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The papers in this volume offer a sampling of the outstanding work of high school and undergraduate interns who participated in the 1992 and 1993 Program for Women in Science and Engineering (PWSE) summer internship programs. From synthesis of materials to developing effective methods of hazardous waste disposal, from non-destructive structural studies at the macroscopic level to microstructural analyses of materials, from testing precision of sensors used as aids in agriculture to isolating effects of specific parameters on plant growth, to name a few, these papers span a wide range of scientific methods and disciplines. They serve as testimony to the high level of performance and ability that emerge when good students are given the opportunity to work on research projects in a collegial environment under the direction of supportive mentors.

Since 1987 when PWSE first initiated its summer internship program, a total of 273 young women have benefitted from the internship experience; 118 high school interns entering their senior year have conducted research for six weeks and 155 undergraduate women have conducted research for eight weeks, all under the active guidance of Iowa State University (ISU) faculty and research staff. The PWSE internships expose these students to the rigor and challenge of scientific research and often lead them to pursue undergraduate and graduate science or engineering degrees. In addition to honing their analytical skills, the internships help students build realistic expectations about scientific research. The interns tell us that their social interactions with highly motivated peers and with research scientists, whom they learn to see as 'regular' people, play a significant role in increasing their comfort level with non-traditional career choices.

The number of young women interested in participating in our summer internship programs is increasing. This year we have placed nineteen high school interns out of a pool of 150 applicants and 40 undergraduates out of a pool of 170 applicants. We hope to sustain students' interest at this level and to attract more researchers to serve as mentors so that over a period of years these efforts will visibly increase the representation of women in scientific fields.

Because their participation in science and engineering has traditionally been low, women are considered an underutilized resource of great potential. As recently as 1991, women received only 31% of the bachelor's degrees awarded in science and engineering while 54% of all bachelor's degrees were awarded to women (Commission on Professionals in Science and Technology, December, 1993). At Iowa State University, 24.18% of all bachelor's degrees in science and engineering were awarded to women in 1992-93 (Enrollment Services, 1993). Interest in careers in the sciences and engineering continues to decline for both women and men. Between 1985 and 1991 the total number of bachelor's degrees awarded increased by 9.1%, but the number of bachelor's degrees in the sciences and engineering decreased by 20.4% (Commission on Professionals in Science and Technology, December, 1993). Overall, in the five-year period between 1985 and 1990, Iowa saw a 22.7% decrease in science and engineering bachelor's degrees awarded (National Center for Education Statistics, 1993).

Dr. Myrna Whigham's current research indicates that Iowa girls believe that they do not have natural ability in science and math. If they do well in these areas, they say it is because they work cooperatively (Whigham, 1993). A study of the 1993 ISU freshman class found that 71.8% of the women rated themselves above average in academic ability but only 38.0% rated themselves above average in mathematical ability. Comparable figures for men were 78.3% for academic ability and 63.0% for mathematical ability (Institutional Research, 1994). The study did not ask students about their scientific ability but we would predict similar results.

A positive relationship exists between attitudes toward science and science proficiency. Students who enjoy science, believe that knowledge of science has practical applications, and perceive that it will be part of their future work tend to have higher proficiency than students with less positive attitudes (Mullis & Jenkins, 1988). Males from both grades 7 and 11 have been found to have more positive attitudes toward science than females. Gender differences have been found in response to statements about the importance of science in life and the use of science knowledge in life (Mullis & Jenkins, 1988). Research internships provide a means to counteract females' negative feelings about science by teaching them scientific procedures and techniques as well as the practical applications of science in the solution of real-world problems.

Female mathematicians, engineers and scientists and girls aspiring to technically-related careers with great regularity stress the impact of salient, supportive models in the development of their career plans (Casserly, 1975; Eccles-Parsons, 1984; Hill, Pettus, & Hedin, 1990). Reports addressing the shortage of scientists and engineers recommend altering stereotypes through the use of nontraditional role models (Nurturing Science, 1987; Clewell & Anderson, 1991). Numerous studies have found that role models influence the course-taking and career choices of female students (Almquist & Angrist, 1970; Douvan, 1976; Tobin & Fox, 1980; Campbell, 1986; Smith & Erb, 1986; Farmer, 1987; Evans, Whigham and Wang, 1994).

Interns' mentors represent excellent role models. As they work on their research projects over a six- or eight-week period, interns learn that research teams are close-knit supportive social units and that scientists have lives outside of their laboratories. The interns in turn become role models to other young women when they return to their classes in the fall.

We thank the many mentors who have worked with our interns over the past eight years. Without their active support the summer internship program could not exist. The papers that you are about to read illustrate what can happen when good students are nurtured by good mentors.

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