CENTER FOR Children & Technology

Critical Issues in the Design & Implementation of Telementoring Environments

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Introduction

In 1994, *Telementoring*, online mentoring via the Internet, was still a relatively experimental idea. While there were many examples of online exchange programs between students at different schools, few programs at the time supported one-on-one mentoring between older professionals and young people online. Over the last five years, the widespread use of electronic mail (email) has opened up a broad range of educational possibilities for students. As a result, online mentoring via the Internet has proliferated in the form of collaborative projects and special programs to provide resources for students and educators across the country. Yet, many questions remain about how to structure and support online relationships and how to scale-up such programs to reach a broad range of participants.

With funding from the National Science Foundation, EDC's Center for Children and Technology conducted a three-year experimental project to develop Internet-based telementoring environments that link high school girls in science and technology courses with practicing professionals for ongoing guidance and support. *Telementoring* aimed to create online environments in which young women in high school could safely discuss their school experiences and feelings with practicing women professionals who have "made it" in science and technical fields. In turn, these professionals could constructively address many of the girls' apprehensions, tensions, and conflicts and help sustain their interest in science and technology.

Mentoring programs specifically designed to sustain the interests of high school girls in science and technology are currently available in a wide variety of forms. While many of these programs have succeeded in raising career awareness, few have provided widespread opportunities for girls to receive sustained support for dealing with the psycho-social and emotional issues that come into play as they pursue courses in nontraditional fields of science and technology. Because high school girls have no easy access to professionals, telecommunications appeared to be a particularly effective medium in which to provide this kind of support.

Over the course of the *Telementoring* project, we learned a great deal about the issues and challenges that arise in designing and supporting online mentoring environments which focus on building "relationships" among people who never meet face-to-face. Based on research from implementation phases of the project, we examined the key features of our program design and some of the critical issues that emerged as we worked with teachers, students, and mentors.

Background Information: Project History and Participants

From the outset, *Telementoring* was developed from the premise that merely getting people online is not enough; to fully utilize the strengths of online communication, attention and care must be paid to building and maintaining a sense of community online among participants. To accomplish these goals, the project consisted of three phases of work over a three-year period: formative research to develop the project components in Year 1, a pilot implementation in ten schools in Year 2, and a larger scale implementation of the program in Year 3. The program gradually scaled up from working locally with a small number of high school girls and female professionals in Year 1, to 109 mentor-student pairs in Year 2, and 153 mentor-student pairs in Year 3 (see Table 1).

Table 1: Scale-Up of *Telementoring* Participants over the Three Years

	Year 1 (1994-95)	**Year 2** (1995-96)	**Year 3** (1996-97)
# of Girls	7 girls 109 matched	115 applied 153 matched	216 girls applied
# of Schools	1 school	10 schools	20 schools
# of States	New York (1 state)	AL, CO, IA, NM, NY, TN (6 states)	AL, CO, IA, NM, NY, TN (6 states)

Over the project's three years, *Telementoring* reached schools in six states (New York, Alabama, Tennessee, Iowa, Colorado, and New Mexico). The mentors were professional women, at all levels of experience, working in a variety of scientific and technical fields, and they hailed from all regions within the United States as well as Australia, Canada, England, and Japan. A range of urban, rural, and suburban locations were represented in this group of mentors and students, as well as a diverse population that included Native Americans, Pacific Islanders, Asians, Black/African-Americans, Anglos, and Latinas. Given this diversity, our preeminent design challenge was to develop a set of online structures and strategies for bringing young and old together online for meaningful exchanges.

Background Information: Project Components

Based on formative research during the face-to-face of the project, we developed a number of online communication formats and resources intended to support different participating groups — students, telementors, and teachers. These included:

- **One-on-One Mentoring Relationships:** At the heart of *Telementoring*, high school girls were matched with female professionals to engage in one-on-one discussions about useful strategies for overcoming obstacles and fears, expert knowledge, and sound career advice. This was the core component of the project and the most time intensive.
- **Peer Lounges:** Each category of participants (mentors, students, or teachers) was provided with its own mailing lists, referred to as "lounges," to engage in training experiences that helped prepare them for their *Telementoring* experiences and to learn informally from each other.
- **Discussion Forums:** Large-group discussion forums, moderated by project staff and experienced mentors, addressed topics such as the balance of family and work, self-image and self-confidence, networking and professional contacts, career opportunities and options, and strategies for dealing with classroom issues.
- **Online Resources:** A World Wide Web site offered detailed information about the *Telementoring* project as well as project-related materials, current research, college and career information, and other information sources that had proven useful in supporting young women in science and technology.
- **Guides for Preparation and Implementation:** Print-based implementation guides for teachers as well as orientation materials for students and mentors were designed to support participation in the project.

About This Report

The primary goal of the *Telementoring* project was to help create relationships between younger and older people for career counseling and personal guidance. This meant that our research and development efforts were focused on the social dimensions of building relationships between groups and individuals in the electronic medium. As a result, we learned a great deal about the necessary supports for promoting productive dialogue online and all of the associated preparation needed to get participants committed to such a venture. This report discusses the key design features of the *Telementoring* program and provides insight into critical implementation issues that were encountered over the three-year project period. Following the natural progression of the *Telementoring* project activities, we explore the following themes:

- Strategies and Issues Surrounding Participant Recruitment
- Establishing Effective Access
- Mentor-Student Matching
- Managing Participant Expectations through Online Preparation
- Facilitation Techniques for Working in the Online Medium
- Pros and Cons of Informal Discussions
- Dealing with Diversity Online

We discuss how *Telementoring* approached each of these programmatic issues and some of the challenges encountered. To shed light on future directions for *Telementoring* program development, we close with considerations for program scale-up and sustainability.

Strategies and Issues Regarding Participant Recruitment

The first step in implementing *Telementoring* involved the recruitment of participants. This step included identifying mentors who were interested in and able to participate in online mentoring relationships, and locating schools where one or more teachers were willing to act as the project liaisons who could recruit students. Since the project's goals were to support and sustain the interests of high school women in science, engineering, and computing, we were particularly interested in targeting girls who exhibited some interest in these fields or were taking advanced courses in these fields. Various strategies were used for recruitment, and the results were surprising.

Recruitment Strategies

Mentors. Mentors were recruited online as well as in-person. An announcement describing the project and inviting applications was posted to a variety of lists with a broad audience including: Black on Black Communications, Society of Hispanic Professional Engineers, Mexican American Engineering Society, Society for Black Engineers, AISESnet for American Indian Scientists, SYSTERS, and Women In Science and Engineering Network (WISENET). In-person recruitment took place at several conferences hosted by leading women and technological associations, including Women in Technology International (WITI), the Supercomputing Conference, and the Telecommunications in Education Conference. In addition, our returning mentors passed on information to their colleagues about the project, and as a result a substantial number of new mentors were recruited through these informal networks.

Professionals interested in participating as mentors were asked to complete online applications asking about their educational background, professional experiences, previous mentoring experiences as well as their interests in the program and their general experiences as a women in science and technical fields. A substantial effort was made to ensure that mentors represented a wide range of backgrounds including race, age, geographic location, career field, and level of education. To become eligible to participate, mentors were required to sign an Acceptable Network Use Agreement which outlined guidelines for appropriate and inappropriate online behavior.

Schools. Schools for the *Telementoring* project were recruited primarily through the Department of Energy's *Adventures in Supercomputing* (AiS) program. The primary goal of the AiS program is to capture and cultivate the interests of diverse populations of high school students, particularly girls and students of color, in science, mathematics, and computing via project-based computational science

courses. Partnering with this existing program gave the project access to schools where Internet connections had already been established. Furthermore, the AiS program provided a unique opportunity to work with a wide range of ethnically and economically diverse high schools from across the country who were involved in computational science courses.

Teachers at these schools were alerted to *Telementoring* through in-person contact with AiS coordinators in each of the five states where the program was in operation, as well as through conference presentations and mailings. In addition to the AiS schools, a New York City high school participated in the program, acting as a pilot site for the face-to-face, and as an ongoing site during Years 2 and 3. Schools interested in joining the project were asked to complete a school application and to appoint a teacher as a project liaison who would act as the contact person for the project.

Teachers. While we targeted our recruitment efforts at the school level, the school's actual decision to join the project usually rested on the interest of one or more teachers, and they were often the only contact the project would have with the school. The project was presented as a way to help support girls who were interested in fields or courses related to science, engineering, and technology. Because the teachers were involved in *Adventures in Supercomputing* classes it was assumed that they would have contact with girls interested in these areas. In agreeing to be project liaisons, teachers were asked to be responsible for recruiting students, introducing the project to these students, and maintaining contact with students as they developed their mentoring relationships. In addition, teachers were asked to help with the collection of data and administrative forms for the project, and to intervene occasionally when any issues or problems arose.

Students. Students were recruited by teachers who were interested in the project and who completed a project application for their school. Teachers at different schools presented the project somewhat differently to their students. This was anticipated and introductory packets about the project were prepared for each teacher to make available to interested students and their family members. Included in the packets were student applications which asked for specific information to be used during the student-mentor matching process. In addition, applications contained other basic questions that probed for students' interests and expectations of the project. During the third year a videotape highlighting the experiences of mentors and students in the *Telementoring* project was created to give students a more descriptive orientation to the project.

Critical Issues Regarding Recruitment

Though the project did not expect any major recruitment obstacles, staff did anticipate more difficulties recruiting mentors and fewer difficulties recruiting students and schools. We found the opposite to be true.

Overall, mentors, in greater numbers than expected, were interested and willing to participate in the project. Those expressing interest, whether via email or through direct contact during conferences, indicated a high level of interest and motivation in mentoring female high school students interested in science, engineering, or technology. Mentors explained that they were particularly drawn to the program because it specifically targeted girls. In addition, many women interested in the project indicated that mentoring by email was an ideal way for them to contribute to a good cause because their very hectic and inflexible schedules prevented in-person mentoring. This combination of attractions — targeting girls and utilizing telecommunications technology — produced a far greater pool of interested mentors than anticipated for the overall size of the project.

The imbalance in numbers raised the problem of possibly misleading mentors about the likelihood of their being matched with a student. Staff addressed this issue by making clear the probability of a match and by limiting the number of mentors who were included in online mentor preparation sessions.

The recruitment of schools and teachers presented several challenges throughout the project's duration. While *Adventures in Supercomputing* provided access to a large pool of schools with Internet access and diverse student populations, not all teachers in these schools saw the need to bolster the interests or efforts of their female students by providing them with a project perceived to be outside of the school curriculum. For some teachers, this feeling was compounded by a concern that they could be placing themselves and their schools in an awkward position by initiating a girls-only program. In some instances, teachers indicated that they had received an indirect message from the district office that "targeted" programs were inappropriate for their schools.

These perceptions of the program had a significant impact on how many schools signed up for *Telementoring* and ultimately the number of girls we were able to reach. It became apparent to staff that the teachers we were attracting to the project were those who already had a strong understanding of the need to provide additional support and guidance to high school girls in the sciences — those who were themselves women science educators, and those with school-age daughters.

As mentioned earlier, recruitment of students was largely facilitated by teachers at the school level who had agreed to act as project liaisons. This allowed for significant variations in how the project was presented to students based on differences in school cultures and needs. Some teachers called a meeting of all the girls in their classes after school to describe the project and ask for volunteers to participate; others gathered the girls during class time and asked for volunteers; still others made participation mandatory for girls in their science or technical courses.

Another challenge presented itself in how teachers identified students for *Telementoring*. While project staff assumed that girls in Supercomputing classes had enrolled because of an interest in technology, mathematics, or science, this was not necessarily the case. Many girls were enrolled in AiS classes because of class scheduling needs, computer course requirements, the email accounts which were allowed only as part of a class, or simply by accident. Under these circumstances, the pool of students from which teachers recruited was configured differently than had been expected. The students were more diverse and had a broad range of interests not necessarily connected to the sciences or technology.

In retrospect, we recognized that student and teacher recruitment requires a more careful examination of how such a project is presented and framed. This is particularly true for an online project, which can seem relatively esoteric if mentors, students, and teachers never meet face-to-face. As a first step in addressing this issue, the project produced an orientation videotape that included mentor and student perspectives on what *Telementoring* involves and the benefits it affords participants. In addition, recruitment brochures and materials were continually revised to provide a clear sense of program requirements and benefits for students.

Issues in Establishing Effective Access

To participate in the *Telementoring* project, all students were expected to have email accounts and to communicate regularly with their mentors (i.e., 1–2 times a week). Therefore, schools that expressed interest in joining the *Telementoring* project were asked to complete an application which included specific questions about their Internet connectivity and the quality and availability of email access for students. Though school staff were clearly informed of access requirements during the application process, we learned that the majority of students did not have adequate email access at their schools on a regular basis for a variety of reasons.

Nearly all AiS schools who joined the project were responsible for their own servers. Nonetheless, several lacked adequate technical support to maintain them, and this often resulted in long periods of non-connectivity. Schools outside of the AiS program that were interested in joining encountered a number of obstacles in establishing email accounts for students. These were largely related to district policies that burdened teachers with heavy administrative requirements or restrictive guidelines that did not permit schools to issue accounts.

By far the most prevalent problems concerned access to email within schools. This was evident in our visits to schools during the implementation and evaluation phases of the project. In some schools the number of computers available was limited, and girls found themselves competing with boys (and often losing) to get online time. In other schools students were allowed only five to ten minutes of online time at the beginning or end of class to read and respond to email. For some students the email address lasted only the length of one class (a single semester) and was then shut down — prematurely terminating mentoring relationships. In schools in which the computer lab was open during lunch or other free periods, accessibility depended entirely on the willingness of a single teacher to stay late or come in early.

These findings pointed to the importance of not only outlining requirements for Internet connectivity but being more specific about the conditions of access necessary for supporting regular online exchanges. They also point to the difficulties teachers had integrating such a program into their curriculum. Because exchanges were highly individualized and took place between students and their mentors, it was easy for the project to become "invisible" to teachers. Consequently, any motivation to make access more deliberate was decreased.

Managing Participant Expectations through Online Preparation

Despite the distribution of orientation and recruitment materials highlighting the goals and objectives of the project, our pilot research showed that many individuals, including mentors, students, and teachers, did not know what to expect from a mentoring relationship. This was compounded by a lack of experience with developing and sustaining online relationships. As a result, participants' expectations were often significantly different from one another's and from those envisioned by project staff. This presented a design challenge that required the project to develop strategies for building a shared understanding of the project's goals and at the same time responding to the differing needs of students, mentors, and teachers.

Participant Expectations

Mentors often assumed they would be mentoring someone who was essentially like their own remembered high school self. These memories often did not include the intense social pressures and concerns that our project's students experienced in their lives; rather, mentors' memories included a serious focus on academics, college, and the world of work. Getting mentors to recognize that students vary greatly from each other and from a mentor's own experience was crucial to preparation for the mentoring role. In addition, many mentors were unaware of the day-to-day workings of schools that impact students' work. Reminding mentors that students did not have continuous email access and often could reply to messages only twice a week was very important in mitigating hard feelings on the part of many mentors who expected immediate responses from their students.

Students, too, came to the project with their own set of expectations. Many held stereotypical images of women scientists and expected that their mentors would be "too old to relate to a student," "stuffy," and "not so friendly." At the same time, many students expected only to chat with their mentors, viewing them as pen pals or acquaintances who would be interested in their relationships to family, friends, and boyfriends. Some students expected to focus exclusively on projects that were class assignments.

Teachers' expectations generally fell into two categories: either they saw the mentors serving as project mentors for their students' project work, or they saw them as completely outside of the school curriculum and providing supportive relationships for the students. In addition, many teachers were unsure of how they should relate to their students' mentors, and some expected to play no role once the project was initiated.

Given these divergent understandings, project staff worked to promote more reasonable and shared expectations among mentors, students, and teachers. This was done in two ways:

1) Through the development of print and video materials that clearly explained what online mentoring could be like and how to encourage these relationships online
2) Through the development of online "prep sessions" tailored to meet the needs of each group of participants.

Both approaches helped to reduce inappropriate expectations on the part of different participant groups. However, the online "prep sessions" were significantly more effective because they elicited active discussion around key issues that helped to dynamically shape participants' understanding of *Telementoring*.

Online Preparation Sessions

The online preparation sessions were initially envisioned as a way to help mentors and students become familiar with the challenges of communicating online rather than in person. However, they quickly evolved into a more substantive project component with the far greater goal of conveying information to participants about project expectations, student-mentor relationships, diversity, online etiquette, and communication approaches.

Online "prep" sessions were designed for each cluster of participants in the project — mentors, teacher liaisons, and students. Each prep session varied in its structure and resulted in varying levels of success.

Mentor Preparation. The mentor prep sessions followed a highly structured format which spanned approximately three weeks and included groups of fifteen to twenty mentors subscribed to mailing lists which we referred to as "mentor lounges." Each mentor prep group included a mentor trainer (either a project staff person or an experienced Telementor) who had been given a detailed guide for facilitating online training and ongoing support from project staff. Before prep sessions began, participants were sent *Telementoring* packets which included print materials outlining the project goals, contact information for project staff, an Acceptable Network Use Agreement, and mentoring information (e.g., the *Guide to Online Mentoring* and the *Telementoring Netiquette* guide).

The mentor prep sessions presented three scenarios highlighting issues drawn from student interviews conducted during the first pilot year of the project. The issues concerned:

1) A student's self-confidence and self-esteem
2) Mathematics anxiety and its effect on girls' willingness to persist in science and technology
3) Working in groups, particularly those in which male and female students are expected to work together and there is dissatisfaction with how the group is functioning.

Mentor Prep Scenario for Online Mentor Training Session

Dear Mentors:

In our interviews with young women, several indicated that they were hesitant to pursue careers and studies in engineering because they were not able to visualize themselves as mathematical beings. One of the strongest students in a pre-engineering class, when asked if she was thinking of pursuing a career in engineering, responded:

"I have pre calculus now. And it's not that I can't do the math involved in the mechanical (engineering) class, it's that I can't do the math involved in my math class, and so, if you need to take certain math classes when you are there (college), I don't know if I would be able to deal with those classes."

Many of the young women we work with believe that the people who make it in technical careers start out mathematically gifted. When these students encounter difficulties in math class, they begin to question their own ability to pursue a technical career.

- *What kind of practical advice can you offer a student that would help her reevaluate her attitude toward mathematics?*
- *How do you help students believe that mathematics is more accessible and within their reach?*
- *What experiences can you share from your own life that can help demystify mathematics for these students?*

Please respond to this scenario under the heading, Scenario 2 Math Minded? by Friday. A new scenario will be posted for the weekend.

Look forward to the conversation!

In addition, all mentors were asked to complete a brief biography of themselves to share with their future mentee, and to describe a day in their lives at work — a virtual office visit.

Each scenario and task was introduced by an online facilitator whose primary role was to model the kinds of interactions that would be expected of mentors: responding promptly to posts, using language that is clear, demonstrating an openness to other's ideas and opinions through inviting a variety of solutions to a problem, and through encouraging participants to comment on each other's postings.

While the content of the three scenarios was considered important, staff saw the scenarios as vehicles for communicating the larger goals of the project to the mentors, including:

1) The expectation that mentors would provide support and guidance rather than directive instruction in content areas
2) The understanding that students differ in their academic levels, as well as with regard to the values they and their families/communities have
3) The assumption that all members of the project (students and mentors) have something valuable to contribute to an online mentoring relationship.

Once trainings were completed, the mailing lists remained available for mentors to discuss issues and concerns arising in their mentoring relationships. Overall, mentor preparation was the most significant and well-received component of our project. Mentors reported that they gained specific strategies for dealing with issues that their students raised in the context of their relationships. Perhaps more importantly, mentors felt supported by their peers and able to use each other as a resource throughout the project.

Student Preparation. To help prepare students for their online relationships with mentors, students were subscribed to separate mailing lists known as "student lounges." The lounges were essentially unmoderated listservs that accommodated 7 to 50 students, depending on the year. In the pilot year, the student lounge had proved to be a valuable place for allowing the girls to make connections with each other and also to become familiar with expressing themselves clearly in an online medium. As we scaled up in Years 2 and 3, we thought of the student lounge much more as a place in which students could prepare for their relationships with their mentors and meet project requirements by:

- Creating a biography that describes their background and interests
- Drafting a set of burning questions that they have for their mentors
- Responding to research queries.

In Year 2, students from the first-year pilot were recruited to serve as facilitators of the student lounges, responsible for orienting students to the project and helping them make connections with peers around the country. Because this was a new approach to student lounges (in the first year the student lounge was largely an informal space formed by the students), lounge facilitators participated in periodic training sessions with project staff in which they discussed what was happening on their lounges as well as how to involve more students, jump-start communications, and settle conflicts. We discovered that student facilitators needed far more support than we had realized in dealing with the diverse interests and conflicts that arose in the lounges and diffusing these conflicts effectively online.

As a result, we decided in Year 3 to maintain the lounges as places for students to share and test out their personal biographies introducing themselves to mentors. Once students completed their biographies, the online lounges were wide open for students to use as they wished. They were largely seen as informal opportunities for students from a broad range of schools to have access to a larger community of support among girls their own age.

The student lounge proved to be especially important to our first-year participants as a tool for building stronger bonds of support among each other in the school and for developing online communication skills. As we scaled up the project in the second and third years, and lounges contained 25 to 50 students from different parts of the country, we encountered more difficulty in sustaining productive conversation. Students were less motivated than mentors to prepare for their relationships in this way, and successful student prep periods depended largely on the composition of the groups and the presence of students willing to take on a facilitative role.

Teacher Liaison Preparation. As mentioned earlier, teachers serving as project liaisons were primarily responsible for upstarting *Telementoring* in their own classes. As project liaisons, they were responsible for recruiting female students, hosting orientation meetings for students and their parents at their schools, filling out necessary paperwork, and matching students with mentors provided by CCT.

To assist teachers with their responsibilities, we created a separate mailing list known as the "teacher lounge." Teachers were engaged in a series of discussions to help understand the project goals and to answer questions regarding the program.

These discussions were facilitated by project staff and included:

- Getting to Know You — Introductions
- Telementoring Goals and Expectations: What Does Mentoring Mean Anyway?
- Bring Your Students to the Web — Attitudinal Questionnaires
- Recruiting and Orienting Students
- Mentor-Student Matching
- Feedback: How Are Your Students Doing?

While teachers found this information useful, they indicated that they did not always have the time to get online and respond to messages. Instead, they were most interested in raising specific implementation issues as they came up during the project. As a result, the teacher lounge evolved more into a space in which administrative and project announcements were made. In lieu of extensive online discussions, all teachers received a *Quick Guide to Getting Started* and a *Telementoring Orientation* video that highlighted project goals from the perspectives of former mentors and students in the program. While the video was created for teachers to show to their students for recruitment purposes, many teachers viewed the tapes for their own orientation to the program. The video sparked interesting online discussions among teachers that did not occur in previous years; subjects included whom the program was most appropriate for and how to deal with issues of diversity.

Critical Issues in Online Preparation

Providing online training and orientation for mentors and students allowed project staff to introduce many common pitfalls of online communication to participants prior to engaging in mentoring relationships. This also gave staff an opportunity to help participants identify their own expectations, develop realistic goals, become familiar with the online environment, troubleshoot technical difficulties, and acquire some familiarity with online communication conventions.

Though staff regarded both members of any given mentoring pair as equal contributors to the overall relationship, greater emphasis was placed on training the mentors for several reasons:

- Mentors were the adults in the relationship and were expected to carry the primary responsibility for initiating and sustaining contact with their mentee. This meant they would need successful strategies for doing so.

- They had more online access time and experience with the culture of email. Almost every mentor had continuous access at their place of work, and many also had access at home. Mentors tended to check their email at least one time a day.
- They were more motivated to participate in intensive training experiences. Many mentors indicated that they had wanted to mentor young women for some time but that this was their first opportunity that fit into their schedules. They also indicated, however, that they were somewhat nervous about what would be expected of them. However the combination of eagerness to mentor, and nervousness about what to expect, can explain mentors' willingness to commit a considerable amount of time and energy to the training process.

Students and teachers, on the other hand, were far less able and willing to participate in extended online training for a variety of reasons:

- Their access to email was often limited to ten or fifteen minutes a day, which did not allow time for reading and responding to multiple postings.
- They did not see *Telementoring* as an experience that they needed to prepare for and therefore perceived preparation as an assignment rather than a necessity.
- The *Telementoring* project was not part of an academic requirement and there was little incentive for completing training activities which most students viewed as busy work.
- Students did not perceive the "need" for a Telementor in the same way that the mentors seemed to want a mentee, though over time many students became as enthusiastic as their mentors (and some even more so).

Designing online preparation experiences to meet the needs and attitudes of each cluster of participants presented an assortment of opportunities and challenges. Through further refinement of materials and online prep sessions, the project succeeded in maintaining a common level of expectation and promoting an understanding of the online environment and its limitations. Online prep sessions were most useful to adult mentors.

Mentor-Student Matching

A significant feature of any mentoring program involves matching mentors with students. For *Telementoring*, the matching procedure evolved over the course of the project to reflect a variety of issues, including:

- Formative research findings
- Scale-up issues
- Student levels of satisfaction with their matches
- Mentor levels of satisfaction with their matches.

Project staff expected *Telementoring* to require the same matching strategies used by face-to-face mentoring programs. Given this, staff examined the matching methods of a variety of projects (both small local programs as well as national programs) and incorporated a range of key matching techniques into the *Telementoring* process.

In addition, project staff conducted extensive interviews during Year 1 with student participants regarding their thoughts and attitudes toward mathematics, science, and technology; school; the sciences in general; and their perceptions of themselves as young women pursuing course work in the sciences. This information helped define criteria for matching students with mentors.

Prior to matching, staff obtained information from students and mentors about their career or career interests, hobbies, other interests, and demographic particulars. This information came from student and mentor applications (supplemented by student interviews during Year 1).

Once students and mentors had completed the project's pre-matching requirements (completion of the application and network use agreement, and participation in the student lounge or a mentor prep session), they entered the matching process.

Mentor-Student Matching Process

The process by which students and mentors were matched varied over the course of the project, due in part to our interest in optimizing the procedure and in part to challenges that arose during programmatic implementation. These approaches ranged from highly individualized to predominantly automated. From each stage, we learned about the types of things that were actually important to students and appeared to make a difference.

YEAR 1: INTERVIEW-BASED MATCHING FOR SMALL GROUPS. Students participating in Year 1 attended one New York City school and all were interviewed by project staff. Once interviews were completed and students' individual needs and issues assessed, project staff considered what qualities each individual might require for a good mentor match. A number of mentors were identified as potential matches, and each was considered as one who might contribute to the students' growth and development. The *Telementoring* staff reviewed all mentor and student applications as well as interview transcripts and identified a set of student and mentor characteristics that could be used to make decisions about mentor-student matches as a whole (e.g., mentors who expressed a sensitivity to gender-equity issues would be matched to students who expressed problems dealing with inequities in the classroom). Staff anticipated that this experience would contribute to an extensive understanding of the matching process and the criteria that might be involved in establishing matches that work.

This matching process is the most individualized of the three approaches that were tried over the course of the project. Staff made an effort to identify students' concerns and then worked to match mentors according to those concerns. For example, several students expressed some anxiety about math ability, and they were matched with mentors who were viewed as having attitudes towards mathematics that would help the student to overcome this anxiety.

This required project staff to evaluate what qualities in a mentor indicated an ability to help a student in this situation. Mentors who reported struggling to understand mathematics were seen as better choices for students experiencing mathematics anxiety than mentors who indicated that mathematics was always easy.

After examining our preliminary sample of students and mentors, staff came away from the first year with the understanding that the matching of students and mentors is not a science, and while some matches looked perfect on paper the personality of the participants contributed enormously to the success or failure of a match. This would be very difficult to glean from project applications. While some matches that staff felt would be definite successes were less than stellar, others that staff were less sure of were highly successful.

YEAR 2: TEACHER AND STUDENT MEDIATED MATCHING. Since our pool of students in Year 2 was much larger and distributed across schools in five states, our matching efforts focused on expediting the matching process by distributing this task to schools. Thus, we experimented with three different procedures involving students and teachers in the matching process. The three methods varied the prominence of the student or teacher role.

The initial procedures resembled those carried out by *Telementoring* staff in Year 1. All students were required to complete an application on the Web, as were all mentors. Then, based on career interests, hobbies, and needs that students described in their applications, *Telementoring* staff selected a diverse group of suitable potential mentors. Mentor "profiles" were created from information in the applications. The profiles were mailed to teachers, who were given the following three strategies:

- MATCHING STRATEGY 1. Teachers decided which mentors should be assigned to specific students in their classes.

  This technique had the advantage of helping the teachers to feel very invested and very much a part of the project. However, it also amplified teacher bias. For instance, in some cases, teachers did not match students based upon the preferences and information that students had provided, but instead, they relied on their own impressions of the student and what she needed.

- MATCHING STRATEGY 2. Teachers made matching decisions for their students, but they asked students to review the matching decisions and to either accept or reject their match. If a student declined her match, she was asked to explain this decision and could possibly be reassigned to a different mentor, depending on the availability of mentors.

  Most teachers ignored this strategy, reporting difficulty in assembling all the students together to review the decisions. Many teachers felt that this option was too time-consuming and would delay the mentoring process.

- MATCHING STRATEGY 3. Upon receiving mentor profiles for their classes, teachers held a caucus of student participants (generally, a pizza party or some event at lunch or after school). Students reviewed each profile and selected their top three choices for a match. Their teachers then made the final decisions about matching.

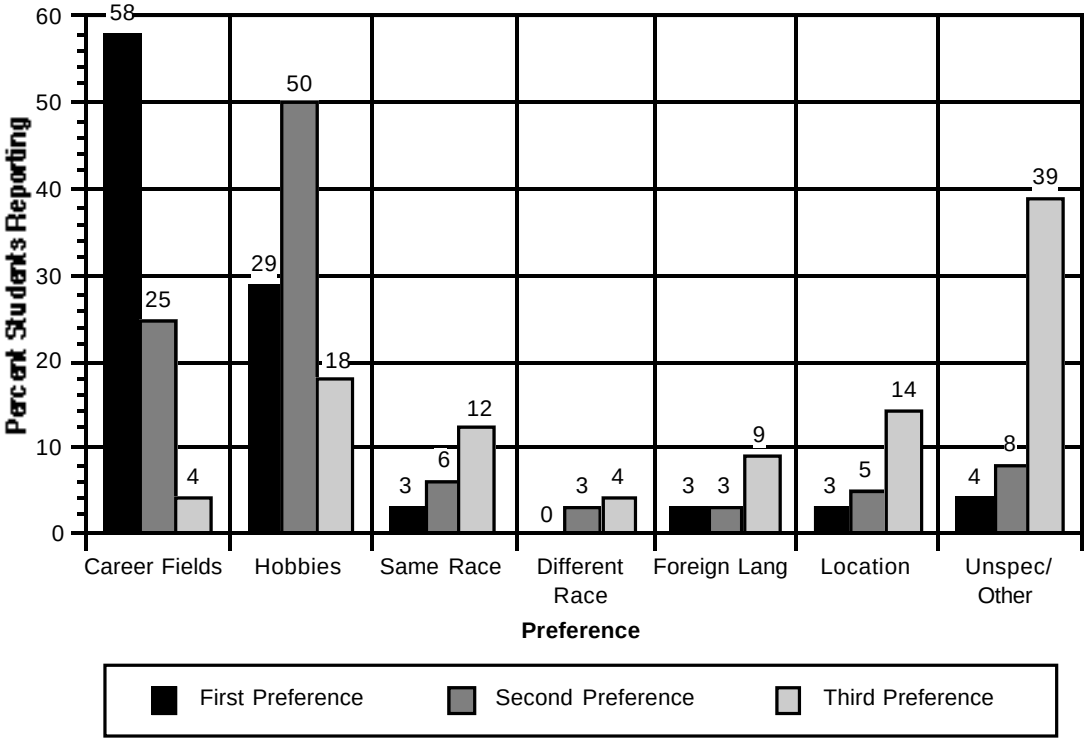
  This approach was favored by teachers though it was also quite time- and labor-intensive. Students also favored this process as it allowed them to feel some ownership and investment in the mentor match. Many students indicated that they were looking for traits such as a sense of humor in a mentor, or a type of personality, though they also acknowledged that these characteristics were not easily gleaned from a "mentor profile." In fact, the students acknowledged an element of randomness in successful matches; e.g., some indicated that they selected a mentor based on a shared first name, or an interesting geographic location.

YEAR 3: SEMI-AUTOMATED PREFERENCE-BASED MATCHING. Project staff identified several success factors in the matching strategies implemented during the first two years of the project and incorporated these into a final matching process for Year 3. This process addressed students' needs to be matched based on varying topics, teachers' time constraints, and the overall project need to negotiate large numbers of student-mentor matches in a short time frame.

Telementoring project staff made matching decisions based on preferences student indicated on web-based applications. The application asked students to select first, second, and third choices from a matching preferences list that included career interests, hobbies, urban/rural residence, and race. (This list was based on students' comments in Year 2 interviews.) All completed applications were automatically transferred from the Web to a database residing at CCT, which allowed us to semi-automate the matching process by searching mentor databases for individuals that met student preferences.

Overall, careers and hobbies figured significantly in students' preferences for mentors (see Figure 1 below).

Figure 1: Students' Matching Preferences as per Application (n=153)



Given the limits of the mentor pool, it was not always possible to match students on their first preference. In particular, many students asked to be matched with veterinarians, marine biologists, and environmental scientists. Very few of these professionals appeared in our sample of mentors. (In these cases, *Telementoring* staff tried to match students on both their second and third preferences.)

In some cases, supplemental information was sought in students' applications or from data supplied in students' online introductions.

When we asked students about the quality of their matches, three-quarters of those who responded reported that their match was satisfactory, even in cases where mentors did not meet their specified preferences, indicating again that preferences play only a small part in successful relationships.

Matching Implementation Issues

Overall, we discovered the importance of streamlining the matching process so that it was not a burden to teachers and schools and at the same time enabled project staff to conduct this process more expediently. Through our experiments with matching, issues of ownership for teachers and students arose; the more they were involved in the process the more they felt they had a hand in selecting their mentors, increasing their level of commitment. This, however, was a very labor-intensive process. At the time, the project had insufficient resources to build a database in which students would search for their own mentors directly, allowing for more ownership. We also did not believe this was the most fruitful approach to matching since we did not want our mentors to become candidates in a popularity contest. In addition, schools appreciated the mediating role of project staff.

Our solution was semi-automation in Year 3, when we relied on student preferences expressed on web-based applications. Even when automated, however, it was clear that mentor-student matching involved necessary and significant administrative tasks.

As we scaled up the program, mentor-student matching no longer occurred at one specific moment in the year, but rather, occurred in phases. In Year 2, classes were matched in three phases as they submitted required forms. In Year 3, most students were matched in two phases; the remainder were matched individually when requirements were met.

This cyclical matching process involved significant tracking of information, database management, and sending of notifications to teacher liaisons with respect to matches. The fact that students were not all matched at once relieved some of the administrative burden of this process. However, it also posed challenges: (a) In

order for classes to be synchronized, students who had met all requirements sometimes had to wait for classmates who responded more sluggishly. This occasionally led to a decrease in students' enthusiasm. (b) Some mentors were matched with students several months after their training had finished and at least three months later than other mentors with whom they had trained. These delays inevitably resulted in some disillusionment on the part of mentors. (c) When classes were not synchronized (i.e., when students were matched singly after submitting all the required information), it was difficult for project staff and teachers to keep track of everyone, increasing the chances for students to slip through the cracks.

When dealing with a nationwide program, coordination is extremely difficult because schools differ in schedules and procedures for dealing with special programs. Our experiences in *Telementoring* pointed to need for a designated staff person solely responsible for mentor recruitment and matching.

Working in the Online Medium: Supporting and Facilitating Relationships and Online Discussions

Developing a project centered on personal interactions mediated entirely by electronic communication presents many benefits and also potential obstacles. What kinds of information will participants need to enter into conversation successfully with others? What kinds of concerns will participants have? What difficulties will result from the non-visual and non-auditory environment that participants are expected to use for meaningful communication? Online facilitation techniques and strategies were essential in helping participants feel comfortable and confident in communicating online in both one-on-one relationships and in group discussions.

Facilitating One-on-One Relationships

Once mentors and students were matched, *Telementoring* was entirely reliant on the interactions that would take place between these pairs. This one-on-one relationship took place via private email between the mentor from her workplace or home, and the student who had access through school connections and occasionally through a home computer. These relationships varied enormously depending on a number of variables such as level of access for the student; comfort with using email; perceived compatibility with mentor; interest in participating in the project; and the level of technical difficulties at the school level.

Overall, *Telementoring* relationships were largely satisfactory for mentors and students. However, in interviews and evaluation surveys, students repeatedly mentioned a number of factors related to the online medium itself that influenced how relationships developed. In speaking with students about their *Telementoring* relationships, it was clear that there was no set path to success. Instead, there were many moments in which students and mentors could connect on a deep level. When a mentor's biography included enough personal information, it could often help generate more substantive conversation. Similarly, through exploring common interests (music, major hobbies, television programs), student-mentor conversations could often wander into deeper issues around career perceptions and aspirations. Humor and lightheartedness in mentor communications often gave students the permission to be silly as well as serious. And finally, direct questioning about the details of one's daily life sometimes led to larger questions and issues. Specifically, there were a few pointed strategies that appeared to be critical in helping online relationships thrive. These are highlighted below.

Attention to Personal Details. Most commonly, students appreciated their mentors' attention to personal details about their lives. For example, one student commented that her mentor looked on the map to find her town. Another noted that her mentor referred to what she had previously written and commented directly on these ideas. These examples suggest that students derive a sense of being listened to and being valued from this sort of attention to detail, and that this is especially important online when mentors and their students do not meet face-to-face.

Direct Affirmations. Students also reported feeling important to their mentors (and subsequently more invested in continuing the relationship) when their mentors told them so directly. One student beamed, "My mentor said I feel like I can talk to you about anything and that I'm mature." Another said that her mentor had told her how happy she was to see her (the student's) email message in her in box; it had made her day.

Examples of Direct Affirmations

- *Wow! I am sooooo proud of you for being such a trooper...*
- *I noticed right away that you have good writing skills. I don't know why that dawned on me...*
- *I enjoyed your last two email messages very much. It sounds like you are one busy, but well-balanced person!*

Personal Presence. Students appreciated knowing their mentors as more than just an email address or text on the screen. Emoticons, little drawings at the bottom of messages, anecdotes of daily life, and humor seemed especially important to the students' increased sense of their mentors as people. One student commented: "The way she makes me laugh is the most memorable about her. I like the way she expresses herself, and the way she opens herself in order to open myself too."

Examples of Creating Personal Presence

- *Have a good day. Say hi to your mom and Joe [the student's boyfriend] for me.*
- *Rotten week...why do things always seem to happen together like that? Haven't figured that one out yet. I'm sorry to hear about...*
- *Anyway, my fingers are saying hasta la vista or, since you're a member of the french club, a bientot et bonne nuit!!*
- *I thought you had been taken hostage by the oppians [Opp is the neighboring town and key opponent of the student's school.] ;>) since I hadn't heard from you in so long. Sorry about the basketball loss, but there's always next year... (I know you won't be there then, but still....)*

Avoiding Silences. Students often remarked that their mentors were very busy and were surprised that these women even had time for them. Given this sensitivity, the students tended to think unexplained silences meant they were an imposition to their mentors. Conversely, when mentors communicated promptly and frequently, the students felt validated. One student wrote: "I liked my mentor because not only was she prompt in her reply to my letters, she was also caring." Another said, "She is the greatest mentor...she always writes no matter how busy she is."

Determining What Is Off-Limits. Students (and mentors, for that matter) subtly negotiated which topics were appropriate for discussion and which were better left untouched. Students held varying beliefs about suitable topics. One felt she could not talk about family issues with her mentor because her mentor had only one daughter and might not understand. Another student was interested in talking about teaching but said her mentor clearly wanted to talk about engineering, so she didn't pursue the matter. Another student was hesitant about raising issues of religion, fearing that her mentor might be uncomfortable with the topic.

To help them determine what was appropriate and inappropriate, students often posed "test" questions to their mentors. For instance, one participant said, "I tested to see if she would respond to something personal, like church. But she didn't, so I didn't bring it up anymore." Another related that after receiving her mentor's "day in my life" description, she asked whether she was supposed to be the way her mentor was and communicate about the same things. Her mentor quickly assured her that she could be and communicate about anything she wished. This permission opened up the conversation and allowed the relationship to develop in the ways the student needed.

Experience and Comfort with Communicating Online. Most of the students participating in *Telementoring* had some prior experience using email and the Internet. Technical knowledge about email interfaces and web browsers, however, did not necessarily correspond with the ability to communicate effectively through the online medium. Indeed, students commented on this gap in skills. One student said, "I'm better at email and the Internet now. I learned how to make things clear in writing. You can be more humorous on the computer once you're familiar with it." Another related, "There's a need to master how to make things clear in your writing since messages can be read the wrong way." Given that students' facility with the online medium takes time and experience to develop, one must not rush to judgment about conversational difficulties encountered early on in the relationship. It is very likely that these difficulties might be due to rusty communication skills rather than personality mismatches. In these instances, mentors may have to take the lead by modeling effective online communication in their exchanges.

Our observations suggest that in order for online conversations to lead to depth, intimacy, and sharing, students must feel (a) valued; (b) that their mentors are more than just email addresses and text on a screen; (c) that they are engaged in a relationship, one in which they are not just being advised but rather one in which they are putting out ideas and being listened to. Furthermore, participants must be aware of certain attributes of the medium (for instance, limited nonverbal cues which lead students to ascribe more importance to factors such as silence) when building effective relationships online.

Moderated Group Forum Discussions

Many individuals, even those with some technical knowledge, have no picture or mental image of how a conversation can take place online. This is especially true for large group discussions where people never meet face-to-face. Without this understanding the participant is often unsure of what to post, how to frame postings, and how to respond to postings from others. In an online discussion this can lead to long online silences and lack of participation — sure signs of discussion failure. Participants need basic information such as:

- The kinds of interactions expected of them (e.g., personal)
- Standard conventions of online communication (e.g., refraining from writing in all capital letters so as not to yell)
- Model responses and questions demonstrating the tone and content of postings.

Providing this information can help participants to take the first steps toward joining an online discussion and can eliminate possible confusion and misunderstandings about their role as a member of an online group.

The program has evolved a range of activities that encourage students and mentors to engage in online group discussions. Central is the use of online hypothetical scenarios that resonate with participants' own lives. The scenarios were designed to be multifaceted, complex, and to capture some of the competing concerns that students often face, such as making college choices:

Scenario: College and You

Maria was accepted to a university out of state that has many courses she would like to take. Yet she is considering going to the local community college since it is affordable and she thinks she could transfer to a four-year college down the road. Deep down, the real deal is that Maria is conflicted about what to do since she would like to go away for college but at the same time she is not sure she is ready to leave her family and her hometown.

Her friend Karyl is a junior-year student and is interested in an environmental engineering program at a top college. The only problem is that she is not positive she wants to pursue engineering exclusively (she likes the performing arts) and there do not seem to be many other interesting courses that she could take at this college.

You are eavesdropping on Maria and Karyl's phone conversation:

What do they talk about? What choices do they have?

The scenario was designed to invite students and mentors to share their ideas about choosing colleges. The most striking aspect of the ensuing discussions was the broad range of issues touched on in response to a somewhat focused discussion on college choices. Topics included conflicts with parents, careers, relationships, peer pressure, and attitudes toward mathematics, very often in all within a single message. This sort of discussion environment, stimulated by a complex scenario and guided by skilled mentors, proved to support the integration of multiple ideas and concerns. This kind of integrated thinking is rarely fostered, let alone allowed, in classroom settings.

Following is a typical but telling example of a student response to the college scenario and a mentor's response.

Student Response

> Hey everybody,

This is gonna be quick because I'm really tired. I'm not really sure where I'm going. Maybe Lehman college, maybe Long Island University, maybe the University of the Arts in Philly. The only thing I'm sure of is that I'll be getting my degree in music. I might also get my degree in music therapy. I wanted to do engineering, but I hate math. I'm kind of confused to say the least.

I have college problems and high school problems and boyfriend problems, and can anyone tell me if they stop soon? I feel like a slacker sometimes. Well it's time for bed so,

> Later! J

Mentor Response

Hi J, Glib answer:

-boyfriend problems stop when you ditch boyfriend

-high school problems stop when you graduate from high school

-college problems stop when you get out of college

So yes, in about 4 years, these problems will probably be over, unless you forget to ditch boyfriend!

Actually, you don't sound like a slacker, you sound like you have a dream, having music in your career, whether as a musician or a therapist (or other ways which you might discover in your future). Having a dream is a good place to start, because you can think about your choices in the context of that dream. Good things happen to those who actively pursue their dreams, I think they turn out to be happier people for it.

So ask yourself how the programs available at Lehman, Long Island University, and University of Arts in Philly fit in with your music interests. Tell us about it, we'd like to know! If there's other college issues on your mind, you can dump those here too. Maybe some other participants have similar college questions, or suggestions. Get some sleep! (Mentor)

A critical factor in the success of these discussions was the presence of skilled adult facilitators who could affirm, validate, and highlight important issues raised in the forum. Successful facilitators were able to deal with the multiplicity of issues that students raised about their life choices.

Observations of large-group forum discussions within the *Telementoring* project suggest that a set of key facilitation skills promote active dialogue. These include:

- Responding to affective as well as pragmatic issues
- Validating and highlighting issues raised by participants
- Offering options for further investigation
- Using a conversational tone
- Inviting other viewpoints/contributions.

Facilitating Structured Online Prep Sessions

As was mentioned earlier, mentors volunteers were recruited as mentor trainers to facilitate mentor prep sessions for their colleagues. We knew that mentor trainers would need a set of skills to support an active discussion space that generates many good ideas and new collegial connections between participants. We observed that good mentor trainers:

- Help direct conversation to key topics
- Ensure that all participants are included in the discussion by directly responding to individuals and calling them by name
- Provide feedback on discussion topics by summarizing comments made and highlighting emerging themes
- Keep the overall goals and structure clear for all participants
- Respond to problems or conflicts that arise among participants
- Model appropriate and expected online participation
- Provide the "glue" necessary to keep individuals connected in a virtual space.

A valuable development in the project was the *Online Guide to Mentor Training*, which each trainer received in electronic and print format. The guide contains postings that each trainer was required to post as part of their prep session (see section on Mentor Preparation for examples of scenarios mentors posted) and tips for making these postings their own. This Guide provided a framework for mentors to follow and was critical for ensuring that mentors had a good grasp of what was expected to happen in training.

The Pros and Cons of Informal Discussion Spaces

The primary focus of *Telementoring* was building mentoring relationships between high school girls and female professionals in science, computing, and engineering careers. We were also interested however, in exploring the ways *peer mentoring* relationships might develop in the online environment. To support peer mentoring and exchanges among participants, we established separate listservs for mentors and for students, which we referred to as "lounges." These lounges were intended as spaces for participants to prepare for their mentoring experiences and to get to know each other. They were different from moderated discussions, such as the mentor prep sessions or the group forum discussions that had regularly scheduled discussion topics. A number of important lessons were learned about the pros and cons of such informal spaces.

Mentor Lounges. As described earlier, mentor lounges were used to structure online training sessions for potential mentors and then left open for mentors to informally communicate with each other once they were matched with individual students. Once trainings were completed, mentors took over the direction of the online discussion by introducing issues and concerns they had within their mentoring relationships. These online lounges provided a link to both project staff and other mentors experiencing similar problems and successes, allowing mentors to feel "connected," despite the isolating nature of the online medium. The value of the mentor lounge was confirmed by returning mentors' requests to set up their own "lounge" for veterans in the third year of the project, even though they had already participated in training.

It seemed clear that the structured online training sessions moderated by their peers and project staff modeled a kind of problem-solving and collegiality that carried over to the lounges once mentors were left to their own devices. This was not true in the student lounges, which contained less experienced, less disciplined participants.

Student Lounges. The student lounges were essentially unmoderated listservs accommodating 7 to 50 students, depending on the number of participants recruited. Activity was occasionally directed (for instance, staff members used the lounges to initiate preparation activities and to disseminate messages about matching requirements and research activities). However, for the most part, these online spaces were wide open for students to use as they wished. They were largely seen as informal opportunities for students from a broad range of schools to build a larger community of support among girls their own age. The student lounge was especially important to our first-year participants as a tool for building stronger bonds of support and for developing assertiveness.

In the second year, approximately 150 students were placed in three different lounges, with each consisting of participants from at least three schools in different parts of the country. The conversations were facilitated to varying degrees by students from New York who had participated in the project during its pilot year. The proportion of Year 2 students who actively participated in the lounges ranged from 20 percent to 66 percent.

Research at the conclusion of Year 2 indicated that students had few positive associations to the student lounges. They were unable to name more than one or two of the other students (outside of their own classmates) and, with the exception of three or four participants, did not feel a particular community or intimacy with the other young women in the program. Additionally, many of the students were annoyed by the volume of email generated in the lounges and by the lack of substantive discussion. Though the young women seemed interested in discussing a wide range of topics with their peers in the program, they were not inclined to initiate or even respond to such conversations online.

When commenting on why they did not post such messages to the student lounges, some participants mentioned their lack of time. Other students, however, mentioned that: (1) they tended not to use email to communicate with other students; (2) if they needed to discuss an important issue, they would do so in person with their own friends; or (3) they preferred to use synchronous chat, rather than email, to talk online with other young people. Thus, the choice to lurk seemed to be partially imposed (by time restrictions) and partially deliberate (determined by students' perceptions of appropriate uses of email).

The greatest amount of activity on the student lounges seemed provoked by issues of cultural or experiential difference. One exchange in particular, about the meaning of cheerleading in different states, led first to a series of angry exchanges and finally to a resolution in which students realized they had inadvertently learned valuable lessons about cross-cultural sensitivity and communication.

Based on findings from Year 2, it was determined that the size of student lounges in Year 3 should be limited to no more than twenty students so that participants could feel that they were communicating with real people and not just posting information. All efforts were made to preserve diversity among the lounges while reducing their size. Peer facilitation of the lounges was also recommended but proved impossible to coordinate due to the lack of repeat participants able to serve as facilitators.

As was the case in Year 2, each of the ten student lounges in Year 3 assumed a different character and tone. In one lounge, two Alabama students quickly took the

helm and initiated a series of Q & A games with their peers. These generally took the form of identifying television, movie, or music trivia. In another lounge, one New Mexico student posed a research question about gender bias in the classroom. She wrote:

> *This year my partner and I are trying to find a correlation between student's G.P.A.'s and gender bias in the classroom.... but we're having doubts. What exactly do you think G.P.A. demonstrates? Knowledge? Competency? Work ethic?*

Despite such attempts to craft the lounges into meaningful and supportive conversation spaces, by and large, students were unsatisfied with the student lounge experience. They complained that activity was dominated by petty argumentation and that, again, the volume of mail was too much to keep up with given their limited email access time. Many others said that they did "lurk" but did not participate. It is notable, however, that a handful of students did "meet" other young women in the lounges with whom they continued to communicate through private email, while others described how they enjoyed learning about different people and places through the lounge.

Dealing with Diversity Issues Online

Our work with open-ended discussion lists raised significant issues about how to address issues of diversity online. One of the most common perceptions about electronic communication is that it is free of gender, race, and age. Senders of email are unseen, their physical attributes are invisible. As a result there is a common belief that email communication is bias-free and can break down barriers that exist in face-to-face communication. In preparing for the *Telementoring* project, staff were concerned that simply removing visual information as a component of communication would not eliminate differences due to the diversity of students and adults communicating with each other online. Our work would require documenting and understanding how issues of diversity arise online.

Issues of appropriate online behavior, correct grammar, choice of vocabulary, stated social and academic preferences and practices, and differences in economic status all figured large in discussions and sometimes heated disagreements among the project's participants. Our interviews with students revealed that *Telementoring* participants were often assuming certain personal characteristics on the basis of where people lived, what they mentioned in their postings, and what they gleaned from the tone of the message. Students, in particular, were sensitive to the often unintentional bias evident in the posting of a peer or mentor. One exchange in which a student mentioned that cheerleading was "lame" led to this posting:

> *"About the cheerleading thing and all of that, our teacher said it may be sort of a North/South thing. Most of us are from Alabama or Tennessee except for N. [who is from the North]. It may be that we just have a different way of communicating or a different level of rude. It may seem kind of rude to us, but maybe not to N."*

One of the ways project staff chose to address diversity issues was through the project's online prep sessions for mentors and students. Though these trainings varied significantly in content and duration, they each provided, through modeling by online facilitators, a way of communicating via email that is clear, includes evidence of an individual's personality, and is acknowledging and supportive of individual differences. In all online interactions, project staff worked to:

1) Model the online behavior expected of all participants (such as ways of clearly expressing thoughts and feelings, ways of acknowledging others' comments).

2) Ensure that the online space is "safe" so that no individual feels excluded or unwelcome because of difference in background, religion, race, etc. This requires that all participants clearly understand a set of communication ground rules which include provisions for addressing inappropriate behavior.

3) Ensure that all opinions and points of view are welcome and not judged.

During prep sessions participants inevitably raised potentially divisive issues such as family status, academic choices, religion, ethnic background, economic concerns, personal histories, and regional issues. Providing a forum where individuals could share this information in an environment that supports variety — and identifies it as a key factor for success — participants could become aware of, and more comfortable with, each other's differences. This was often dealt with through discussions in classrooms offline as well as between participants online.

Diversity Challenges in the Context of Online Exchanges

- ***Cultural issues***
  cheerleading vs. stepping (another form of cheering that incorporates dance and is popular among urban and African American students)
- ***Class issues***
  "they all have cars and we don't"
- ***Regional issues***
  "they don't like that I talk southern"
- ***Linguistic issues***
  degrees of "rudeness"
- ***Religious issues***
  discussion of religious holidays
- ***Race issues***
  opting not to communicate because of race

Evidence of the comfort mentors had in raising diversity issues is visible in the following exchange posted to a mentor lounge designed for returning mentors — those who were matched with a student for a second year in the project. It is a testament to the kind of openness that was encouraged and supported throughout the *Telementoring* project and modeled in online training sessions.

Mentor Posting: Issues of Diversity in One-on-One Relationships

Hello, all you mentors! I have a question that I might as well send out to you all and see what you have to say, as long as this wonderful new lounge exists!

My experience this year is wholly different from last year's. My mentee and I write regularly. I'm a bit concerned that it's almost all about her social life and a new guy she's dating, but I guess in time, if I keep up with her, maybe it'll be more like a mentoring thing rather than a big sister thing.

My concern is this: she wrote me a while back about her church group going bowling, and then told me she's Baptist, that she thinks going to church is very important, and then asked if I go to church. (She's from the Tennessee group, for those of you who understand Southern churches.) I sure wish I'd had you all to ask this of before I responded! I was a bit concerned, but replied that I'm Jewish and also think that religion is very important, etc. Since that time, she has (now, maybe I'm being oversensitive) seemed more distant. When she wrote back, she never mentioned that at all. I mentioned it one more time in response to something else she'd said, and again, she didn't say anything. Also, at the beginning of our correspondence, she signed her messages "Your Friend" and that has stopped, and she only signs her name. It's entirely possible that she's never met a Jew, and may have even heard terrible things about Jews. This could be an opportunity for me to help her appreciate difference, but she hasn't responded at all. It's too late to change what I said, but does anyone have any suggestions for getting back on track?

Should I carefully avoid any more references? Any ideas on what I should have done? Thanks. I really appreciate having a group like this one to ask these things of!

—L

Mentor Responses

L,

I live in Tennessee. I have generally found Southern Baptists to believe that only Christians will get to heaven, and that even other Christian religions are "not on the right track." Not all "Southern churches" are like that. Jews, Catholics and Muslim are rare here but they do exist.

Religion and which religion one is seems to be more important here in Tennessee than other places I have lived i.e. Montana, Oregon and PA. I guess it is not called the "Bible Belt" for nothing.

I was surprised last year when working at the Science Bowl put on by the Department of Energy and Cray that one of the high school students commented strongly that a question on "evolution" should be worded "One of the theories of creation." I had figured that since it was a "Science" bowl that we all had started with certain assumptions.

There are more Bibles on work desks than I have been aware of any where else. This is hard to write about because I don't want to offend anyone. I hope this helps to understand the south a little more, T.

****

I am not sure how you can "recreate what you had" with her if religion is the issue. I strongly believe that you, being her mentor, will in some way help her to broaden her views and acceptance; she doesn't get much chance to becomes friends with others from a lot of other religions. You could let it go and see if it comes up again. Though both of you find religion important, I would try to keep focused on careers, math, science, colleges and other less "belief" topics since religion can be problematic and she isn't ready.

My experience is very different this year too. I have gotten lots more email from my mentee this year than what I got last year. She talks about a lot of personal things; like it sounds like yours does. She seems to be having some difficulty in school and has considered quitting. I hope I can have some effect on her to stay in school.

Good Luck, C.

Staff made every effort to acknowledge that differences exist through direct online facilitation as well as indirect modeling of online communication. This was done by informing all participants that many others who were part of the project came from different backgrounds and had varying experiences, and pointing out that online diversity can play a visible and positive role, broadening the perspectives of all involved. Staff also took action when necessary to defuse a conflict.

Scale-up and Sustainability Issues

All of the program components described thus far were accompanied by significant challenges concerning scale-up and sustainability. Each year, we increased the number of schools and students involved in the program. While we had initially hoped that some of the processes and procedures would be taken on by schools, it became clear in our pilot implementation phase that this expectation was unrealistic. The amount of administration and online facilitation required to support and sustain relationships online went well beyond the capacities of the already burdened teachers volunteering to participate in the program. As a result, CCT project staff took on the bulk of the responsibility for recruiting, preparing, and matching participants. We believe, however, that if online mentoring is to be more widespread, a number of sustainability issues must be considered.

Growing Experts from Within. As the project scaled up, we needed to accommodate an increasing number of mentors in online preparation sessions. To do so, the number of training facilitators needed to be increased. Using past mentors as trainers of new mentors proved to be an excellent way of passing on some of the experiences from the previous year. In addition, new mentors regularly indicated that they wanted to talk (online) with a past mentor to get a sense of what the experience was really like. This approach successfully addressed many issues: bringing new mentors into contact with experienced mentors, providing training to an increasing number of future mentors, offering returning mentors a new challenge as volunteer participants in the project, and allowing the project to scale up in size without increasing project costs.

Similarly we recruited mentors and students when possible to facilitate online discussions that focused on particular topics of interest to students. This required developing support materials (e.g., mentor training guide) to help volunteers readily adapt to these roles and to provide practical strategies and techniques for facilitating discussions.

Administrative Support. The human infrastructure needed to support and sustain such a program cannot be overestimated. Online preparation requires the participation of volunteers who are able to facilitate discussions productively. Although technological tools can facilitate the matching process (e.g., web-based applications and searchable databases), the matching process cannot be fully automated without jeopardizing quality control. When working with students under the age of eighteen, network use agreements and parental-consent forms add an additional layer of administrative work. Contemplating who will be part of the

administrative infrastructure to take on these different tasks is critical before setting up a program. Minimally, a mentoring specialist is needed to coordinate training experiences and to maintain the matching process.

Incentives and Roles for Teachers. While most schools applying for the program were enthusiastic about getting their students involved, once students were matched to mentors many teachers felt quite distant from the program after completing their administrative duties. Defining appropriate roles and incentives for participating teachers is necessary from the outset, while at the same time being respectful of teachers' available time. In ideal circumstances, one would hope that teachers would be committed to supporting students' mentoring relationships. We had observed this when teachers played a facilitative role by helping students to formulate questions that they might want to ask their Telementors. On other hand, one would hope that teachers would enable students to develop their own rapport with their mentors without intervening or directing the course of the relationship. Striking the right balance for teachers is a question to be explored with educators.

Technical Support. Obvious though it may be, technical support is critical to the process of telementoring. Some schools encountered severe technical difficulties during the course of the project, limiting online access time for students. Evaluating access might also include examining school or district policies for student email use along with technical considerations.

The Right Fit. Schools were somewhat ambivalent about how a telementoring program fit with their curricular goals and practices, which resulted in teachers often leaving participation exclusively up to the students. This raised the issue of whether classrooms are the only appropriate setting for the type of online career counseling that the *Telementoring* project provided. Community-based organizations or libraries equipped with the appropriate technologies might provide more ample time for students to communicate freely with mentors on a regular basis without the added pressure of meeting their class work deadlines. Teachers also suggested that such a program might fit best within the guidance office of schools, where students are seeking out specific advice for selecting colleges and careers.

Tailoring Program to Local Needs. It was impossible to anticipate the broad range of students' interests and needs that we confronted in the *Telementoring* project. To be successful, a *Telementoring* project must be adaptable and responsive to local conditions and needs. This means that mentors must be made aware of the various roles they might need to play that do not always accord exactly with the larger project goals (e.g., providing more personal rather than academic advice). This again points to the importance of preparation for mentors that helps them to be flexible and resourceful in relationships.

Flexibility in Timing. The timing of *Telementoring* project activities and recruitment need to be flexible and cyclical. This means structuring recruitment, matching, preparation, and discussion events on a rolling basis to accommodate the varying schedules of different schools. At the same time, this requires adequate tracking so that applicants do not fall through the cracks.

Smaller Units of Implementation and Scale-Up. *Telementoring* was a national program implemented in five states participating in the Department of Energy's *Adventures in Supercomputing* program. This led the project to assume certain similarities between school sites, but in actuality student needs and interests were very different in different states. Furthermore, the quality of technical access differed depending on state and local networking initiatives. For these reasons, scale-up strategies might best be implemented on a district and state level, rather than the national level. This would allow the program to be tailored to the specific needs of local communities and to successfully build on the resources they already have available.

Distributed Responsibilities through Strategic Partnerships. Mentor recruitment, online preparation, matching, and facilitation were key ingredients of the program. To make such a program sustainable, strategic alliances with other organizations are necessary to help take on these various responsibilities. This might mean a combination of centralized activities performed by national or professional associations. For example, mentor recruitment and training could be conducted by professional societies dedicated to mentoring. While telementoring may never be entirely self-sustaining, alliances with businesses, local communities, and government agencies are necessary to keep such programs alive on a long-term basis.

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In this three-year experiment, *Telementoring* proved to be a powerful means for connecting students with professionals who can provide guidance and support that is rarely available to students in the classroom. Through our work with mentors, teachers, and students nationwide, it became clear that more intricate social structures and supports are needed to promote productive online exchanges. The benefits for students and mentors already more than justify the need for ongoing research to better understand those structures, both in terms of the human infrastructure needed to support such programs as well as new technological advances that can help expedite some of the processes that we have identified as key design components.