

REVIEWING THE START-UP PHASE OF MENTORNET: PROGRESS, FINDINGS, RESULTS, LESSONS LEARNED

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INTRODUCTION

MentorNet, the national electronic industrial mentoring network for women in engineering and science, is a national program which links undergraduate and graduate women studying engineering and related sciences with professionals in industry for year-long, structured mentoring relationships conducted via e-mail.

In considering strategies to address the under-representation of women in the technical work force, mentoring has been proven to be useful as part of the solution¹. Yet not all students currently have access to mentors. Time and distance prevent more technical professionals from serving as mentors in traditional face-to-face mentoring relationships. MentorNet seeks to leverage the growing use of electronic communications technology to retain more women in engineering and related sciences through a structured mentoring program which provides students with information, support and encouragement, a sense that a real person cares about their success, and an opportunity to explore and visualize the future. Through the mentoring experience, we also want to construct a trajectory that moves students from dependence to independence, so that they will gain understanding about the process of mentoring and its value, and thus be in a strong position to initiate their next mentoring relationship. MentorNet, in leveraging technology which has only recently become widespread in its use but shows great promise for communications in mentoring, also seeks to establish best practices in "e-mentoring."

USE OF ELECTRONIC COMMUNICATIONS IN MENTORING

"E-mentoring," also sometimes termed telementoring, cybermentoring, or virtual mentoring, describes a mentoring relationship which uses the tools of electronic communications either to extend and enhance an existing mentoring relationship, or to create one where it would not otherwise exist. For those of us who have become quite comfortable with the use of e-mail over the last decade or more, which includes most professionals in higher education, particularly those working in engineering and science education, there are some obvious benefits to use of e-mail for mentoring. We recognize

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that it is a technology that is relatively easy, comfortable, and accessible for regular computer users. We can readily communicate with others regardless of their location or geographic proximity. The asynchronous quality of e-mail allows for less disruptive communications across time zones, and across lifestyle differences, so that a student can query a professor at 2:00 a.m., and the professor can respond early the next morning, each at times convenient for the individual.

There are less obvious advantages to the use of e-mail in mentoring when compared with traditional face to face mentoring. E-mail allows communication to be thoughtful and deliberate. MentorNet participants can take time in composing a message, to get their query or response to a point where it reflects just what they want to say. Furthermore, e-mail provides a record of the communications. Electronic communications also attenuate status differences². A student can easily communicate with a high-powered executive, without being intimidated by direct confrontation with reminders of status differences, such as age, style of dress, office furnishings, security and/or secretarial screening. The restricted channel of communication helps to build relationships between individuals, and gives those who otherwise are often on the margins of mainstream groups more opportunities to participate fully in conversational exchanges². When a student is just one of a handful of women in an engineering classroom, if not the only woman, as frequently happens, she may feel isolated from her peers and may be less likely than her male classmates to participate fully in discussions and exchanges. With e-mail, the restricted channel of communication helps build relationships and give all students an equal opportunity to participate.

MENTORNET STRUCTURE

MentorNet is designed as a *national* program for three primary reasons. First, the large pool of mentors and students provides greater diversity in participants, leading to better matches between any given student and mentor. Second, students are not limited to those sectors of industry concentrated in their campus's location or specific sphere of industrial relations. Third, economies of scale offer organizations relief from the costs of administering small individual programs.

MentorNet focuses on *industrial* e-mentoring for several reasons. Although most students ultimately find employment in industry, the primary mentors available on college campuses are those in the academic profession. Electronic mentoring allows industry professionals to serve as mentors, including those whose locations, time and scheduling constraints would preclude participation in face-to-face mentoring relationships with students. Such mentors can provide students with a greater awareness of post-graduate opportunities in industry, thus encouraging retention in science and engineering³. Corporations have expressed interest in helping to support a program that will serve their goals in developing and recruiting the best talent available for the future scientific and technical work force. In terms of pragmatic considerations, future sustainability of MentorNet is more likely if it serves the needs of corporate partners in addition to serving students and universities and colleges, because corporations have

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funds available to help support such endeavors. Finally, while a national e-mentoring program could benefit many populations, such a new, developing venture must establish some limits to provide a focus for its initial activities. Once a program has been established, tested, and proven effective, expansion to serve other target groups is possible.

MENTORNET PROGRAM

MentorNet represents a structured mentoring program, providing matching, training, coaching and ongoing support, evaluation, and closure. The design of MentorNet is based on research in a variety of areas – mentoring, women and gender issues in engineering and science, human-computer interface – and also benefits from the experience and evaluation of pilot testing. The web site – www.mentornet.net – provides on-line information, applications, and training materials.

Eligible mentors are those professionals working in industry with educational backgrounds in engineering or science, willing to commit to exchange of weekly email with a student for one academic year. Mentors may be men or women. In 1998-99, approximately 80% of mentors were women. A “Call for Mentors” is disseminated throughout the spring and summer, available in paper, e-mail format, and PDF files available on the web site. Corporate and professional society representatives help to disseminate the “call.” It is also distributed via electronic mailing lists, individual corporate and professional society contacts, by campus representatives to alumni/ae via publications and e-mailing lists, through showcases, exhibits, and presentations at professional meetings, and via “cold” faxes to corporate human resources and research and development personnel at technology-based companies.

Colleges and universities are invited to participate in MentorNet. While we are building toward capacity to include all interested, in the interim, campuses are selected primarily based upon the interests of MentorNet’s primary sponsors; as new funding organizations are added, the pool of campuses is expanded. Each participating campus is required to identify a designated representative to the program.

Eligible student participants are those undergraduate, graduate, or postdoctoral students studying engineering or related sciences and math, who are potentially interested in careers in industry, are enrolled at a campus participating in MentorNet, and who are willing to commit to regular e-mail exchange with a mentor throughout the academic year. While we emphasize that MentorNet was created to address the underrepresentation of women in engineering and related sciences, and has been designed with the specific needs of that target population in mind, we do not prohibit male students from participation; if men apply to participate in the program, they are treated just like any other student. To recruit students, information is sent to designated campus representatives, including sample e-mail text and PDF files for “posters” or flyers announcing the MentorNet opportunity to students. Campus representatives may choose a target population for dissemination of the information, based on the specific campus

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and its population, but any student who applies from that campus and meets our eligibility requirements may participate. Representatives use a variety of mechanisms to spread the word to students, including e-mail, announcements in newsletters and at meetings, and student and faculty networks.

Prospective participants complete web-based applications, and the data from these feeds into a database. Applications request basic demographic information and ask prospective participants to indicate their preferences for particular characteristics in being matched with a partner, such as level of study, campus affiliation, gender, etc. Matching software (developed by MentorNet's systems administrator) sorts through the database to find the best matches among potential participants. Three rounds of matching, approximately two weeks apart, take place, and involve staff review of the matches suggested by the software program. Tentatively matched participants must individually approve the match, given brief, non-identifying information about their prospective partner, e.g. "a sophomore in mechanical engineering at Berkeley," before the match is official. In 1998-99, 539 pairs were matched from 973 students and 693 mentors.

Once matched, pairs are launched on their mentoring relationship. They are initially directed to training materials available on the web site to help them get started with introductions and establishing a mutual set of expectations for their mentoring relationship. In addition to this web-based material, in 1998-99, some mentors had the opportunity to participate in experimental, small group, on-line discussions of case studies with a facilitator. And, MentorNet's mentoring specialist provides regular e-mail "prompts" to all program participants which include "just-in-time" training with "hotlinks" to web site material, and suggested topics for discussion. We hope to begin to develop an interactive web-based training curriculum beginning in 1999-2000.

The regular weekly (to undergraduate students) or bi-weekly (to mentors and graduate students) "prompts" sent out via e-mail by the mentoring specialist accomplish three objectives: 1) they provide direct training content, 2) they serve as a reminder to students and mentors to exchange e-mail with their partner, and 3) they connect participants to the program on an on-going basis, reminding them there is a person to contact if they have questions or concerns about their mentoring relationship. The campus representative may also serve a role in tracking down students, or providing information if needed to help solve problems. At the end of the academic year, the mentoring specialist also coaches students and mentors as they determine if their mentoring relationship will come to an end, or continue in some other way, providing an important end-of-year closure to the mentoring relationship.

EVALUATION

MentorNet evaluation is being conducted by the Ithaca Evaluation Group (<http://www.itheval.com>), and involves a three-pronged approach. All mentors and students are asked to complete mid-year and end-year web-based questionnaires designed to assist both formative and summative evaluation. In addition, a small group of mentor

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and student pairs have volunteered to copy their regular e-mail exchanges to the evaluators for content analysis, providing an unusual opportunity to understand the actual exchange between mentors and students that is not dependent on self-reported data. Finally, a longitudinal study will follow program participants to learn more about long-term effects and outcomes.

MENTORNET RESULTS

MentorNet first tested its national program through a start-up semester during the winter and spring of 1998. Of 280 students from 15 campuses and 241 prospective mentors who applied, 204 pairs were matched and participated. Matched mentors represented 93 different employers; 73% of mentors were women. The majority (54%) of matched students were studying in engineering fields, with an additional 18% in computer engineering or science, 8% in chemistry, 7% in bio-sciences or engineering, 5% math, 5% physics, and 3% geology/environmental sciences. From the pilot semester, we learned that expectations for weekly communications make for stronger mentoring experiences, and that participants were more likely to be satisfied when matched first on academic and career interests and backgrounds. Participants also indicated that one semester is too short a timeframe for a satisfactory mentoring relationship.

In 1998-99, of 973 students from 26 campuses and 693 mentors who applied, 539 pairs were successfully matched. Matched mentors represented 261 employers; 80% were women. 78% of matched students were undergraduates, 8% masters' students, and 14% Ph.D. students. Among students, 55% were studying engineering, another 24% in computer science or engineering, 8% in bio-sciences/biochemistry, 3% math, 3% physics, 2% chemistry, and 2% geology or environmental sciences.

In 1998-99, we revised and improved the matching protocol, and added non-moderated, topic-based electronic discussion groups for all mentors and unmatched students. In 1999-2000, we expect to double the number of matched pairs, add approximately 8 new campuses to the program, add some experimental small group mentoring experiences as alternatives to one-on-one mentoring, enhance and refine the electronic discussion groups, develop an electronic resume database for interested students, and develop a memberships program to underpin the long-term sustainability of the program.

FUTURE PLANS

While various models of sustainability were discussed in planning MentorNet, including the possibility of student participant fees, there has always been general agreement that financial support must come from participating organizations and external sources, rather than from individual participants. As noted previously, planning and initial start-up support has been provided through the generosity of a number of organizations. Through these resources, staff members were identified, and a pilot semester launched in 1998, and early partnerships have developed to help continue the start-up. We have also been fortunate in securing substantial start-up funding for the next three years to allow

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MentorNet to become more developed, to be implemented, tested, and evaluated, and its benefits documented, proving its value to its constituents and prospective constituents, to the point where its partners can fully support the program.

A membership program for corporations, professional societies, and universities is in the process of being developed to extend the program well beyond the duration of these start-up funds. The memberships program will have tiered membership fees, beginning at \$5,000 annually for a corporate member. Corporate members will be recognized on MentorNet's web site and in printed materials. A company-designated representative to recruit mentors within the company and will receive a priority in matching their employees as mentors to students. The representative will receive monthly program and financial reports, as well as an annual report of evaluation and research findings related to MentorNet and mentoring programs in general. In the future, we will be developing an electronic resume database for MentorNet students to post their resumes if they are seeking short-term or permanent employment. Corporate members will have exclusive access to this database, and also will be able to post job opportunities on the MentorNet web site. Universities invited to participate in MentorNet will also be asked to join MentorNet as members with a \$2,000 annual membership fee, and professional society memberships will take a similar form to the corporate membership program.

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