Effects of Faculty-Student Interactions on Faculty Career Satisfaction

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Abstract

At the undergraduate, graduate and faculty levels, women represent 18%, 20% and 11% of the population, respectively (Science & Engineering Indicators, 2008). The number of women who to participate in engineering continues to remain low, particularly in academe. While a large body of research has shown that outreach and student development programming have positive impacts on the recruitment and retention of all make and female students (e.g. Amenkhienan & Kogan, 2004; Campbell & Campbell, 1997; Cross & Vick, 2001; Secola et al, 2001), little has been done to investigate the impact programming has on faculty who engage in these activities. The purpose of this study is to understand the impact that two student/faculty networking luncheons have on female engineering faculty. The research question guiding this study is: To what extent does interaction with students enhance faculty's professional career satisfaction?

Based on the theoretical framework that social support programs increase retention, mentoring provides a valuable resource to female undergraduate engineering students, and cultivating meaningful relationships empowers women to consider leadership positions, we are hosting two, one-hour and twenty minute lunch networking events that will bring together engineering female faculty with graduate and undergraduate students. Our goal is to understand what impact networking lunches have on faculty and students. Our research goal is to determine what rewards female faculty reap from interactions with students. We speculate that one reward may be greater job satisfaction. The methodology we use to answer our research questions are: interviews with faculty one-and six-months after each luncheon, and longitudinal survey data from faculty that assess the short- and long-term impact of faculty engagement with students during the luncheons. This paper reports interview data, which was collected one-month after the luncheon. Our primary findings indicate that the luncheon provided faculty with an opportunity to build a sense of community, and to develop their identity as campus leaders and role models.

A. Introduction & Framework

Current national averages indicate that women represent 11% of engineering faculty (Science & Engineering Indicators, 2008). This number indicates that there continues to be a lack of women participating in engineering, particularly in academe. A key component in female faculty members' decision to leave their position is "level of satisfaction." Salary adequacy and level of influence are significant variables (Matier, 1990; Smart, 1990); as are, research, teaching and service commitments, perception of value and recognition by peers and institution, access to resources, sense of community, mentorship, perceptions of equity and transparency, and work-life balance (August & Waltman, 2004). The aim of this paper is to determine whether and how mentorship contributes to the level of professional satisfaction for a group of female faculty members in the School of Engineering in a Research 1 University in the East Coast of the United States.

While mentorship is only one element contributing to level of satisfaction, it is a powerful tool that increases the retention and success rates of women and minorities in engineering, and it has been gaining importance in the educational arena (Wells & Grabert, 2004; Boyle & Muller, 2001; Campbell & Campbell, 1997; Jacobi, 1991). Participating in a mentor/protégé relationship provides benefits to both parties; the protégé acquires useful knowledge and receives guidance, advice, and academic assistance. The mentor receives satisfaction from assisting the mentor. Furthermore, mentoring has positive impacts on women and minority students in engineering (Kahveci, Southerland, & Gilmer, 2006; Single & Muller, 2001; Opsata, 1995).

Students, participating in academic and social programming, demonstrate increased persistence in engineering programs, regardless of the students' academic profiles prior to entering college (Marra et al, 2009; Kahveci,Southerland, & Gilmer, 2006; Amenkhienan & Kogan, 2004; Goodman et al, 2002; Cross & Vick, 2001; Kojaltic & Kuh 2001). In a National survey conducted by the Committee on Women in Science and Engineering in 2001, 40 to 68% of established female engineering faculty reported experiencing a type of mentoring which included having research assistantships, receiving guidance and direction in research or having an individual serve as a role model.

The specific aspects of mentoring which contribute to persistence, personal, and professional satisfaction for students and faculty members has yet to be investigated in depth. Little research has been done to understand the impact academic and social programming has on the level of career satisfaction of female engineering faculty mentors who engage in these activities with students. Our study aims to understand what impact networking lunches have on female engineering faculty and students. The hypothesis is that female faculty also reap rewards from interactions with students, which may cause greater job satisfaction. We will collect interview data from faculty members who assesse the short-term impact of their engagement with students during the networking luncheons.

B. Analytic Method

B1. Participants

All 18 female engineering faculty members were invited to attend a 90-minute Networking Luncheon. Eight attended the event, five had scheduling conflicts, and five did not reply to the invitation. Of the faculty members who attended, four are Assistant Professors, two are Associate Professors, and two are Professors; two are members of the Materials Science and Engineering Department, one is a member of the Chemical and Biochemical Engineering Department, one is a member of the Biomedical Engineering Department, one is a member of the Electrical and Computer Engineering Department, one is a member of the Mechanical Engineering Department and two are members of the Industrial Engineering Department. The goal of the luncheon was to provide an opportunity for faculty to engage socially with students. Approximately 50 undergraduate and graduate, female students attended the event. The students were all engineering majors with declared specialties in applied sciences, industrial and systems engineering, civil and environmental engineering, electrical and computer engineering, mechanical and aerospace engineering, biomedical engineering, chemical and biochemical engineering, and material science and engineering. Similar events have been previously held at Rutgers University, but few have been targeted specifically at women in engineering.

B2. Procedure

During the one-hour and twenty minute activity, six faculty members went to tables with six to eight students, rotating every ten minutes to insure maximum interaction with students. (This set up is commonly referred to as "speed networking." The designation of the professors, superior in both status and experience, as mentors defines the set up as "speed mentoring.") A list of ice-breaker questions was placed at each table, but participants were invited to speak freely. Faculty interacted with each other in the beginning and at the end of the activity.

B3. Data Collection & Analysis

One month after each luncheon, faculty attendees were invited to engage in individual interviews. Four faculty members (one Assistant, two Associate, and one Professor) agreed to be interviewed. For anonymity, we have named the faculty members: Anna, Betty, Catherine, and Diana. The purpose of the interview is to assess the impact of the luncheons. The interview protocol (Appendix A) was designed to answer our guiding research question: What impact did participation in a Networking Luncheon with female engineering students have on female engineering faculty? Faculty members were invited to participate in a voluntary interview via e-mail; all interviews took place in the faculty members' offices and were approximately 45-60 minutes in length. Two members of the research team were present at each interview and faculty members signed an informed consent form prior to beginning the interview.

The researchers planned to audio record and take notes at each interview. However, one interview was not recorded due to technical difficulties. Recording from the three interviews were transcribed and notes from all four interviews were typed and triangulated with transcripts of audio recordings during coding phase. The audio and document data were analyzed using grounded theory principles of analysis (Strauss & Corbin, 1998).

The purpose of this study was to identify the impact that interaction with students had on faculty. The researchers used open coding to inductively code interviewee's talk from the individual interviews. Each researcher reviewed the text of the interview and broadly categorized segments of the interview that answered our guiding research question. The researchers then discussed the categories and developed a coding scheme.

Table 1 is a summary of the inductive coding scheme that emerged from open coding. Once coding was complete, two fellow graduate students in the mathematics education doctoral program verified my coding scheme by independently reviewing and coding transcripts. We compared notes and resolved all disagreements. Miles and Huberman (1994) suggested calculating intercoder reliability by dividing the number of agreements by the sum of total number of agreements and disagreements. Using their formula, we arrived at 95 percent intercoder reliability.

Code	Example	Reason for Coding
CSB: Community	"The luncheon and similar events	The luncheon helped Diana
Building - Sense of	are important because it makes me	identify herself as part of the
Belonging	feel part of the community."	community.
CM: Community	"Maybe you'll see more	Anna indicated that the event
Building - Meeting	interdisciplinary research	provided an opportunity for
Others	developing also between faculty	faculty to discuss their work
	members."	with each other and she
		recognized some possible
		links.
CA: Community	"They [students] can feel free to	Betty was discussing how she
Building –	come to me and talk to me."	benefited greatly from her past
Altruism		professors' knowledge and she
		wanted to share her expertise
		with students.
IL: Identity	"I'm competent in my research	Betty is describing how being
Development –	that's why I want to be really good	recognized as a competent
Leader	at what I do in a scientific way."	researcher goes hand-in-hand
		with being seen as a leader and
		as a source of information for
		her colleagues and students.
IR: Identity	"Seeing someone who looks like	Catherine indicates that she
Development –	you in a position you aspire to is	serves as a role model for
Role Model	so important. Having someone to	female students and new
	encourage you is important."	female faculty.

Table 1Inductive Coding Scheme

C. Results

Our study aims to understand what impact networking lunches have on female engineering faculty. The guiding research question was: What impact does interaction with female engineering students at a networking event have on female engineering faculty? To this end, we hosted a Networking Luncheon where 6 female engineering faculty members engaged in "speed-mentoring" with approximately 50 undergraduate and graduate engineering students. One month after their participation, four faculty members reflected on their experiences with our research team. In their reflection, two common themes emerged during data analysis: Community Building and Identity Development. The following subsections describe each theme.

C1. Community Building.

Community building is a threefold endeavor: (1) developing a sense of belonging, (2) becoming acquainted or reconnected with members of the community, and (3) contributing to the community by performing altruistic acts.

First, in developing a sense of belonging, faculty members spoke of investing time and interest in utilizing social events as a method for connecting with members of the community. For example, Anna stated, "These things [networking luncheons] are really helpful, whenever we can find time or money to arrange some get together, they're really helpful." [Interview 1; 12/21/09; 17:20]¹ She explained that at social events, faculty are given an opportunity to speak with each other about possible interdisciplinary work and that students become aware of undergraduate research opportunities so that they all feel like part of one community. In reflecting on the event, Betty stated, "it makes me feel like I have a role" [Interview 2; 12/22/09; 12:20] in the community. Catherine indicated that the event provided a venue for students and faculty to interact and develop relationships outside of the classroom [Interview 3; 12/22/09; EHL & CML]. Similarly, Diana stated, "The luncheon and similar events are important because it makes me feel part of the community... [and] feel more integrated with students." [Interview 4; 1/5/10; 6:10] She recognized that as a new faculty member, it was beneficial for her to attend the Luncheon because it was a way to integrate herself into the community and that it provides a window of opportunity for students and faculty to connect outside of the classroom. Providing an opportunity to socially engage with colleagues and students seemed to be beneficial for the faculty participants.

The second subtheme that emerged was recognizing the Networking Luncheon as a venue for meeting or reconnecting with other faculty and students. Anna indicated that "Maybe you'll see more interdisciplinary research developing also between faculty members" [Interview 1; 12/21/09; 18:30] if they have the opportunity to meet together in events like the Networking Luncheon. Diana also commented that these types of social events could spur interdisciplinary work. With regards to students, Diana indicated that although she is the Junior Class Advisor, not many students go out of their way to visit her during office hours. Similarly, Catherine explained that even though she is the Graduate Student Advisor, not many students approach her for mentoring, but that our Networking Luncheon gave her an opportunity to meet graduate students within and outside her department. Furthermore, Catherine expressed that her male colleagues would challenge the need for organizing mentoring events for female graduate students. She indicated that she was "grateful for the Networking Luncheon because it gave me a cover." [Interview 3; 12/22/09; EHL & CML] In other words, Catherine identified the Networking Luncheon as a venue for building a community among female students and faculty that did not require her to justify the need for such an event to her male colleagues. Similarly, Anna explained that although she enjoyed the Networking Luncheon and believes that these types of events are important, her department does not place much importance on mentoring. She states, "You know, if you spend more time on your teaching and mentoring, you won't get merit raises, you won't get promotions, you

¹ Indentifies data source: audio recording [# of interview; date; timestamp] and researcher notes [# of interview, date, researcher(s) initials]

won't get anything, so it is difficult... Because in our system of merit, teaching and mentoring is not valued as much [as research]. They become competing ideals." [Interview 1, 12/21/09; 24:30] Anna elaborated that there is a strong push from her department to publish at ten papers per year and secure large grant dollars for research. As with Catherine, Anna identified the Networking Luncheon as an opportunity for her to engage in mentoring without going through her department. Lastly, Betty recognized the networking event as an opportunity to meet other faculty and students because she is new to the University. She described the event as "useful in a broader meaning... to understand the students and maybe for them to get to know me." [Interview 2; 12/22/09; 18:55] Betty continued to explain that not only is she new to the university, she is also new to the east coast. She attends social events to meet people, as well as to learn about local customs.

Lastly, faculty members indicated that attending the Networking Luncheon was an opportunity to "give back" to their community. For example, Betty stated, "I also want to be a reference point for students so that they can feel free to come to me and talk to me." [Interview 2; 12/22/09; 5:49] She related this back to her personal experience of being able to approach a teacher she had in high school about anything, professional or personal. Her interaction with the teacher outside of the classroom enhanced her learning and Betty explained that through mentoring, she hoped to do the same for her students. Similarly, Diana explained that engaging in undergraduate research solidified her desire to pursue an engineering degree and a career in academia. Diana indicated that she made it a point to discuss undergraduate research opportunities with every student she met at the Luncheon because it had such a positive impact on her. Each of the faculty members who were interviewed shared similar stories and expressed a desire to provide learning opportunities for students. Anna and Catherine indicated that they have an invested interest in speaking with students at networking events so that they could encourage students to consider pursuing doctorate degrees. Specifically, Anna stated, "I like that feeling when they come and ask or when... you feel you can contribute to them." [Interview 1; 12/21/09; 21:59] Catherine referenced back to her personal experiences. A great impact on her was to have female role models "in a position you aspire to" [Interview 3; 12/22/09; EHL & CML] and she hopes to be that role model for other female engineers.

In discussing the faculty's participation in the Networking Luncheon, each member recognized the event as an opportunity to build a sense of community. In their reflections, faculty members expressed that gathering a large group of female students and faculty cultivated a sense of belonging and a venue to meet and reconnect with other members of the community. Also, the Networking Luncheon was an altruistic outlet for faculty to give back to the community.

C2. Identity Development

Faculty members described their participation in the Networking Luncheon as contributing to their identity development. Specifically, as a result of mentoring the students at the Networking Luncheon, they identified themselves as (1) leaders and (2) role models.

Serving as a point-of-reference was greatly linked with developing faculty members' leadership identity. Faculty members defined being a leader as being a point-of-reference for both personal and professional matters. For example, Anna stated, "You feel you can contribute to them and that's a good feeling that you get from these interactions, especially in that group they asked me about my family, about being an immigrant here." [Interview 1; 12/21/09; 22:10] Betty experienced a similar interaction with a student who was from the same country. Professionally, Betty explained, "I'm competent in my research... that's why I want to be really good at what I do in a scientific way... to be a reference point for students so that they can feel free to come to me and talk to me." [Interview 2; 12/22/09; 6:30] In other words, becoming a leader in their respective fields is linked with being seen as a point-of-reference from which students can learn. Catherine and Diana also linked serving as mentors with being leaders in their field. Catherine described herself as being a "role model" [Interview 3; 12/22/09; EHL] and that links to her identity as a leader. Diana reflected on her role as a research advisor. She has the opportunity to mentor students in her lab and she believes that contributes to her identify as a leader. She stated that she used the networking event as an opportunity to promote undergraduate research so that she could recruit more students into her lab.

Acknowledging that engineering is a male-dominated field, the participants recognize the need to serve as role models and to have role models. They each advocated the need for women to gather in all-female events. Anna expressed, "Just as a role model, being there, really helps." [Interview 1; 12/21/09; 35:05] Anna spoke about being a role model for her female students who aspired to be faculty and she reminisced about one student in particular who is now a faculty member at a research university and continues to keep in contact. Betty shared, "I have a lot of girlfriends who are strong and really interested and smart and really interested in their jobs so we kinda hold on to each other." [Interview 2; 12/22/09; 26:01] For Betty, her girlfriends are sources of inspiration and she views them as her role models. Catherine indicated, "seeing someone who looks like you in a position you aspire to is so important. Having someone to encourage you is important." [Interview 3; 12/22/09; EHL] Catherine participates in many of the University's and other outside organization's women in engineering programs so that she can be a role model for as many female students as possible. Diana indicated that it was important to find "some people who are like you" [Interview 4; 1/5/10; 24:55] because being in a male-dominated field can be somewhat isolating and that gathering a group of women together in one place breaks the isolation.

In their description of role models and mentors, three of the interviewees discussed male role models or a gender neutral perspective. Anna expressed a desire to have "male faculty members who are sensitive in the sense that, maybe not sensitive, but not insensitive." [Interview 1; 12/21/09; 35:20] She reflected on a situation where a male faculty member inappropriately advised a female student that she was not "engineering material." Diana also expressed that "male and female mentors and advisors need to be supportive" [Interview 4; 1/5/10; 24:29] in being advocates for their students and colleagues. Betty wants "mentors who don't regard you as woman or a man but as a scientist or a student, asexual person maybe and that's the best thing to have them be

open minded." [Interview 2; 12/22/09; 28:40] Her comments were in the context of Betty describing the external pressures of having a family and being seen as a mother first before being recognized as an engineer by her family and colleagues.

C3. Summary

Four faculty members reflected on their participation in a Networking Luncheon where female faculty mentored female undergraduate and graduate engineering students. Faculty described the Luncheon as an opportunity to build a sense of community among female faculty and students by cultivating a sense of belonging, meeting or reconnecting with members of the community, and giving back to their community. Also, faculty recognized the Networking Luncheon as an opportunity to develop their identity as a campus leader and role model.

D. Discussion

Overall, the networking lunch was positively reviewed, with faculty members expressing appreciation for the opportunity to interact with both students and colleagues. In reviewing faculty members' experiences, the research team identified two areas of impact: Community Building and Identity Development.

D1. Community Building

Our study reveals that, in keeping with the general trend, the eighteen women engineering faculty rarely have opportunities to interact with each other and with students, despite the near proximity of the departments in the School of Engineering. Furthermore they reveal feelings of isolation in a male-dominated field, with one woman stating that she feels "like an outsider." Typically women and minorities perceive themselves as being "left out of male networks" and "treated differently from their male counterparts" (August & Waltman 2004). Faculty members also expressed a need to be better connected. An important factor in academic success is having access to information relevant for professional development and success. Typically, female faculty members perceive themselves isolated without having access to networks that will provide information and opportunities necessary for advancement (e.g., tenure protocol, funding opportunities, collaborative work, etc.). A simple social event with a structured networking component seems to be one way to create opportunities for faculty to form a network with other faculty and students which may impact professional success and satisfaction.

Faculty members noted the sense of community that was cultivated from the luncheon, which is an important element contributing to a sense of connection and a level of personal and professional satisfaction (August & Waltman 2004). Faculty members were able to both meet colleagues and new students and reconnect with ones they already knew. Some faculty members viewed this opportunity to connect with colleagues they rarely interact with as a potential opportunity to engage in interdisciplinary research. Clearly, even brief luncheons can contribute to fostering a sense of community in an academic environment.

This may be a self-selected group as only professors interested in engaging with students would attend a networking luncheon, but an important factor for their professional satisfaction was the opportunity to engage with students. It is worth noting that these professors were not only motivated in their careers by working with students, but also see a need for mentoring. Two of our younger faculty members felt the need to "give back" to students because they themselves have had strong mentors. Two of our senior faculty members felt the need for more structured, formal mentoring, and desire the opportunity to form quality relationships with students.

One reason faculty members may see a need for mentoring, aside from the general positive professional development effects mentioned earlier, is the declining number of students attaining bachelor's degree in engineering fields (Engineering Workforce Commission 2006). Increased mentorship, which is an important factor for retaining students, will increase the number of students graduating from the School of Engineering with graduate degrees and thus contribute to the generativity of engineering programs in the United States. Clearly, working in departments that value this type of mentorship commitment would enhance faculty's level of career satisfaction, as they would be contributing students to the national need for high-tech workers. Faculty were split in describing how their departments view mentoring. The two women who have been at the University for more than two decades described their departments as unsupportive, while the two new faculty members believed that their departments were very supportive. It is interesting to note that two of the faculty members (one experienced and one new) are from the same department. The research team is interested in exploring this issue more with these two faculty members in the future.

All faculty members who participated in this study expressed a willingness to go above and beyond what was demanded of them in their departments in order to foster the development of the engineering student body, while also realizing the liability of investing in teaching and service for professional success. In a study titled "Gender Differences in Faculty Experiences of Interpersonal Climate," female professors reported feeling more appreciated by students for their teaching role and less appreciated for their research activities than did their male counterparts (Bronstein & Farnsworth 1998). This may have particular implications for women's professional advancement because women, who are more inclined toward student success, or encouraged to be so by their colleagues, and less inclined toward interacting with their fellow academics, will be significantly disadvantaged in the tenure and promotion processes. Female faculty members, performing extra work in the areas of teaching and service, may find their work devalued in the evaluation process (Callister, Minnotee, & Sullivan 2009). Faculty members are aware of disparity in professional role and success: "Because in our system of merit, teaching and mentoring is not valued as much, they become competing ideals." While mentoring students may increase faculty satisfaction in the short-term, it is highly possible that is will negatively impact career advancement in the long-term.

D2. Identity Development

Many factors influence the decision to enter academia as an engineering professor and while no single factor has dominance, several components have more weight. In the case of our interviewees, a passion for their research is a major contributing factor and they view their passion for research as a model for future engineers. In our study, all of the faculty members also cite the importance of role models as both essential to their own development as successful researchers and to the development of current students. Generally, role models are inspirational, motivational, and may even guide students' academic aspirations. Individuals become role models when others emulate them, copying certain attributes and excluding others (Marx & Roman 2002). One participating faculty member asserts her pleasure in being considered a role model, stating that mentorship, "makes me feel that I have some role, makes me feel important to them. For maybe a few of them, I'll impact their lives in some way." Stating that she "feels important" indicates that she views herself as valuable to her students, which is another significant part of determining satisfaction. Mentoring studies indicate that more successful outcomes are obtained when mentor and protégé are "matched by type" (Davidson, & Foster-Johnson 2001; Athey, Avery, & Zemsky 2000). This may be the desired scenario for some individuals, however, because of the shortage of women in engineering most female students have no choice but to work with male mentors.

Even in mentoring relationships the role of evaluation is an important component on how the protégé is guided. Based on their personal experiences, faculty express the need, as female engineers, to be evaluated based on their science and not on their gender. Hence the use of the adjective 'asexual' mentioned earlier in the Results section. Research substantiates the sentiment of unfair evaluations alluded to by female faculty members in this study. Typically men and women are evaluated differently in their performance. Especially in male dominated fields, women are judged to be less competent because of their gender (e.g., Olian, Schwab, & Haberfeld 1988; Steinpreis, Anders & Ritzke 1999). Faculty members who participated do not mention that when a critical mass is reached, individuals are assessed based on the merit of their work rather than biases that may relate to their gender or race. However, they do mention the need for a "role model." One states: "Seeing someone that looks like you in a position you aspire to makes it real, makes it easier to picture. Women need women to back them up." Another similarly notes that is important to have female-only groups so that "you are around people who are like you." Their statements are supported by a 2002 study in which females performance on math exams was enhanced by the presence or perceived presence of a woman mathematician role model distributing the test (Marx & Roman). Although inconclusive, it is likely that being perceived as a role model enhances faculty's level of career satisfaction.

We hypothesized that female faculty would experience greater professional satisfaction from the opportunity to share their experiences with undergraduate students at a networking event, and thus are more inclined to consider mentorship a part of the leader identity. While the interviewees did not cite feeling "empowered to lead" as a result of the Networking Luncheon, all of the faculty members noted that they considered mentorship to be a leadership activity. Faculty members identified mentoring as important in developing leaders in both students and within themselves; two commented that they would like to be recognized as approachable by students and colleagues and a third stated that mentoring contributed to her identity as a leader because she is "committed to sharing her experiences with others." While the extent of empowerment experienced by the faculty is vague, it is clear that the networking luncheon had an impact on the faculty's sense of leadership identity.

A growing concern in academia and industry is the under representation of women in positions of leadership (Valian 2002; Buttner 2001; Greene & Greene 1996; Ayman 1993). Even though women comprise a little over half of the national workforce, they only hold approximately 5% of top leadership roles in the country (US Census Bureau, 2002). Possible factors for the under representation of women in leadership positions are an inability to recognize leadership potential due to lower status positions, the perception that women are overburdened by family/life (non-work) responsibilities, and the lack of women's integration into prestigious organizational coalitions (Crawford & Unger 2000; Fletcher, Jordan, & Miller 2000; Savery 1990). Gender typing, the fear of negative evaluation, and the desire to remain connected with colleagues seems to have impeded women's desire to pursue positions of leadership. In other words, women who believe that taking a leadership role will sever their relationships with colleagues (connectedness) appear to be less interested in positions of leadership (Boatwright & Egidio 2003; Kreuzer 1992).

D3. Summary

The question guiding our inquiry was: To what extent does interaction with students enhance faculty's professional career satisfaction. Our findings indicate that female faculty draw satisfaction from interacting with fellow female faculty and students because their interactions generate a sense of community. These interactions with students may have different implications compared to male faculty, especially toward their professional goals of tenure and promotion. They value their interactions with students because it seems to not only contribute to their sense of identity as role models and as researchers, but also as female engineers and as leaders of their professional community.

E. Implications for Future Research

The model that we provide for student faculty interaction is simple and age-old with a specific component: it is a social interaction in a professional setting with a structured networking component. A possible future research questions is whether faculty opinion for role of social interaction in student development can be altered with events similar to the one implemented in this study. The goal would be to determine how opinion and behavior of faculty members may shift if they do not have particular interest in student development or student diversity. A similar question can be asked about professional satisfaction for faculty with a pre- and post-questionnaire component around the networking event. A longitudinal research question would be to examine the role of such

networking events on the persistence of female and minority students. We do realize such an activity cannot be the only one offered for student development.

Another question is the value of a women-only environment. For example, a faculty member expressed her gratification at being able to insert herself into the structure of a woman in engineering networking event without having to be challenged by male colleagues for hosting it herself. Thus, student and faculty satisfaction with networking events can be surveyed when the event is single gender versus mixed gender.

Appendix A Interview Protocol

- 1. How many undergraduates/graduates students to you formally/informally mentor?
- 2. Do you seek out mentoring events similar to our luncheon?
- 3. To what extent, if at all, did the Networking Luncheons impact your professional career?
- To what extent, if at all, did the Networking Luncheons impact your personal life?
 a.
- 5. Were there any short-term/long-term benefits from attending the Luncheons? For example, students working in your lab or interdisciplinary partnerships with other faculty who attended?
- 6. Did you continue to speak with anyone you met at the Luncheons? If so, please describe the relationship.
- 7. What was it like for you to participate in the Networking Luncheons?
 - a. Pick three adjectives that describe your experience?
- 8. From your point-of-view, how does mentoring contribute to your identity as a leader?
 - a. Research has found that having female mentors and role models increases women's persistence in engineering. To what extent do you agree or disagree with these findings?

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