MENTORNET: LESSONS LEARNED IN BUILDING A LARGE SCALE E-MENTORING PROGRAM

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Abstract — *MentorNet, the Industrial Electronic Mentoring Network for Women in Engineering and Science, is a non-profit program that pairs community college, undergraduate and graduate women studying engineering, science, technology and math with professionals who work in industry and government, for mentoring relationships conducted via email. MentorNet's goal is to provide students with mentoring to enhance their persistence in fields where they remain underrepresented and facilitate their entry into scientific and technical careers. Now in its fourth year, the MentorNet program functions as a collaborative effort between MentorNet and the thousands of individual mentors and students who volunteer to participate in the program, as well as between MentorNet and nearly 100 other individual organizations, including colleges and universities, professional societies, government agencies and national laboratories, and corporations. These organizations partner with MentorNet in many ways: providing financial support, mentor and student recruiting support, and programmatic guidance. Building and growing these partnerships and the mentoring program have presented many challenges and provided many learning opportunities for all involved.*

Index Terms — *Collaboration, mentoring, women in engineering and science*

INTRODUCTION

MentorNet, the Industrial Electronic Mentoring Network for Women in Engineering and Science, is a non-profit program that pairs community college, undergraduate and graduate women studying engineering, science, technology and math with professionals who work in industry for mentoring relationships conducted via email. MentorNet's goal is to provide students with mentoring to enhance their persistence in fields where they remain underrepresented and facilitate their entry into scientific and technical careers. MentorNet's mission is to further women's progress in scientific and technical fields through the use of a dynamic, technology-supported mentoring program, and to advance women and society, and enhance engineering and related sciences, by promoting a diversified, expanded and talented workforce.

The MentorNet structured e-mentoring program leverages technology and the Internet to serve students and mentors in the United States and, increasingly, internationally. Potential mentors and students fill out applications on the MentorNet web site and then are matched in one-on-one pairs via an automated matching program developed in-house. Mentoring pairs are fully supported by web- and email-based training, coaching and facilitation during their academic yearlong official participation in the program. MentorNet has contracted with outside evaluation firms for both year-end programmatic evaluation and, more recently, a long-term study of the impact of participation on students in the program.

The MentorNet mentoring program has been very successful, as measured by the year-end program evaluations [1,2]. Students responding to the 1999-2000 program evaluation reported a high satisfaction with one-on-one e-mentoring (3.95 out of a possible 5) and students who have participated in MentorNet report an increased self-confidence in fields of study [2]: "This reaffirmed my belief that I want to be an engineer." In addition, 84% of students said that they would recommend MentorNet to a friend.

The year-end evaluations report benefits to mentors as well as students [1,2]. In the 1999-2000 evaluation, 83% of mentors reported experiencing the satisfaction of helping another person while 57% appreciated the opportunity to engage in self-reflection on their own career [2]. 18% also said they experienced a renewed commitment to their field through mentoring a woman student in MentorNet. Other benefits included insight into what it is like to be a student today and networking contacts [2].

The long-term evaluation study has just recently begun, but has already revealed results [3]. A survey of students one year after they participated in the program reported 95% retention of these students in engineering & related sciences. Nearly 70% of respondents report that in retrospect, MentorNet was a good use of their time. 50% continue their

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relationships with their mentor or apply for another MentorNet mentor, and approximately 60% state that their MentorNet experience increased the likelihood that they will seek mentors in the future.

Now in its fourth year, the MentorNet program functions as a collaborative effort between MentorNet and the thousands of individual mentors and students who volunteer to participate in the program, as well as between MentorNet and nearly 100 other individual organizations, including colleges and universities, professional societies, government agencies and national laboratories, and corporations. These organizations are critical to MentorNet's success and partner with MentorNet in many ways: providing financial support, mentor and student recruiting support, and programmatic guidance.

MentorNet has grown significantly each year since its inception (Table I). This growth has been possible in part because of the base of support provided by the collaborations and partnerships it has developed and the design, assessment and improvement of its mentoring program.

TABLE I
MENTORNET'S GROWTH

	Year 1 1998	Year 2 98-99	Year 3 99-00	Year 4 00-01	Year 5 01-02	Year 6 03-04
Students Matched	204	515	1250	2000	3500	5000
Mentors Matched	204	515	1214	1913	3500	5000
Participating Campuses	15	26	36	71	100	125
Companies Represented by Mentors	93	261	588	690	N/A	N/A

Future goals for MentorNet include expanding the number of mentors, students, participating campuses and partnering organizations (Table I). With support from partnering organizations such as the U.S. Department of Transportation, Texaco, AT&T and the Alcoa Foundation, MentorNet is also making targeted efforts to expand to specific populations including minority serving institutions within the US and colleges and universities internationally. In addition, the U.S. Department of Education's Fund for the Improvement of Postsecondary Education (FIPSE) has provided funding for extending MentorNet to community college students

This panel presentation will focus on the challenges met and lessons learned from building and growing MentorNet's partnerships and its mentoring program, including presentations from MentorNet staff and from representatives of collaborating organizations. Student and mentor perspectives are documented in the MentorNet evaluations and in previous presentations and papers [1,2,3,4]

MENTORNET: A COLLABORATIVE PARTNERSHIP

MentorNet is organized as a collaborative organization. There is a core MentorNet staff, with offices located at San José State University and De Anza College, including an executive director, a finance manager, a part-time director of development and the technical and program staff which develop and administer the e-mentoring program. In addition, MentorNet has developed relationships with colleges and universities from across the United States and Canada as well as with corporations, U.S. government agencies, U.S. national laboratories and professional societies.

Organizations partner with MentorNet in different ways. Colleges and universities are invited to participate in MentorNet before the beginning of the program year; the colleges and universities are selected according to various criteria, including MentorNet major funders' interests, diversity concerns, special initiatives and demonstrated interest by the institution. The students of participating colleges and universities are eligible to sign up as students in the e-mentoring program. Participation is free, but colleges and universities are invited to contribute financially to support the program at a level of $2,000 per year, and receive extra services if they choose to do so.

Corporations, government agencies and national laboratories contribute financially to support MentorNet and are either contacted by MentorNet or contact MentorNet to extend their support. Contributions are at several different levels and the benefits extended to the funders differ at each level. Those who give at the highest level are given a seat on the MentorNet advisory board, putting them in the position of recommending schools for inclusion in MentorNet, and are given enhanced visibility in front of the students participating in the program.

Professional societies are somewhat unique. They also support MentorNet financially, and recruit mentors from among their members; they may also have their student members participate in MentorNet, regardless of which college they attend, assuming they agree to meet certain conditions replicating the volunteer support provided by campus representatives.

These various organizations derive multiple benefits from partnering with MentorNet. Corporations, government agencies and national laboratories benefit from:

- Positioning as leaders in support of scientific and technical women
- Early identification of recruitment opportunities
- A positive effect on corporate environment, networks, and knowledge, as more employees participate as mentors and are aware of the corporation's support of such activities and gain mentoring knowledge and experience
- Leadership and accountability in MentorNet's direction and success

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Professional Societies benefit from:
- Opportunities to acquaint students with their society
- Enhanced exposure to students who can join as student members
- Promoting the profession and its networks
- Identification as a society committed to supporting its women members

Colleges and universities benefit from:
- Increased student retention and satisfaction in technical and scientific fields
- Enhanced pre-professional development for students
- Recognition as institutions committed to supporting women students in engineering, science, and math
- The opportunity to offer a full-scale structured e-mentoring program, with access to mentors at various corporations, firms and national labs, without having to cover the costs of administering an in-house program.

All participating organizations have a designated MentorNet representative within the organization. The responsibilities of these representatives vary slightly depending upon the type of organization, but from the standpoint of growing and sustaining the e-mentoring program, the primary responsibility of a representative is the recruitment of students and/or mentors. While MentorNet provides materials, such as posters and email messages to help representatives with recruitment, the methods used to recruit are left to the representative to determine so that they can utilize the avenues most appropriate for their organizations.

These representatives and their recruiting efforts are crucial to the success and scalability of MentorNet. In order to fulfill MentorNet's projected participant growth, we rely on these representatives to recruit students and mentors. All of our participating students come from participating colleges, universities, and professional societies, while approximately 60% of mentors are from sponsoring companies.

LESSONS LEARNED

MentorNet staff will discuss some of the many lessons learned in building such a large collaborative effort. First, the expressed interest of campuses and students in participating in MentorNet appeared to be growing at a more rapid rate than our pool of mentors and financial resources, validating the expectation that planned growth is required to manage the project successfully. Nearly 100 currently non-participating colleges and universities have inquired about participation. For the 2000-2001 program year, however, more mentors than students were recruited; the reason for this is unknown. The selection of participating colleges and universities was largely driven by funder interest in the past,

while this year, to try and increase the number of students, several colleges and universities which had expressed a strong interest in MentorNet but which had not been on major funder target lists, were invited to participate at a late date and, in many cases, did an outstanding job of recruiting students. This response has led MentorNet to enhance and plan to expand its growth strategy for colleges and universities in future years.

Second, partnerships usually take several months, or longer, to develop to the point where an organization is willing to invest substantial funding. While MentorNet has made good progress in beginning to develop these relationships, it has also learned that each prospective partnership involves a somewhat different set of parameters, interests, language, and expectations, reinforcing the soundness of the initial strategy: to identify a small group of major investors, and working with them to develop the program, before standardizing relationships for a larger number of participants.

Third, the 1999-2000 academic year was the first year MentorNet requested modest membership fees from participating campuses. Doing so resulted in extended dialogue with our campus partners. Because we were requesting a contribution to support MentorNet, they felt freer to express their needs in receiving more detailed information about the program, students participating at their campuses, and evaluation of the program and expressed an interest in being a part of the extended MentorNet community to a greater extent

Fourth, upon querying various participants, an unexpected finding has been that many of MentorNet's volunteers – mentors and campus, corporate, government and professional society site representatives alike – would like to feel even more connected to the MentorNet program, through enhanced communications, feedback loops, and as part of a community. This growing group of volunteers – this year, more than 2,000 mentors plus approximately 100 representatives in various colleges, universities, corporate sites, government agencies, national laboratories and professional societies – provides essential services to help make MentorNet successful. To increase MentorNet's scale in the future, attention to the needs and interests of this group of volunteers will be critical to success, and MentorNet is addressing this issue by holding a Partners Forum for representatives to attend, meet one another and exchange ideas, and is adapting the web site to try and create a sense of community for participants.

Finally, in the start-up phase of MentorNet, the organization planned and was successful in procuring several large grants, primarily from corporations and the federal government. Based upon an assumption that these "strategic partnerships" (at a level of at least $50,000 per year) alone could not be expected to sustain program growth indefinitely, we began to develop a lower level of corporate sponsorship, with the expectation that a broader base of

support could be developed and sustained over time at a level of approximately $5,000 per year (with other donation levels available in between these two levels). We currently have approximately a dozen such partners at this level of support, and plan to expand the numbers over time. Due to the interest of U.S. government agency lab scientists in participating as mentors from the outset of the program, we have also developed a partnership agreement with several U.S. government labs and scientific sites, commensurate with the basic sponsorship level for corporations.

A CAMPUS REPRESENTATIVE'S PERSPECTIVE

Monica Lin, from the Center for Undergraduate Matters in the Electrical Engineering and Computer Sciences Department at the University of California at Berkeley, joins the panel as MentorNet's Berkeley campus representative to discuss the challenges in garnering institutional support for external programs such as MentorNet, and the impact of MentorNet on Berkeley women students as evidenced by the program's campus-specific evaluation data. Of particular concern and interest to student affairs staff at Berkeley is how mentoring affects students' overall academic experiences within their majors, including their level of satisfaction with their department's treatment of women students.

The University of California, Berkeley has participated in MentorNet for the past four years, and in 2000-2001 maintained the fourth highest participation rate among all 71 campus partners, with 93 women signed up for the program. The fact that the number of Berkeley students involved has nearly doubled from the previous year is testimony to both MentorNet's growing success and the benefits of closely collaborating with campus representatives.

Although women students in both the Physical Sciences and College of Engineering are served by designated student affairs staff and support programs, MentorNet offers unique opportunities for Berkeley students. The program provides a mentoring network that spans all of Berkeley's engineering, math, and science departments, thus serving a broader range than any departmental student affairs office has yet done on campus. A main focus of the Center for Undergraduate Matters is to sponsor workshops and mentoring programs for EECS students to increase retention and academic success. Because MentorNet is likewise designed to encourage and retain women in science and engineering, the partnership works well to educate students about career options and expose them to a wide variety of professional working in industry. What students ultimately gain is greater pre-professional development and a support network encouraging them to stay on the path towards a technical or scientific degree from Berkeley.

The common goals between the Berkeley campus and MentorNet allow for a strong connection in providing access to programming that best fits the needs of students. As a MentorNet campus partner, Berkeley has become more fully engaged in efforts to support women students in engineering, science, and math, and expects to discover how our campus might be more receptive and responsive to academic programs that will enhance students' experience at Berkeley.

A CORPORATE REPRESENTATIVE'S PERSPECTIVE

IBM has consistently recruited more mentors than any other company, providing 440 mentors this year, 358 of which were matched. How is this accomplished?

IBM builds on its established focus on Women in Technology issues in seeking mentors for the MentorNet program. The company's efforts to engage employees and enroll them as MentorNet mentors is very successful, and is made easier by the fact that there is already a large group of women who are members of an informal network tuned in to the issue of the shortage of I/T and engineering skills. Included in the network is a number of high level women executives, who, along with the senior management throughout IBM, encourage and lend credence to participating in mentoring programs in general, and MentorNet specifically. This network is very supportive of several initiatives which IBM has developed specifically to address the under representation of women in technical fields. The initiatives include 1) EXITE Tech Camps for Middle School Girls, held at IBM sites in multiple countries, 2) WIT workshops for girls in the schools, run by IBM women volunteers, 3) quarterly electronic communications to this network, with all the latest activities happening in this arena, both inside and outside IBM, 4) strategic partnerships with WITI, WEPAN, SWE and other key organizations, and 5) IBM's own internal conference for technical women, held every other year.

Because the nature of these programs is ongoing and far-reaching, the MentorNet Call for Mentors each summer is well-received. Email communications are sent to alert former mentors that their continued support is needed, and new mentors are encouraged to sign up to help answer the growing pool of university participants. One technique that seemed to be very effective in IBM's mentor recruiting efforts this year was to survey mentors about their satisfaction with their mentoring experience in MentorNet at the conclusion of the academic season. These results were then used (which were overwhelmingly positive!) to interest others in the program.

Peggy Waterfall, Program Manager for IBM's Women in Technology focus, will discuss her experiences with these aspects of corporate mentor recruiting, and will share the results of her internal survey during the session.

CONCLUSION

MentorNet has leveraged technology and its partnerships to create a set of systems that achieve economies of scale and programmatic depth and breadth impossible to gain by one

or a few organizations acting alone. MentorNet has a strong interest in creating partnerships that work; partnerships that serve not only the interests of MentorNet, but also the interests of students, mentors, and organizational partners. These partnerships will continue to develop and be responsive to all parties' changing needs over time.

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AUTHOR INFORMATION

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Jennifer Dockter is a Program Manager with MentorNet. She is a graduate of the University of California at Berkeley, where she obtained a BA in Integrative Biology and the University of California at San Francisco where she earned a Ph.D. in Biomedical Sciences. She has taught anatomy at San Francisco State and run her own science writing business. Her personal interest in supporting women in science led her to join MentorNet, where she is currently responsible for web content development

MONICA H. LIN
A Student Affairs Officer in the Electrical Engineering and Computer Sciences Department at the University of California, Berkeley, Monica H. Lin oversees undergraduate women's mentoring programs and undergraduate research initiatives for 1,062 EECS majors. Beyond her departmental role, she serves all the engineering, science, and math departments as the campus MentorNet liaison to recruit women into the national electronic mentoring program. Ms. Lin was recently recognized for her student service contributions with the 2000 Chancellor's Outstanding Staff Award.

PEGGY WATERFALL
Peggy Waterfall is the Program Manager for IBM's focus on technical women. She graduated from Oklahoma State University with a B.S. in General Engineering. During her 20 years with IBM, Ms. Waterfall held a variety of engineering assignments in IBM's development laboratory and manufacturing plant in Tucson, AZ, as well as middle management positions in quality engineering, business strategy, and technical support for IBM personal computers and operating systems. She has been involved in competitive analysis in the PC marketing organization, and most recently managed IT architects and IT specialists in IBM Global Services. Her current role with the IBM Women in Technology team includes three areas: Communicating the initiatives to IBM women worldwide, coordinating programs designed to recruit and attract qualified technical women to work for IBM, and serving as the women in technology campus liaison for Georgia Institute of Technology.

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CAROL B. MULLER
Carol B. Muller is the founder and executive director of MentorNet, the national electronic mentoring network for women in engineering and science, based at San José State University. Also a consulting associate professor of engineering at Stanford University, she works with colleagues there in designing and implementing a series of engineering faculty development workshops. She graduated from Dartmouth College in 1977 with a major in philosophy and English, and earned masters (1981) and PhD (1985) degrees from Stanford University in education administration and policy analysis. As associate dean for Dartmouth's school of engineering in the 1990s, she co-founded the campus' award-winning Women in Science Project, building on her expertise in gender issues in education and employment. Among service on other boards, she was an elected member of the WEPAN Board of Directors from 1995-1999.