaching Record is in Career Advancement

How does your campus identify and foster administrative leaders? The participants were asked to provide a few examples. The primary examples were as follows: none or not sure it exists (41.7% of participants), participation in key decision making committees of department, faculty, or university (16.7%), top-down approach (12.5%), and encouraging faculty members to attend conferences such as WELI. Other examples were participation in NSF ADVANCE efforts, need to be a "yes person"/compatibility, Faculty Fellows program (temporary administrative position), and bottoms-up approach.

Reflections on Legacies and Leaders

The participants were asked to reflect from their own perspective on the notion of a legacy by identifying results of efforts in the 1960s and 70s on behalf of women. In particular, they were first asked what the essential or specific elements of that legacy are for women in engineering in academia. The answers given most often in decreasing order are:

- Economic independence, confidence, equal consideration for positions, opportunities for women in engineering.
- Women can do anything, it is ok for women to be in engineering, women can reach positions of power
- Inclusion and encouragement of programs to entice women into academic positions
- Providing some strategies to rise (survive), right to presence in engineering

Other examples included:

- Through women studies and statistics on women in engineering the lack of women in engineering became known
- Awareness of “female friendly” or gender neutral examples in class
- Encouraging female engineering professional to mentor younger girls/females
- Tenure clock stop for family and family leave issues
- Some recognition of problems women engineering faculty have faced

The second part of the question asked the participants to identify examples of where efforts have fallen short in terms of present needs and issues for women academics in engineering? The participants answered with the following major examples in decreasing numbers:

- Ability to work part-time without sacrificing research grants or tenure opportunities.
- Continued dominance of traditional white male norms in administration and leadership/”Good ol’ Boys” network in journals and other areas
- Number of women academics is very small/Lack of role models/Have to give up a lot to be a woman faculty member

Additional areas mentioned were:

- Lack of support for women faculty/lack of mentoring of women engineers in graduate school and as academics
- Lack of encouragement of young girls and their families to consider engineering
- Lack of recognition of non-traditional fields in engineering that many women prefer
- Recognition of different expectations of and reactions to female professors by students
- Extra work load for women faculty on committees
- Equal employment opportunities

The participants were then asked to identify one item on a list of concerns or issues which need to be addressed on behalf of women engineers in academia in the next 5-10 years. The three major items were:

- Different model to allow for flexibility in work/family balance/Ensuring a recognition of greater responsibilities that women have in family and social responsibilities
- Advancement and transforming the rules for success/Lack of women at the full professor level to mentor and make decisions/Not having to prove oneself over and over again/Women voices not heard and women feel isolated/Equitable pay/Fair evaluations
- How to encourage young (middle school and high school) women to go into engineering to raise the overall number of women in engineering

The engineering women were asked to select one woman (or women) who, in their opinion, most fully embodies the term “leader” and why. The responses included:

- Hillary Clinton: strong, smart, savvy
- Eleanor Roosevelt
- Emily Murphy (Canada): responsible for women obtaining legal status and the right to vote
- My mother: rose from secretary in US Air Force to chief of Civilian Personnel at one of the largest Air Force bases
- The group of faculty women at MIT: who investigated and reported on biases against women faculty in such an effective manner
- Condoleezza Rice: appealing, strong, gets things done, is generally likeable
- My Aunt Mabel: was caring, but firm; stuck to her values and was fair; she mentored and impacted countless lives
- Nancy Hopkins, Dianne Feinstein, Shirley Ann Jackson: have a vision and a plan; make positive change that is sustainable; less worried about being popular than achieving their goals; Hillary Clinton could be on this list too, especially if she is elected president.
- Dr. Ruzena Bajscy: an extraordinary woman, internationally recognized researcher and leader
- Golda Meir
- Barbara Busse: Dean of College of Communication and Fine Arts at LMU
- Millie Dresselhaus: has been around a long time
- Maria Palmera: Manager at Bell Labs
- Anita Borg: influential and motivating
- Carolyn Meyers: provost at NCSU and now a college president

Finally, the women were asked to identify one item that has been critically important for improving opportunities for women academics in engineering. The two major items were:

- Upper administration encouragement to increasing the number of women faculty and role models
- Upper administration realizes what women engineering faculty issues are important/Implementation to advance women’s careers such as the tenure clock/Support for female faculty work/family balance/Childcare

Other items included:

- Programs to help graduate women and young women academics to establish their careers
- Increasing the number of women in academia
- Media spotlight on women engineers
- Equitable pay, fair evaluation being taken seriously
- Development of more specific criteria for promotion
- Funding opportunities
- Women in Engineering Programs
- Women helping women

Is There Life Outside of Academics?

We conclude this picture of potential women engineering academic leaders with a quick look at their life outside of academics. They were asked about their current interests/hobbies/leisure or recreational activities. Most of them had several interests outside of their research and academics. The interests were quite diverse and included the following in order of number of women who had that interest: hiking (9), reading (9), swimming (6), spending time with the family (5), gardening (5), running (4), traveling (3), backpacking (2), crocheting (2), sewing (2), cycling (2), photography (2), horseback riding (2), and sailing (2). Other interests mentioned were: cooking, learning about other cultures, knitting, baking, church, playing with their dog, soccer, table tennis, yoga, aerobics, outdoors/camping, German folk dance, canoeing, bird watching, hockey, music, and cleaning. Two women listed their only interests as inventions and discoveries associated with their research. One woman faculty member probably summed up the reaction of many faculty women when asked about her outside interests: Ha! Ha!

We were also interested to learn if these women had any artistic/musical talents or inventions/discoveries that they have made. We learned that three enjoyed painting, two played the violin, and two wrote poetry. Other artistic talents included: journaling, guitar, discovering original paintings, music, foreign languages, piano, sewing and knitting, and a percussionist. One woman mentioned her research discoveries. One woman had sold her piano. Others showed their creative talent by making Halloween costumes for her daughter, stating that their musical talent was having musical children, and a great one: making visually stunning desserts. A second faculty woman probably summed up the reaction of many others when she list: Ha!

Analysis

Anecdotal and qualitative findings from the WELI/SWE conference reflect opinions expressed in a number of recent studies carried out among women faculty in SMET disciplines at colleges and universities throughout the nation. Like subjects in the most comprehensive studies, such as those completed at MIT and Princeton, WELI/SWE participants noted the dearth of opportunities for women to acquire leadership training that will prepare them for senior positions like department chair, college dean, etc. (Zakian, 2003; Gibson, 2002). Women in SMET disciplines find themselves at a particular disadvantage because they are so few in number with severely limited opportunities for mentoring by those who understand, and can effectively navigate the particular issues women face.

WELI/SWE participants identified several conditions that hinder the advancement of women academics in engineering departments. They include the persistence of a model of “success” that fails to incorporate women’s experiences, ranging from childbearing and rearing responsibilities (and the need for flexible work schedules and tenure tracks), to alternative management styles. Other examples cited include excessive workloads, lack of institutional financial support for research, and fewer opportunities for advancement because women faculty lack the connections requisite to following traditional paths of success. These conditions are nearly identical to those cited in the aforementioned studies, as well as NSF-funded initiatives, addressed in programs carried out by universities who have received NSF-ADVANCE grants intended 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” (ADVANCE, 2006). For information about ADVANCE programs at American colleges and universities, see, for example, Case Western Reserve University ACES (2005) or the University of Washington, UW Advance, Center for Institutional Change (2005). For a comprehensive bibliography of the vast literature on women in SMET disciplines, see the Women in Science and Engineering Leadership Institute Library (2005). For a complete list of all institutions who have received NSF-ADVANCE grants, see NSF-ADVANCE (2006). Indeed, the obstacles women academics face in engineering (and other disciplines) are now widely accepted as not only pervasive, but as damaging to the academy. In order to redress these obstacles, a group known as the Nine Presidents issued a statement in late 2005, calling for the further development of “academic personnel policies, institutional resources, and a culture that supports family commitments” to ensure “productive career paths for all faculty” (Baltimore, 2005). From the information we collected at the WELI/SWE Leadership Institute, these actions would go a long way toward redressing the inhospitable climate many women faculty in engineering experience at their institutions.

In order to evaluate the effects of the WELI Institutes, surveys have been sent to participants some time after the actual Institutes. One question asks, “Looking back on your experiences at the WELI Leadership Conference(s), what are the most important benefits you received from attending the conference?” The most common answer was “networking.” Thirty-one of the 60 women who were surveyed said “networking” as the answer or included “networking” in their answer. The networking stories helped the participants in learning what they wanted to do and in what they did not want to do in the future. Some of the women said that the conference helped them decide not to pursue administration at this point in their career. Others said the conference helped them learn ways to get things done without being an administrator. One woman appreciated the demystifying of the nature of administrative jobs and activities; the details of how administrative positions are handled, and also appreciated the negotiation training; media training; and a sense of what other institutions are like; all useful data for future negotiations. Another woman mentioned that finding out the “real” story on budgets and supplemental pay was the most useful. One participant decided to start learning leadership skills by watching and thinking the leaders around her and expects to look for an administrative position such as chair in the relatively near future. Several women mentioned that confidence building was a main outcome of the conference for them. “Frank discussions on dealing with difficulty situations in leadership positions” was particularly meaningful for one participant. Although the networking was a plus, one woman said that “the most important benefit was learning the details of what was involved in going into academic leadership....Since so much of this profession is done in closed

offices or during short meetings at technical conferences. It was quite refreshing and informative to hear women discuss issues relating to academic leadership.”

The former WELI participants were asked what leadership activities they had performed as a result of attending the WELI Leadership Conference(s) and how much the WELI participation had entered in their decision to do so. Many of the participants (20) are considering leadership positions and many (25) have taken on added administrative duties since their WELI experience. A few became a Chair or Associate Chair soon after the WELI conference. Each of these women said that the WELI conference solidified their desire to go into administration and gave them added skills to do their job well. Several (11) of the attendees were in administration when they attended WELI. They state that skills learned at WELI have helped them to do their job better. Some women said that the information they received at WELI assured them that administration was not for them, at least at this point in their career. Others have used the skills learned at WELI to become a more effective leader within their department without taking on a specific administrative role. Two respondents said that it was too early to tell what they would do with the WELI information..

A third question asked of the WELI participants was “What was the value to you of the networking opportunities with other women engineering faculty at the WELI Leadership Conference(s)? How has your attendance at the WELI Leadership Conference(s) affected your ability to network with other women engineering faculty?” The answers to this question varied broadly. For many participants (25 of 47), the networking was critical and of great importance to them. For most of the others, while they enjoyed the WELI networking, since the conference they have not followed up on any of the networking. However, several said that if they were to consider being a chair, they would contact several of the WELI people they met and ask for specific advice. Many of these WELI participants mentioned that the email listserv was keeping them in touch somewhat with WELI. Others mentioned that they have invited speakers they met at WELI to come to their university and speak. Others mentioned that they have used the experiences and skills learned at WELI in their own presentations that they have given since the conference. One participant wrote that she had made many friends and had found ways to network on many issues through the WELI connections. Several mentioned that the WELI networking was valuable in showing them that the challenges they meet are not unique and that others are also going through the same situations. One participant wrote, “I feel very supported after the meeting. I believe it was clear to me that the mentoring by other women is seriously needed for success.” Another expressed, “I can better appreciate the value of networking, and in an indirect way that has probably changed my behavior at some recent conferences/meetings.” Another summed it up nicely, “I have a MUCH greater understanding that my issues are similar to other people, and thus am more likely to ask for help when presented with a problem. WELI gave me a great network to help out with problems and bounce ideas off of. Thanks!”

Summary

This paper has given a characterization of engineering faculty women. Although they had to have the support of their Dean to attend the CA WELI Conference, while the FL WELI Conference participants did not, their basic demographics are quite similar. Their comments about administration and leadership values, leaders, and what needs to be improved in engineering education give good insights into the challenges that engineering women faculty

face. A survey of the women's interests and artistic talents show that the faculty women do have some life outside of academia. However, for some of these women, the only answer to these topics is that we must be kidding!

A post-conference survey showed that the women who participated were pleased with the workshop, especially the networking opportunities and the negotiation skills session. Nearly 60% of the participants were more interested in leadership positions and close to 40% were more interested in both leadership and administrative positions. All would recommend the workshop to their colleagues.

Short-term effects of the WELI Conference(s) are very positive as expressed by participants on a post-conference survey. Already several of the participants have moved into chair positions or higher. The long-term effects of WELI and the positions assumed by WELI participants will be very interesting to assess at a later time.

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