

MENTORING OF YOUNG WOMEN USING DISTANCE TECHNOLOGY

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Project EDGE (Eliminating Discrimination by Gender in Education), was a three-year project funded by the Program for Women and Girls, Division of Human Resource Development, National Science Foundation and the Rochester Institute of Technology (RIT). Community support for live video conferencing had been implemented in participating institutions from earlier funding (a \$80,000 grant), which was provided by the Rochester Telephone Corporation (RTC) to acquire classroom video conferencing equipment. RTC also contributed engineering, installation and service for the Rochester area interactive television network (RAITN) for the first two years of the project. The project targeted young women in the Rochester, New York area, offering intervention at two key educational transition points: the tenth grade and first year of college. The project included seven high schools from six school districts and RIT freshmen. There was, in addition, at least one math or science teacher and a counselor from each high school, each year. There were seven university faculty members from the Colleges of Science and Engineering at RIT, participating each year over the three years of the project.

GOALS AND GENERAL OVERVIEW

The overall goal was to encourage and support the interest in and the retention of more young women in science, engineering, and mathematics (SEM) by increasing the frequency, consistency and coherence of positive experiences and messages about participation in careers in these fields. To accomplish this goal, RIT proposed a tiered approach to address several issues that have been identified by research as key events that discourage young women in SEM fields. Project EDGE focused on these issues by attempting to make systemic changes in the instructional styles of teachers, connecting young women's learning about SEM fields with real-life career experiences, and by sharing resources and data with others.

Project EDGE recognized the current research which identifies teachers as the "first line of attack" for addressing the problems of classroom equity. The project sought to

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sensitize the secondary teachers, counselors and university faculty, who interact so closely with the young women, to the pedagogical practices that promote gender equity and also to provide collaborative learning opportunities that expand the students' interface with the current professional SEM world. The project provided ongoing mentoring and support by role modeling and exposure to successful professional SEM women for the young women in high school and the first year of college. Mentoring relationships were developed with: professional women working in SEM careers with regard to career information and life-style choices; teachers, who were involved in both instructional development and support groups; and peers and other students involved in the project. Throughout the project, students had many opportunities to communicate informally with women in SEM careers through a series of face-to-face activities complimenting on-going communication taking place via distance learning technologies and data networks.

As mentioned previously, Project EDGE had several major objectives. Among them was changing teaching strategies in the classroom of high schools and college faculty in educating women and girls in science and technology. This part of the project focused on several workshops lead by national experts on gender-equitable practices in the classroom. Dr. Laura Tubbs' presentation and paper discusses this in more detail.

Another objective was providing real life examples of options for women in science and technology careers. These included sponsorship of presentations by nationally known women in high-profile science, math and technology careers to provide encouragement and act as role models for students. There were two major events each year over the course of the grant where the students had the chance to interact with speakers such as Lieutenant Eileen Collins, the first female shuttle pilot and Nobel Peace prize winners, Dr. Rosalyn Yalow and Gertrude B. Elion. There were also workshops at RIT about career options, such as the Faces of Change conference. There were also sessions to help the undecided students, such as the career interest identification seminars. In these, the different aptitudes for different career areas were covered, as well as personality types and fits with different career choices.

TECHNOLOGY OVERVIEW

The primary objective of this paper is a discussion of a mentorship of young women by working professionals in the fields of science and technology. This part of the project was primarily conducted using distance technology and computer conferencing. There were two major forms of communication which were used in the project. One was meetings held over RAITN, the Rochester area interactive television network; the other was computer conferencing.

RAITN allowed up to four schools at once to connect to each other and experience live video teleconferencing. This network was very useful for several events, where limited time prevented the mentors from going to each individual school. In the Fall and Spring, the "meet the mentors" sessions were held over RAITN. At the "meet the mentor"

sessions, the mentors discussed with the high school students their career motivations, outlooks and lifestyles, including salary and career field future developments. They were able to impact students at four schools at the same time. If they had needed to travel to each school to "talk" with the young women, time constraints would have prevented most of the mentors' participation in this part of the grant, and there would have been less crossover discussion among schools.

In the first year of the grant, the schools were not networked. They used modems to "dial in" to RIT, where they used Notes conferencing on a VAX system with low-end computers using terminal emulation software. It was a command line interface environment, which in 1993 was innovative enough to the students that they believed it was "cool". But it was also limited in that it was unable to display graphics or color. In the second year, EDGE moved from a modem-based asynchronous environment to a networked environment. As the second year progressed, some of the schools became networked, and the modems were replaced by Ethernet. By the third year, the remaining two schools that were still dialing in also converted to the new equipment. Some of the students had by this time experienced AOL (America On-Line) and other GUI (graphical user interface) technology. Instead of continuing with a terminal emulation package on the Macs and PCs, a new conferencing software was implemented that took advantage of the new network's pull-down menus, icons and the mouse. The client-server conferencing package selected for year two and three was FirstClass, developed by Softarc. While year two experienced some start-up problems with school network installations and added training for participants, by the third year most of the start-up difficulties of the previous year were anticipated and circumvented. Students and faculty were more comfortable with the underlying technology, and we were more prepared to assist them through user interface details.

An advantage of using FirstClass as the conferencing package was that the client software was free to the user. This was unusual in the client-server conferencing world. Usually there are fees associated with both the client and the server. Another advantage of the switch to conferencing software versus e-mail was that the conferencing format was more supportive to the students. With this type of format, the students could see the answers that a mentor gave to another student and either glean information from it or join in the conversation. It was also very easy to use and works with both the Macintosh and Windows operating systems.

One of the disadvantages of using FirstClass is that the client hardware needed to be a relatively current level PC or Mac. Specifically, FirstClass worked with Windows 95, Win NT and Mac OS 7 and up. It required at least 16 Mg of RAM (random access memory) to run efficiently and 20 Mg of hard drive space for installation of the software. While this is a basic entry-level system today, older, previously installed computers such as 386s and 486s tended not to work well, as they do not have the memory or speed necessary to run FirstClass. The slowest PC that was used in the project was 75 Mhz. Further, the computers that the students were using had either Ethernet cards in them (to connect to the network) or modems. The modems could not connect at speeds higher

than 33.6 Kbps, as the phone lines in the Rochester area do not support higher speeds. This was very frustrating for the modem users, and occasionally the internet service provider (ISP) would give a busy signal, which was also a source of frustration.

STUDENTS

The students were recruited by their teachers. The teachers were encouraged to pick students who weren't just A and B students. Although young men were not prevented from joining, none applied even though a few expressed some interest. Students were expected to have an interest in exploring math, science, technology or engineering, and to be committed to participating for the school year. Most of the students were in classes taught by the participating teachers. The students were encouraged to log into their FirstClass accounts frequently. Teachers were also expected to hold monthly meetings with the students.

MENTORS

The mentors were professional women in Rochester area industries and RIT and University of Rochester (U of R) professors. Their motivation for participation was because they wanted to provide incentive to the young women to explore many career options. Most of the mentors expressed sentiments that they wished similar experiences to Project EDGE had been available to them when they were in school. The mentors were selected based upon area of expertise. They were recruited through industry, personal and teacher contacts. It was helpful if they had computers that were "Internet ready" and if they were comfortable with the technology.

The mentors were expected to come to the opening and closing events, to be available for the monthly scheduled activities, and to check their FirstClass accounts every week or two. We also added weekly chat sessions so that the students and the mentors could respond to each other in a synchronous format. Mentors were not assigned to interact with a single student. Students and mentors interacted in any manner they found useful. By allowing all students to interact with all mentors, a more varied perspective on careers could be shared with the students. Staff moderated the conference to provide responses and help to the students and teachers. Staff only intervened if there was a problem. For example, if the mentor hadn't answered a question in a week's time, staff sent the mentor e-mail to gently prompt them into action. Many times it was found that the mentor had been out of town or had gotten very busy at work.

EXAMPLES OF STUDENT – MENTOR INTERACTION

Hello,

My name is Courtney. I go to Brighton High School and I was wondering if you could answer some questions about your job.

- What does a Hydrogeologist do? Does it have something to do with water and the earth?

- How did you come about to taking up this career?
- Did anything or anyone ever try to discourage you from becoming what you wanted?
- What kinds of technology do you use in your field of work?

Thank you for taking the time to read this, I would really appreciate it if you could write me back about the questions.

Thanks,
Courtney

Hi, Courtney. Sorry that it has taken so long for me to respond, but here are the answers to your questions: A hydrogeologist is someone who studies groundwater (water that is found in the ground). I became very interested in geology while I was an undergraduate so I went on to get a Master's degree in geology, specializing in groundwater. I was very fortunate to have a lot of support from my family and friends, so if I ran into any opposition I didn't pay much attention. We use a lot of different technologies in my field. We drill monitoring wells, take soil and groundwater samples, the chemists analyze our samples for us. We use computer models to determine groundwater flow and contamination plumes. We work with engineers to design treatment facilities to clean up soil and groundwater contamination. I hope these are the kind of answers you're looking for.

Hi,
I was just wondering if any of the mentors know anything about Computer Engineering. I would really like to pursue a career in the field of Engineering and I love computers so I thought that Comp. Engineering would be a good career to look into. If a mentor could write me back with a bit of info. on Comp. Engineering I would appreciate it.

Tasha

Tasha:

Computer Engineering is a relatively new discipline and related quite closely with Electronic Engineering. Courses are very similar up to the 2nd and 3rd years of study between Computer Engineering and EE. It is a very good career if you are interested in the subject, and it is a very marketable profession. You may want to contact the Department of Computer Engineering at RIT or in other colleges to get a description of the curriculum. The Department Head of Computer Engineering at RIT is Roy C. Lo-yi.

PROCESS: ISSUES

The teachers were trained to use the software at the summer institute, where they also received their gender equity training. Because of the time delay between learning the software and implementing it, many of the teachers had forgotten what to do in the early Fall. "Refresher" training was offered to the teachers when the students were trained at the school site. The more comfortable the teachers and the counselors were with the technology, the more comfortable the students seemed. It appeared that there was a correlation between comfort level and usage. Actively involved teachers that interact with the student participants on a regular basis are crucial to maintaining student

involvement. In the schools where the teachers were "too busy", the students did not participate as often or as fully as did the students in the schools where the teachers held monthly meetings.

Because the network was new to the school districts, there was not full support in place for electronic activities. Some of the schools had technical support in the third year, in the form of a single harried technician trying to do hardware and software support for the whole school. Other schools had volunteer teachers, who were interested in the technology but did not have the release time to devote to school's technology needs. There are also challenging school district infrastructures. The seven schools in Project EDGE were in six different districts, each having its own infrastructure and politics. Time, or lack of it, seemed to be a major factor. The mentors were busy professionals. The teachers had many obligations outside of the project to divide their time. The students were often dedicated to many activities outside of EDGE. If any of them become frustrated with the technology not working properly, they quickly opted out of the project. The students also became frustrated if a mentor did not reply quickly. They had expectations for instantaneous responses due to the immediacy of electronic communication. The mentors did not always meet this expectation.

FINDINGS AND LESSONS

- Maintaining communication over a long period of time is difficult. More contact over a shorter period of time may be more effective for other projects. It is clear that it takes a sustained and supported effort for teachers to experiment with changes in their teaching style and to fully integrate the changes. Programs of this type need to be long-term, sustained efforts. The students appear to value the multifaceted approach that this project has taken. The effort to provide this wide range of activities should not be underestimated.
- Choose mentors wisely so they have the comfort level with the technology necessary to use it. They need to have the time and commitment to stay for the school year. It is very frustrating for the student who gets no response from a mentor.
- If the school district does not have a full-time technical support person who is willing to help with your project, the project needs to have a tech-support person. They should be familiar with the hardware and software used and be committed to the project. Depending upon the size and scope of the project, the tech-support person may need to be full-time.
- There is a dire need for a full-time project coordinator for a project of this size. Vying for the students' time are sports, music, clubs and jobs. The project events need to be polished, professional, well organized and of high quality. If the students are not engaged and motivated, they lose their commitment quickly. There is quite a bit of behind-the-scenes work for every success.

- Technology changes. Just when it seems that everything is optimal, something much better comes along. Computers become obsolete in three years. Ethernet will be replaced by something bigger, better, faster that will require a bigger, better, faster computer. Technology also breaks, usually when you are counting on it most.
- Given the obstacles and successes Project EDGE experienced, it is recommended that pilot projects start small and limited in time frame. Emphasis must be made on both technical infrastructure and support of activity and communications. The interpersonal organization of such a project is the most important feature once the technology is in place. Mentors and students can be technically connected through electronic communication, but this is only the beginning of the conversation.

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