"CALCULATE THE POSSIBILITIES": A SUMMER PROGRAM FOR YOUNG WOMEN

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During the summer of 1996, twenty-four high school women from Indiana participated in a program with the dual purpose of enhancing career awareness and developing skills in the areas of science, engineering, and mathematics. The structure of the program, the many varied activities in which the young women participated, information about the mentor groups, the technology training, and the research component are discussed. The assessment of the program is summarized including the girls' own reactions to their participation in the program.

PURPOSE OF THE PROGRAM

"Calculate the Possibilities" was a four-week summer residential program for Indiana high school women. It had a dual focus of career awareness and skill development in the areas of science, engineering, and mathematics (SEM). The purpose of the program was to increase the awareness of young women about careers in SEM, to introduce them to SEM role models, to have them collaborate with SEM mentors, and to positively impact their choice of a SEM career. Figure 1 illustrates the essential components of the program. The program was funded by the National Science Foundation and Ball State University (BSU).

Figure 1. Introducing Young Women to SEM Careers

PROGRAM DIRECTORS AND CONSULTANTS

Bernadette Perham, Professor of Mathematical Sciences at BSU, and Rebecca Pierce, Associate Professor of Mathematical Sciences at BSU, were co-directors of the project. Five women faculty served as SEM mentors, each meeting with 4-5 of the girls to work on discipline specific projects. These were Nancy Behforouz, Professor of Biology, Mahfuza Khatun, Associate Professor of Physics and Astronomy, Jayanthi Kandiah, Associate Professor of Family and Consumer Sciences, Mary Kite, Professor of Psychological Science and Patricia Lang, Associate Professor of Chemistry. Ellen Mauer, BSU Coordinator of Career Counseling, served as the career consultant.

SELECTION OF PARTICIPANTS

Students selected for this program had completed either their sophomore or junior year in high school by the beginning of the residential program. Applicants were required to have completed the following courses: algebra, geometry, and at least one laboratory science course (biology, chemistry, or physics).The twenty-four selected to participate, ten juniors and fourteen sophomores, had an average overall GPA of 3.78 and a mathematics and science average GPA of 3.75. Their home towns encompassed the whole state and represented inner-city, rural, affluent public, private, and parochial schools.

LIVING ARRANGEMENTS

The program participants lived on campus during the 4 week program. The dormitory was staffed by four female counselors. All the counselors had experience in providing guidance to young people having previously served as resident hall assistants or camp counselors. Dorm living was a new experience for all of the women participants and the counselors made their transitions easy. These four served as younger role models for the participants as each discussed their plans for the future - law school, high school mathematics teacher, clinical staff psychologist, and additional graduate school.

GOALS OF THE PROGRAM

On the first day, the young women were informed in detail about the goals of the project and their responsibilities. The goals of the project were the following: to increase your awareness about careers in SEM, to introduce you to SEM role models on the job, to have you collaborate on a research project with SEM mentors, and to positively impact your choice of a SEM career. The responsibilities conveyed included the following: a)

creating a portfolio of career information, b) formulating and carrying out a plan to disseminate and share the information on SEM careers with home school peers, c) acquiring skill in the use of various technologies, d) engaging in a research project lead by your SEM mentor, e) sharing your research experience with the other participants and the SEM mentors, f) completing independently related research work at your home school, g) attending with your home school resource teacher a fall day on the BSU campus, and h) submitting your written research work for review.

SUMMARY OF ACTIVITIES

The program had a structured daily schedule which incorporated some planned recreational activities and some free time. The layout for Monday, Tuesday, Thursday, and Friday of each week included the following: career explorations and counseling, skill development in technology and statistical techniques, lunch, working with mentors on research activities, dinner, computer lab work or career films, and study time. On Wednesdays, a chartered bus transported the young women to companies for site visits.

The July 4th holiday fell on a Thursday and as a change of pace, the participants had a day was filled with activities such as a picnic and softball game at a local city park, swimming at near-by state park, and attending the local fireworks celebration. The dorm counselors and SEM mentors also participated in these activities. This one day of extra-curricular activities provided a time for the participants to view the project directors and SEM mentors in a much different light and added a new dimension to their frame of reference of “who scientists are.”

CAREER OPPORTUNITIES

Through career seminars, company site visits, and panel discussions, the participating young women learn about careers and job opportunities: what they require and how they are achieved. The young women visited and took planned tours of major Indiana companies where they had the opportunity to interact with professionals in pharmaceutics, medical care, manufacturing, engineering, natural resources, and quality control. Each company site visit offered a different perspective for the participants. Every effort was made to have the young women interact with female role models at each facility. Ellen Mauer was responsible for assisting the young women in exploring their career objectives and goals. Her responsibilities included selecting, administering, and

interpreting the results of a career assessment battery which examined each young woman's skills, interests and abilities and provided a listing of occupations that matched career interests.

CREATIVE PROBLEM SOLVING

In the context of creative problem solving within a variety of SEM areas, the young women acquired skill in the use of a spreadsheet (Excel), a word processor, and the TI-92 graphing calculator. More specially, the young women's mathematical understanding and problem solving abilities were addressed in daily technological sessions. Each week a topic in mathematics was used as the basis for learning about technology. The topics covered were algebra, geometry, and statistics. Both written and hands-on activities and experiments were used to present material in these areas. The program also provided opportunities to acquire skill in using statistics and technology to support future research efforts.

The young women were selected to do collaborative research in one of the following areas: biology, chemistry, nutrition, physics, or psychological science. The SEM mentors and co-directors selected students based on their personal statements and self-indicated interests. The SEM mentors met in the afternoons four days a week with their small group. Each mentor planned and developed activities for their specific discipline. The young women were exposed to the scientific method of inquiry and to various laboratory techniques. The mentors introduced the young women to the library as a resource for research and showed them how to go about a literature search for writing scientific reports and research proposals within the context of their collaborative research projects. Each young woman also independently completed a final report at her home school with the support of an on-site resource teacher and her university mentor.

On the final day of the four-week program, each of the five research groups gave an oral presentation of their results to the other participants, the co-directors of the program, and the SEM mentors. It was an exciting afternoon! Each group presented their results in a unique way using a variety of presentation techniques such as the overhead projector, poster broads, and skits to convey the essence of their work. The enthusiasm and pride of what they had accomplished within a short four week period came shining through.

FOLLOW-UP ACTIVITIES

During the following Fall the participants and their home school resource teachers spent a day on the BSU campus to meet with the program staff. At this time, the resource teachers were given a packet of materials and received the training needed to support the research efforts of their respective students. The resource teachers became acquainted with the research techniques and technology used by the young women in the summer research projects. The five SEM groups met with each mentor and discussed their progress to date. Additional instruction was given as needed and first drafts were collected from each participant. Each young woman also turned in a typed plan for sharing career information with their peers.

EVALUATION OF THE PROGRAM

This project was designed to help high school girls assess their career direction and become more aware of the role of women in the sciences. There were several evaluation instruments and activities. These were aimed at assessing the changes in the participants' thinking with respect to their own careers, and collecting information about the effectiveness of specific aspects of the program. The overall finding, based on the assessment information collected, is that the project was very well received by participants.

In particular, the participants evaluated each company visited. The visit to Eli Lilly, an Indianapolis-based pharmaceutical firm, received the highest rating (70% agreement) in terms of increased awareness about careers in science, engineering, and mathematics. Across all visits, 77 percent reported an increased awareness about SEM careers. The specific sessions addressing career activities were also evaluated at the end of each week. Ninety-one percent of the respondents strongly agreed or agreed that they were pleased with the weekly career activities. About 87% of the participants agreed or strongly agreed that the goals of the weekly activities were clear to them. Results from the overall Summer Program Evaluation indicated that the program was very successful. At least 80 percent of the respondents strongly agreed that the program familiarized them with "the skills, interests, and abilities needed for success in science, engineering, and mathematics," and provided them with career information they can share with their peers. More than 90 percent strongly agreed the program introduced them to role models in science, engineering, and mathematics. The participants were invited to write open-ended

comments on the Summer Workshop Evaluation. When asked what they liked best about the workshop, one responded “Everything!! This was the best learning experience!” Another student responded, “I enjoyed this whole program.”

CONCLUSION

Looking across the results of all the assessment activities, the program was well thought out, well executed, and very successful in accomplishing its purposes. Participation in the program enriched the lives of the 24 Indiana high school girls and the 20 BSU faculty and staff who were involved in the program. The author has remained in contact with the participants and intends to learn more about the impact of the program on their career choices by conducting a follow-up study.