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Evolution of a Faculty Mentoring Program for STEM Women

***Jill Nemiro¹, Barbara Hacker¹, Susan Tucker², Mary Lucero Ferrel¹,
Deanna Prall¹ and Erika DeJonghe¹***

¹California State Polytechnic University, Pomona, USA

²Evaluation & Development Associates LLC, USA

ABSTRACT

As part of a five-year National Science Foundation (NSF) ADVANCE grant with the overall goal of recruiting, retaining, and professionally developing women faculty in Science, Technology, Engineering, and Mathematics (STEM) disciplines on the Cal Poly Pomona (CPP) campus, ADVANCE at CPP developed a mentoring program for STEM female faculty. CPP is a state-funded, comprehensive university that primarily serves undergraduate students. This case study describes the development of the CPP ADVANCE mentoring program, from its informal beginnings, to a more formalized program with a variety of options for participants. The challenges faced in the development of the mentoring program, and the lessons gained from these challenges are shared.

KEYWORDS

Mentoring; women; faculty; STEM disciplines

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INTRODUCTION

Mentoring is a supportive relationship which gives people the opportunity to share their professional skills and experiences, and to grow and develop in the process. A mentoring relationship is formed between a senior faculty (mentor) and junior faculty (mentee), so that a mentor may share her specific experience and knowledge related to the mentee's needs. Mentoring can be viewed as a learning partnership, where both the mentor and mentee can benefit from the experience. In our mentoring program, benefits for mentees included: 1) Gain advice and support on career-related issues (retention, tenure and promotion; teaching and research); 2) Gain familiarity with the university and college culture; 3) Alleviate feelings of isolation by having someone as a mentor to contact for support and advice; 4) Gain strategies on work-life balance; and 5) Develop a personal network of role models. For mentors, potential benefits included: 1) Opportunity to support and advocate for other STEM women faculty; 2) Provide an opportunity for self-reflection and exchange with other women faculty on campus; 3) Support the development of leadership skills in junior faculty; and 4) Further one's own mentoring and networking skills.

CONTEXT

California State Polytechnic University, Pomona (CPP) is a comprehensive university located in Pomona, California, and is one of two polytechnics in the 23-member California State University (CSU) system. CPP was awarded a five-year federally funded ADVANCE grant from the National Science Foundation (NSF). The goal of our NSF ADVANCE grant was to address the shortage of women faculty in STEM disciplines on the CPP campus. Since 2006, the grant has been pursuing four initiatives across the Colleges of Agriculture, Engineering and Science: 1) institutional assessment, development and sustainability, 2) recruitment, 3) career development, and 4) leadership development. As part of the grant, the CPP ADVANCE mentoring program was initiated to support the career development initiative of the grant. This case study discusses the evolution of this mentoring program as well as the challenges faced in the program's development, and the lessons that can be gained from our experiences.

Two years into the grant, a context of particular note involves the dynamics created by the economic downturn, which impacted many higher education institutions across the US, particularly public universities. Faced with severe budget cuts to CPP and the entire CSU system, efforts to recruit qualified STEM women faculty were dampened by a university-wide soft hiring freeze where only mission-critical positions were filled. Then, in the 2009-10 academic year, existing faculty were furloughed (which means a mandatory temporary reduction of days worked and salary) by 10% while simultaneously experiencing an expanded workload due to larger class sizes and service commitments being spread across fewer faculty. As a result, ADVANCE at CPP needed to strengthen its focus on retaining currently employed STEM female faculty. One way to do this was to develop an effective

mentoring program based on participants' needs.

METHODOLOGY

At the onset of the grant, there was no formal mentoring program for STEM women or any faculty at CPP. Informal mentoring for STEM women began in October 2007, when ADVANCE created JavaNet, weekly coffee and conversation sessions to encourage informal networking and mentoring among STEM women faculty. The goal was to create an informal gathering place where these women could converse and share information. Anecdotal reports from participants suggested that women attending JavaNet appreciated the networking. However, attendance was irregular and the informal JavaNet model proved to be insufficient as a long-term support system for mentoring STEM faculty.

Seeking a more sustainable strategy to address female faculty retention challenges caused by the hiring freeze and furloughs, a formal mentoring program was developed for women in STEM. The CPP ADVANCE Mentoring Program experienced three distinct phases of development, as shown in Figure 1. This section outlines the objectives and program elements within each phase, and necessary revisions and improvements.

Phase 1: Initial Formalized Mentoring Program

Through a series of focus groups conducted in October 2007 with CPP STEM women faculty at different stages of their academic careers and with Department Chairs in the STEM disciplines, we explored perceived barriers to advancement for women, and what factors individuals identified as integral to success. Evident from the focus group data was the need for a formal faculty mentoring program. However, STEM women faculty shared in the focus groups that they also benefited from informal mentoring opportunities (Wachs & Nemiro, 2007).

To follow-up on faculty requests for a formal mentoring program, several senior female faculty members in STEM were interviewed to gather information on a possible mentoring structure. An abundance of models existed for STEM programs located at research-oriented institutions but few models could be found at US universities which were designed as "comprehensive" institutions which expect a more extensive teaching load of typically three to four courses per term. Based on their feedback, further research on mentoring models across ADVANCE programs serving a mixture of research and comprehensive institutions was conducted (ADVANCE mentoring programs reviewed included Brown University; Georgia Institute of Technology; Marshall University; New Mexico State University; University of North Carolina at Charlotte; University of Rhode Island; University of Texas at El Paso; University of Washington; and Virginia Institute of Technology) and a formal mentoring program was designed.

Figure 1. Goals and Phases in CPP ADVANCE's STEM Women Faculty Mentoring Program

Overall Program Goals

- Enhance the professional development of women faculty in STEM
- Assist junior faculty in becoming familiar with university and college culture
- Retain faculty by enhancing work-life balance
- Reduce feelings of isolation for women faculty in STEM
- Create a supportive networking community among STEM women

Phase 1 (2008-2009) - Initial Formalized Mentoring Program

Program Elements

- Mentoring Pairs
- Mentoring Circles
- Mentoring Kick-off Meeting
- Evening Get-Togethers

Phase 2 (2009-2010) - A Menu of Options to Increase Participation

Program Elements

- Mentoring Pairs
- Mentoring Kick-off Training
- Quarterly Hot Topic Workshops
- Quarterly Mentoring and Networking Lunches
- ADVANCE Website Mentoring Resources (visit <http://www.csupomona.edu/~Advance/leadership.htm>)

Phase 3 (2010-2011) - Mentoring Training and Program Expansion

Program Elements

- Mentoring Pairs
- Mentoring Kick-off Training
- Quarterly Hot Topic Workshops
- Quarterly Mentoring and Networking Lunches
- Mentoring Training Day (for mentors and mentees)
- Training on Strategies for Mentoring New Faculty (for department chairs and administrators)
- ADVANCE Website Mentoring Resources

The structure of the Phase 1 mentoring program included two major elements.

- (1) "Mentoring pairs" were dyads of senior faculty (mentors) partnered with junior faculty (mentees), so that mentors would share their specific experiences and knowledge related to the mentees' needs. Suggested interactions between mentor pairs included: reviewing one another's writings (for example, tenure and promotion packages, sabbatical applications, drafts of grant proposals, and professional publications); reviewing each other's course syllabi; visiting each other's classrooms and/or labs; and attending ADVANCE sponsored professional development events.
- (2) "Mentoring circles" were small groups of mentoring pairs who gathered together informally (usually over lunch) once per quarter to share ideas and support.

In addition to these two major elements, a face-to-face kick-off meeting was held, and informal social get-togethers (such as going to dinner and a play or film on campus) were also planned throughout the year for mentoring participants.

During Phase 1, mentoring pairs were matched based on overlapping availability. An email invitation was first sent to all 55 STEM female faculty inviting them to join the mentoring program. The email also included an outline of program goals and requirements. Mentoring pairs could meet as frequently as they desired, but were strongly encouraged to attend, every quarter, at least one ADVANCE sponsored event together. All mentoring participants received \$250 to use toward professional travel, and a book on women and professional development (selected by each mentoring circle to guide their discussion). Interested faculty members were asked to respond to the email invitation with days and times they were available. Mentoring matches were then made based on common availability. The rationale was that mentoring pairs and circles would most likely get together if they had the same days and times available.

In Phase 1, 34 out of the 55 STEM women faculty at CPP (62%) participated in a mentoring pair and/or circle (two women participated only in mentoring circles). Sixteen mentoring pairs that crossed department and/or college lines and eight mentoring circles (made up of two mentoring pairs) were formed. Mentoring circles were not discipline-specific, and faculty from different colleges were integrated into the same mentoring circle.

During Phase 1, the most prevalent challenge shared by participants as documented by a January 2009 survey was finding the time to meet with one's mentor or mentee and to attend mentoring circles. In addition, participants desired more structured mentoring and networking events in addition to or in place of mentoring pair relationships.

In response to this initial feedback and to encourage more STEM women faculty to participate in mentoring and networking events, the ADVANCE team planned more structured social activities during the rest of the academic year, including dinner and play social gatherings, campus luncheons, and other informal opportunities for mentoring circle get-togethers. Participant surveys indicated that they enjoyed

these activities, however attendance was still low. Logistical and scheduling issues also continued to be challenging for mentoring pairs and circles.

Phase 2: A Menu of Options to Increase Participation

Over the summer of 2009, the ADVANCE team reviewed participant feedback on program challenges, and conducted further review of promising mentoring practices implemented within other ADVANCE mentoring programs, at both research and comprehensive universities. The mentoring program was then revised to include the following program elements: 1) a Mentoring Face-to-Face Kick-off Training; 2) Mentoring Pairs; 3) Quarterly Hot Topic Workshops (where faculty could come together for a one-hour lunch workshop on a variety of mentoring topics); 4) Quarterly STEM Women's Faculty Mentoring and Networking Lunches; and 5) ADVANCE Webpage Resources on Mentoring (found at www.csupomona.edu/~advance), including materials from ADVANCE-related events, an application form for new mentees, and a Mentoring Toolkit (discussed in the Mentoring Pairs section that follows). A summary of the program activities that occurred during Phase 2 and participation rates follows.

Mentoring Face-to-Face Kick-off Training

In September 2009, a one-hour luncheon kick-off training was held and all STEM women faculty, whether they had been in the mentoring program the prior year or not, were invited to attend. Thirteen STEM women faculty attended. The meeting agenda included presentation and discussion of relevant skills for mentors and mentees, and information on how to develop mentees.

Mentoring Pairs

To match mentors and mentees, in October 2009, surveys were sent out to all 56 STEM women faculty, whether they had previously participated in the mentoring program or not. If faculty were either new to the program, or wanted a new mentor or mentee, they were asked to rate the importance of a series of characteristics in matching them with a mentor or mentee - department, research interests, rank, leadership experience, administrative experience, or other reasons. Seventeen faculty (7 mentors and 10 mentees) who had previously participated in the mentoring program and two faculty that had not previously participated completed the survey. A follow-up email was also sent out to all women STEM faculty encouraging them to join the mentoring program, and several faculty responded indicating interest, providing comments on what they considered important in making an appropriate mentoring match for them. Taking into consideration the data from the surveys and email responses, and personal knowledge the ADVANCE Project Director had of the needs of individual faculty, the ADVANCE grant team met to discuss and form appropriate mentoring matches.

Twelve mentoring pairs (12 mentors and 12 mentees), a total of 24 (out of 56) women STEM faculty (43%), participated during Phase 2. Eight were from the College of Engineering, 12 from Science, and four from Agriculture. Of the 24 participants, five were first year program participants, and 19 had prior experience as a mentor or mentee the previous year.

Pairs were given formal guidelines and coaching at the beginning of the year. In addition, mentors and mentees received a 25-page detailed Mentoring Toolkit developed by ADVANCE (which can be found at www.csupomona.edu/~advance/leadership.htm), with information on how to develop and maintain an effective mentoring relationship. The following elements were included in the Toolkit:

- Description of potential benefits of being a mentor or mentee.
- Outline of what participants would be agreeing to do by taking on the role of mentor or mentee (responsibilities they would need to fulfill).
- Description of the necessary qualities and skills for being an effective mentor or mentee.
- List of expected stages and steps to follow during the mentoring process.
- List of suggested activities for mentors and mentees to develop and maintain their relationship.
- Description of the importance of confidentiality and what to do if the mentoring relationship is not working.
- *Personal Benefits Checklists* and *Expectation and Norms Worksheets* for mentees and mentors to independently complete to assess personal benefits for involvement in the mentoring program and to outline personal needs and goals, preferred frequency of interaction and methods of communication, and availability.
- A *Mentoring Plan Worksheet* to integrate information from the Personal Benefits Checklists and Expectation and Norms Worksheets. Mentors and mentees jointly complete the Mentoring Plan, listing: 1) agreed-upon benefits of participation; 2) acceptable topics to be discussed, joint activities to participate in and desired outcomes that may result from the mentoring relationship; 3) frequency of contact and which communication methods will be used to maintain the mentoring relationship; 4) actions to take if any challenges arise during the relationship; and 5) actions to take to acknowledge successes in the mentoring relationship.

Quarterly Hot Topic Workshops

One-hour discussion/workshop lunch sessions were held once a quarter (Fall, Winter and Spring) on a variety of key issues in mentoring and professional development. With the goal of reaching more faculty, the Hot Topic Workshops were opened up to other STEM faculty without requiring they be a formal part of a mentoring pair, and to women outside of STEM as well. Input was gathered in October 2009 to assess interest in a variety of proposed issues. Hot Topic Workshops were then designed and offered on the issues that received the most interest. Examples of topics and participation numbers of workshops during Phase 2 are summarized in the table below.

Table 1. Topics and Participation Numbers for Phase 2 ADVANCE Hot Topic Workshops

| Phase 2 Hot Topic Workshops | Total Number of Attendees | Number of STEM female faculty participants |
|--|---------------------------|--|
| Managing Difficult Working Relationships | 18 | 10 |
| Positive Political Skills | 13 | 7 |
| Faculty Burnout and Stress | 14 | 7 |

Quarterly Women's Faculty Mentoring and Networking Lunches

During the last week of each quarter (in Fall, Winter and Spring) luncheons were held for mentors, mentees, and other female faculty to offer the opportunity to meet under relaxed conditions and build collaboration and a sense of community. Participants gathered together for information and conversations around a focused topic. Topics and participation numbers for each luncheon held in Phase 2 are summarized in Table 2.

Table 2. Topics and Participation Numbers for Phase 2 ADVANCE Mentoring and Networking Luncheons

| Phase 2 Mentoring and Networking Luncheons | Total Number of Attendees | Number of STEM female faculty participants |
|---|---------------------------|--|
| Recap of Managing Difficult Working Relationships | 16 | 14 |
| Identification of Gender Bias | 13 | 9 |
| Building a Sustainable Mentoring Program | 14 | 12 |

Evaluation feedback from participants at the Spring Quarterly Mentoring and Networking Luncheon indicated the need for more formalized training for mentors, mentees, and department chairs on mentoring strategies and techniques. As a result, designing more formalized mentoring training opportunities continued to be discussed by the ADVANCE grant team over the summer of 2010.

Phase 3: Mentoring Training and Program Expansion

At the onset of Phase 3, in addition to developing formalized mentoring training, another objective was the expansion of mentoring pairs to include women faculty outside of STEM disciplines. All formal mentoring program elements established in Phase 2 continued in Phase 3, with the addition of formalized training for mentors, mentees, and department chairs on mentoring strategies and techniques. A summary of Phase 3's mentoring elements is described below and summarized in Table 3.

Table 3. Summary of Phase 3 Mentoring Activities

| Phase 3 Mentoring Activities | Total Number of Attendees | Number of STEM female faculty participants | Number of non-STEM female faculty participants |
|--|---------------------------|--|--|
| Mentoring Face-to-Face Kick-off Training (Yearly Introduction) | 19 | 15 | 4 |
| Mentoring Pairs | 30 | 20 | 10 |
| <u>Hot Topic Workshops:</u> | | | |
| 1. Time management | 11 | 7 | 4 |
| 2. Stress and your health | 12 | 6 | 6 |
| 3. Developing emotional intelligence | 23 | 14 | 9 |
| <u>Mentoring and Networking Luncheons:</u> | | | |
| 1. Strategies for Sustaining Mentoring | 6 | 2 | 4 |
| 2. How to Stay Connected and Keep Mentoring Alive Post CPP ADVANCE | 15 | 10 | 5 |
| <u>Formal Face-to-Face Mentoring Training:</u> | | | |
| 1. For mentors and mentees | 23 | 13 | 10 |
| 2. For department chairs and other administrators on <i>Strategies for Mentoring New Faculty</i> | 19 | 4 | 15 |

Mentoring Face-to-Face Kick-off Training

Similar to Phase 2, to start off the year, a one-hour introductory mentoring training session was held in September 2010. Nineteen women faculty participated (15 STEM; 4 non-STEM).

Mentoring Pairs

Fifteen mentoring pairs (15 mentors and 15 mentees), a total of 30 women faculty, participated. This was a slight increase in participation over the previous year. Of the 30 participants, 10 were new to the program, and 20 participated as either a mentor or mentee the previous year. As an objective for Phase 3 was expansion of the mentoring pairs element to other disciplines outside of STEM, an invitation for involvement in mentoring pairs went out to all 195 women faculty (54 STEM and 141 non-STEM) at the beginning of the academic year. Ten mentoring participants (6 mentees and 4 mentors) were from non-STEM disciplines and new to the ADVANCE mentoring program this year. Mentoring pairs were given the opportunity to attend the yearly face-to-face introductory kick-off training, and were presented with the Mentoring Toolkit. In addition, mentoring pairs were invited to attend a formal Mentoring Training Day in December 2010. (Details on this training will be provided in the section on Formal Mentoring Training.)

Quarterly Hot Topic Workshops

One hour discussion/workshop lunch sessions held on a variety of key issues in mentoring and professional development continued in Phase 3. In an effort to

expand the mentoring program university-wide, the forum was again opened to women faculty from both STEM and non-STEM disciplines. Topics and participation numbers for Hot Topics were: 1) Time Management – 11 attendees (7 STEM; 4 non-STEM); 2) Stress and Your Health – 12 attendees (6 STEM; 6 non-STEM); and 3) Developing Emotional Intelligence – 23 attendees (14 STEM; 9 non-STEM).

Quarterly Women's Faculty Mentoring and Networking Lunches

Networking luncheons for women faculty currently participating in the ADVANCE mentoring program (whether STEM or non-STEM) continued in Phase 3. Topics and participation numbers included: 1) Strategies for Sustaining Mentoring – 6 attendees (2 STEM; 4 non-STEM); and 2) How to Stay Connected and Keep Mentoring Alive Post CPP ADVANCE – 15 attendees (10 STEM; 5 non-STEM).

Formal Face-to-Face Mentoring Training

A new element added to the ADVANCE Mentoring Program during Phase 3 was the inclusion of two formal mentoring training sessions: 1) Full day training for participating mentors and mentees; and 2) Training for department chairs and other administrators on strategies for mentoring new faculty. A description of each training session follows.

Mentoring Training Day.

A full day training seminar was held during December 2010 for all women faculty that were current or prospective participants in the ADVANCE Mentoring Program. Twenty-three women (13 STEM women and 10 non-STEM women) participated, 8 of whom were prospective participants. As a result of the training, 3 women (1 mentor, 2 mentees) joined the mentoring program. Each participant received a 25-page workbook (developed by CPP ADVANCE) to use during the training, which included a series of activities, tools, and resources on mentoring; and the CPP ADVANCE Mentoring Toolkit. The training day included the following elements:

1. Brief overview of the mentoring program and how to become involved, for any prospective mentors or mentees attending.
2. Discussion of what mentoring is, and the responsibilities of mentors and mentees.
3. Networking time for participants.
4. Breakout sessions for mentors and mentees to discuss the benefits and critical skills for each role.
5. Luncheon Guest Speaker, Dr. Ellen Ensher, who introduced participants to the concept of Power Mentoring, having a network of mentors to provide emotional and career support.
6. Mentoring Pairs Panel, during which invited CPP ADVANCE mentors and mentees shared how they made their mentoring relationships work effectively, and what their specific challenges were as well. Following the panel, Dr. Ensher shared her insights on how to deal with the specific mentoring challenges posed by the mentoring pairs' panel.
7. Mentoring Plans Activity which included time for mentoring pairs to develop a shared set of expectations, norms, and actions to guide their mentoring relationships. A *Mentoring Plan Worksheet* (previously discussed in the Mentoring Pairs section of Phase 2) was completed jointly by the mentor and mentee to

address their mentoring needs, review schedules and decide on the best way to communicate with one another.

Fourteen participants completed a brief evaluation form at the conclusion of the training day. Of the 14, six were currently participating as mentors, six as mentees, and two were prospective mentees. Using a five-point descending Likert scale (1= very much agree; 5 = very much disagree), participants evaluated the mentoring training day on a variety of factors. Mean results (shown in Table 4) indicate that overall participants were highly satisfied with the training on all indicators, and particularly satisfied with: workshop organization; the opportunity to engage in discussions, ask questions, and share ideas; and developing an awareness of their responsibilities as a mentor or mentee. Qualitative responses indicated that participants particularly enjoyed the opportunity to network and share ideas with other female faculty during the training day.

*Table 4: Mean Scores of Mentoring Training Evaluation Items
(1= very much agree; 5 = very much disagree)*

| <u>Item</u> | <u>Mean</u> |
|--|-------------|
| The training workshop today was well organized. | 1.14 |
| I found the content of today's training workshop worthwhile. | 1.36 |
| The opportunity to engage in discussions with women across the university was valuable. | 1.21 |
| I had sufficient chances to ask questions or share thoughts and ideas. | 1.28 |
| After attending this training workshop, I am more aware of the responsibilities of my role as a mentor or mentee. | 1.21 |
| After attending this training workshop, I am more aware of the critical skills I need to fill my role as a mentor or mentee. | 1.36 |
| After attending this training workshop, I feel better prepared to fill my role as a mentor or mentee. | 1.36 |
| The content of this training workshop will be useful to be successful in my career at CPP. | 1.57 |
| I would recommend attending this training workshop to a colleague. | 1.21 |
| Overall, I am satisfied with the training workshop today. | 1.07 |

Training on "Strategies for Mentoring New Faculty."

This training session was contained within a 3-hour session developed to share with department chairs and other administrators the lessons learned from ADVANCE activities with respect to faculty recruitment and retention. Nineteen people (4 STEM; 15 non-STEM) participated including department chairs, administrators, and faculty.

This particular presentation included discussion of:

- 1) How mentoring benefits new faculty. Benefits reviewed included: individual recognition and encouragement; constructive criticism and informal feedback; advice on scholarship, teaching, and service, and how to create balance between these areas; briefing and inside information on the Department and University; knowledge of the informal and formal rules for advancement; and reduction of stress through psychosocial support.
- 2) Suggestions for supporting new faculty, which included: a) initially offering a reduced teaching load; b) allowing them to repeat courses; c) helping them establish key research collaborations; d) suggesting they schedule weekly time on scholarly writing and involve students in research; e) referring them to both internal and external resources and funding that may assist them; f) giving them copies of successful grant proposals, and reviewing their proposals; and g) offering assistance with preparation of retention, tenure and promotion packets.
- 3) Responsibilities of both mentors and mentees.
- 4) Types of mentoring relationships, including one-to-one matches, multiple mentors for one person, group or peer mentoring networks, or task-oriented mentors to review specific papers or offer a certain area of expertise.
- 5) Specific advice for department chairs in establishing mentoring programs, including: a) making expectations and criteria for promotion clear; b) facilitating the acquisition of resources to meet expectations; c) offering frequent and accurate feedback; and d) reducing potential impediments to progress towards promotion.
- 6) Ways to make time for mentoring, which may involve: a) integrating mentoring with activities already performed (i.e., eating, exercising, curriculum design); b) using technology (like email or Skype) to mentor; and c) introducing and delegating former mentees to new mentees.

Resources Needed

In the CPP ADVANCE budget, approximately \$12,000 was allocated for mentoring over the three phases of the program. The \$12,000 was spent on: 1) lunches provided during the Hot Topic Workshops; 2) quarterly mentoring and networking lunches; 3) \$250 travel awards to participants in Phases 1 and 2; 4) \$100 participant stipends for the Mentoring Training Day in Phase 3; 5) in Phase 1, any lunches that mentor and mentee pairs or circles attended together; and 6) materials and supplies for all mentoring events. In addition to the overall budget of \$12,000, one faculty member was funded by the grant to receive one-course release from teaching per quarter (normal teaching load is three courses per quarter) to develop and oversee the last two years of the mentoring program.

IMPACT

To assess the impact of the mentoring program, three waves of program evaluation were conducted throughout the phases of program development. In January 2009, nearing the end of Phase 1 of the program, a survey was sent out to all 34 mentoring participants to assess initial experiences. Fifteen faculty responded to the survey (49% response rate). An evaluation survey was also sent out near the end of Phase 2, in June 2010, to the 24 mentoring participants. Participants were asked to assess their satisfaction with the program, topics discussed in mentoring pairs, and how well their needs and goals were met by the program. Fifteen faculty (11 mentees, 4 mentors) responded (58% response rate). Finally, Phase 3 of the

program was evaluated in June 2011 with a similar survey as was sent out in Phase 2. The survey was sent out to all 30 mentoring participants for that year. Eleven faculty (5 mentees, 6 mentors) responded to the 2011 survey (36% response rate). Evaluation findings across the three phases of program development are discussed below.

Program Satisfaction

Mentees and mentors were asked to rate their overall satisfaction with the mentoring program, using the following Likert descending scale – very satisfied, satisfied, neutral, dissatisfied, or very dissatisfied. Across all three phases of the program, over 80% of respondents indicated they were either very satisfied or satisfied with the program. The percentage of respondents who were very satisfied with the program increased over the three phases of the program. No respondents indicated any level of dissatisfaction with the program. Table 5 shows the percentages of satisfaction ratings across the three phases of program development.

Table 5. Program Satisfaction Ratings across Three Phases of Program Development

| | Phase 1 January 2009 | Phase 2 June 2010 | Phase 3 June 2011 |
|----------------|-------------------------|----------------------|----------------------|
| very satisfied | 33% | 36% | 49% |
| satisfied | 47% | 50% | 39% |
| neutral | 20% | 14% | 12% |
| not satisfied | 0% | 0% | 0% |

Across the three phases, participants’ qualitative responses indicated the program enhanced networking with colleagues, offered assistance with accessing department/college resources, provided advice on teaching strategies and balancing work and personal life, and presented opportunities to learn valuable skills (through Hot Topic Workshops). On the other hand, the most prevalent challenge was finding the time to meet with one’s mentoring circle, mentor/mentee partner, or to attend mentoring events.

Needs and Goals Met

Phase 1

During Phase 1, one section in the January 2009 assessment survey asked participants to indicate which needs were being met by the mentoring program. Participants indicated four needs being met: help with communicating with colleagues; help with accessing departmental and college resources; help with teaching strategies; and help with managing balance between work and personal life.

In addition, respondents indicated that their mentoring conversations addressed two areas with the greatest frequency, research (40%) and teaching (60%). Other topics mentioned that were discussed during mentoring exchanges included: career strategy, difficulty of career/family balance, help with administrative issues, and how to face student/teacher tense situations.

Phase 2

At the end of Phase 2, two separate assessment surveys were created – one for mentors, and one for mentees. For the most part, the surveys were identical, but a section was tailored to individually assess the degree to which either mentee needs or mentor goals were met by the program.

Mentee Needs Met.

Mentees were asked to rate the degree to which a series of needs were met by their mentoring pair relationship. These needs had been introduced to mentees in the Mentoring Toolkits, described above. The needs most commonly rated as “strongly met” for mentees in Phase 2 were: 1) connecting with someone who shares similar experiences; 2) guidance on teaching; 3) advice and information on university and department policies; 4) help finding needed resources; and 5) help establishing professional relationships within CPP.

Mentor Goals Fulfilled.

Mentors were asked to rate the degree to which a series of goals (introduced to mentors in the Mentoring Toolkits) were fulfilled by involvement in the mentoring pair. The goals rated as “strongly met” for mentors were: 1) encourage and support the career development of other STEM women faculty outside of the traditional hierarchical relationships; 2) have the opportunity for self-reflection and exchange with other STEM women faculty; 3) pass on relevant knowledge; and 4) establish close professional relationships with other STEM women faculty. In addition, respondents reported that the topics discussed most in their mentoring pair conversations were help with research, teaching and promotion and tenure preparation; and how to manage work and family life.

Phase 3

The same surveys as used in Phase 2 were distributed to mentors and mentees at the end of Phase 3.

Mentee Needs Met.

Mentees were asked to rate the degree to which each of their needs was met by their mentoring pair relationship. The needs often rated as “strongly met” for mentees were: 1) connecting with someone who shares similar experiences; 2) help in establishing professional relationships within CPP; 3) advice on department politics; and 4) advice on adapting to university and/or department culture. The first of these, connecting with someone who shares similar experiences, was rated a top need being met in both phase 2 and phase 3.

Mentor Goals Fulfilled.

Mentors were asked to rate the degree to which a series of goals were fulfilled by involvement in the mentoring pair. The goals rated as “strongly met” for mentors were: 1) pass on relevant knowledge; 2) establish close professional relationships with other women faculty; and 3) have the opportunity for self-reflection and exchange with other women faculty. As can be seen when comparing with Phase 2 responses, there was much continuity of goals being met. In addition, topics

reported as being discussed the most in mentoring pair conversations were help with research and promotion and tenure preparation, and how to manage work and family life.

Program Expansion

To assess the expansion of the mentoring program to disciplines outside of STEM, participation rates in mentoring events were reviewed for non-STEM women faculty. Overall, women from non-STEM disciplines did participate across all the mentoring program elements. In Phase 3, ten mentoring pair participants (33% of the total participants) were from non-STEM disciplines. In addition, ten non-STEM women attended the Mentoring Training Day (44% of training participants); and 15 non-STEM department chairs and administrators (79% of training participants) attended the Training on "Strategies for Mentoring New Faculty." Non-STEM women also participated considerably in both Hot Topic Workshops and Mentoring and Networking Luncheons. For the Hot Topic Workshops, 46% of women faculty attending were from non-STEM disciplines in Phase 2; and 41% of women faculty attending were from non-STEM disciplines in Phase 3. Mentoring and Networking Luncheons drew 19% of attendees from non-STEM disciplines in Phase 2 and 43% of attendees from non-STEM disciplines in Phase 3.

Retention

Anecdotal reports from participants in the mentoring program indicated that involved faculty members felt a greater connection to the university community and were more willing to stay at CPP as a result of their involvement in the mentoring program. In addition, retention rates thus far appear to be high for women involved with the mentoring program. Of the 34 women enrolled in Phase 1 of the mentoring program, over 91% remain at the university. For women enrolled in Phases 2 and 3 of the mentoring program, 100% are still at the university. In contrast, the overall retention rate for women faculty at CPP from 2003-2011 was approximately 71%. However, it will be several years before it is possible to determine whether retention of faculty members involved in mentoring is sustained at a higher rate than the general faculty population.

CONCLUSION AND PROGRAMMATIC LESSONS LEARNED

There are few models of faculty mentoring at comprehensive institutions of higher education. ADVANCE at CPP strived to develop a responsive mentoring program to meet a variety of challenges, most importantly to encourage participation of faculty who were already busy with teaching, research and service commitments. In spite of these challenges, surveys of mentoring participants indicated they benefitted from the program. We learned many lessons in developing the CPP ADVANCE mentoring program. Our recommendations include:

- Research other university mentoring programs for successful elements. In designing our program, we researched what other ADVANCE programs and comprehensive universities were offering in the way of mentoring. Examples include ADVANCE mentoring programs at the University of Rhode Island (www.uri.edu/advance/faculty_development/mentor_training_program.html), and at Brown University

(www.brown.edu/Administration/Provost/Advance/development.html). Other ADVANCE mentoring program resources can be found at www.portal.advance.vt.edu/Categories/Initiatives/Mentoring.html.

- Match mentors and mentees based on their individualized needs. We solicited information from participants on what characteristics they wanted to be matched on prior to making mentoring matches. Many mentees requested mentors outside of their departments, so they could openly discuss issues and gain needed advice. Some participants also requested being matched with others with children, so they could seek or provide advice on work/life balance.
- Continually collect assessment data on how the mentoring program is doing, and modify the program based on the results. Our mentoring program was revised as a result of assessment data we collected from participants through surveys, observations and interviews.
- Start each year with a face-to-face kick-off meeting/training for both mentors and mentees. While mentoring occurs outside of formal events, and often through virtual methods (such as email or phone), to gain commitment to program expectations, norms, and guidelines, it is essential to pull everyone together face-to-face.
- Provide necessary resources and guidance to help participants succeed in mentoring. We provided detailed toolkits for mentoring pairs, formal mentoring training, and training on supportive communication and other relevant interpersonal skills.
- Offer a variety of ways for faculty to participate in the program at the level they want. Some of our faculty did not have the time or need for a mentoring pair relationship. Our Hot Topic Workshops and Mentoring and Networking Luncheons provided ways for faculty to gain mentoring and networking support that required less time commitment.
- Realize that sustainability means lasting involvement in the community of the mentoring program, and not necessarily long-term partnership with the same mentor or mentee. Having a variety of program options keeps women involved that otherwise may drop out.

REFERENCES

ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE).

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383

Wachs, F. & Nemiro, J. (2007) Speaking out on gender: Reflections on women's advancement in the STEM disciplines. *Journal of Women and Minorities in Science and Engineering* 13 (1), 77-94