

# THE DOUGLASS SCIENCE INSTITUTE FOR HIGH SCHOOL WOMEN

Ellen F. Mappen, Ph.D.

Douglass College  
New Brunswick, New Jersey

In a recent Symposium on Minorities and Women in Chemistry, reported in the Pittsburgh Conference Tomorrow, May 1991, Dr. Phyllis Brown of the University of Rhode Island spoke of "inner obstacles," or "the powerful messages delivered to children" about their future roles in the adult world. She gave an example from "a leading children's magazine" which "depicted boys as adventurous and girls playing a maternal role". The article reports her as saying that "continuing through education and life, girls repeatedly get a double message about success: study hard, but if a woman is too smart, she will never meet a man and get married. Dr. Brown vowed to the audience to write a children's book entitled 'Grandma is a Chemist' after she retires."

When I read this report from the article sent to me by Dr. Dale Kennedy, a former director of the Douglass Science Institute and now a professor of Biology at Kansas State, I thought about the DSI, as we call it, and how with its comprehensive approach we hope to encourage the persistence of bright young women in math, science, or engineering careers in spite of the "inner obstacles" and outer peer pressures young women face.

Our approach is at least two-pronged in that in addition to the program for the young women, we involve parents or guardians in some of the activities. We also try to involve the students' teachers.

We focus our first intervention between the sophomore and junior year of high school because it is one of the key times when young women leave the pipeline and cut their career paths in math, science, or engineering. An article in the February 18, 1991 issue of The Scientist emphasized the need to retain in quantitative fields those young women who have expressed an interest in math, science, or engineering while in high school. Research shows that for girls, the end of the 10th grade is a crucial time when students choose what course to pursue at greater depth (PEW Science Program in Undergraduate Education, 1988).

Before giving a summary of the activities of the DSI and a description of our findings, I would like to place the DSI in the context of our larger program to support women in math, science, and engineering at Douglass College. Since the fall of 1986, the Douglass Project for Rutgers Women in Math, Science, and Engineering has sponsored programs to develop peer and faculty support networks for our undergraduate women. We offer numerous kinds of activities, including an orientation program for new students, peer study groups, lab visits, career options panels, faculty talks, various types of mentoring programs, and a math

*W*OMEN IN ENGINEERING CONFERENCE: A NATIONAL INITIATIVE

and science residence hall, named for two former deans of Douglass, Mary I. Bunting and Jewel Plummer Cobb. In October of 1990, the Douglass Project received the Progress in Equity Award from the Legal Advocacy Fund of the American Association for University Women. Part of the reason we did receive the award was for our outreach to pre-college students.

I would like to focus on that outreach now and start with a summary of our activities. Each summer since 1988, the DSI has provided 46 "rising" juniors from across New Jersey with a two-week residential program of "hands-on" science, career exploration, seminars on gender and/or ethical issues in science and technology, field trips and fun. Because they live on campus and meet undergraduate women, graduate students, and faculty, the participants experience, however briefly, what it is like to reside on a college campus. For many of the participants, it is their first experience away from home. And, because we attract students from all over New Jersey and from all ethnic and racial backgrounds, the young women establish interracial relationships which appear to continue beyond the two-week period. For example, in the spring 1990 follow up of the 1988 DSI students, 50% of the girls were still keeping up interracial relationships established at the DSI.

By focusing on the multiple needs of girls, we thus provide the encouragement they need to sustain their interests in these fields and also provide a setting for girls from different racial/ethnic backgrounds to work and live together cooperatively. They learn they can survive in a college setting and can become mathematicians, scientists, and engineers.

During the course of the program, the young women participate in "hands-on" labs in molecular biology (molecular approaches to the study of gene activity using the fruit fly), immunology, and physics (lightwave communications). They also have mini workshops in math (discrete math), computer science, and engineering (electromagnetism).

Because we hope that the young women will feel part of a larger network of women pursuing math, science, or engineering, our involvement with them does not end after the residential program. The DSI serves as a nominating agency for the New Jersey Governor's Schools of the Sciences and the Environment. Summer participants are also invited back to campus for another enrichment program (or reunion) during the spring of their junior year in high school. The second encounter provides the opportunity to offer a workshop for parents on how to encourage their daughters in the pursuit of math and science degrees (teachers are invited too). During the reunion, the participants do both a physics and a biology lab with their summer teachers, hear from undergraduate women about what it is like to pursue a degree in math, science, or engineering, and renew their relationships with each other. In addition to the reunion, each participant is sent a newsletter twice a year.

I want to say a word about the structure of the program because I think this is one reason it is successful. First, the physics and the biology labs are taught by excellent high school teachers using modules developed by the Center for Math, Science, and Computer Education at Rutgers. The teachers who work with us in the DSI had a hand in developing or testing the modules. In many ways, we serve as the "lab" for them. Four of the five teachers who will work with us this summer

have been involved with the DSI since the first summer. Each lab also has a graduate student assistant and is supervised by a member of the Rutgers faculty.

Second, the girls are exposed to many role models of women in science. Either through our field trips or through the career panels, the girls see that women are actively involved in the doing of science. As one of the 1988 DSI participants said, "It was inspiring to see all those women who are smart, impressive and in important positions."

What have we found?

Evaluation has been an integral component of the DSI from its inception. We are trying to measure the DSI's impact on young women who already have an interest in science when they apply to the program.

We have concluded that the DSI's impact is subtle but tremendously important. What the DSI does is reduce their sense of isolation (about three quarters of the young women appear to keep in contact with each other after DSI). DSI moves young women away from the "nerd" image of math and science and helps them see that they are neither alone nor weird because they are good in math or science. In other words, it is okay to be a smart girl and like math or science. As one young woman said,

I previously had a stereotyped vision of what a math or science whiz would look like and now I realize that they are no different from my friends from DSI and our common denominators are curiosity and the willingness to experiment.

By making math and science and those who do math and science more attractive to these young women, DSI causes them to increase their commitment to careers in math and science, a commitment, which for at least our first group, has continued through the first year of college. A follow up of the 1988 students this spring brought in 28 responses (61%).

What did we find with these students:

Sixty-one percent of the students are planning to major in either math, science, or engineering. Even more interesting is that 85% are still taking math and 96% are taking science. Thus they have not taken themselves out of the pipeline yet.

The students said that the DSI had an influence on their choice of major, primarily by making them feel they had made the right choice, because it had caused them to think of math and science as "possibilities," and because it had made them more confident in their career choices and more comfortable with being a woman in science.

Let me conclude by saying that there is certainly a need for support programs for smart girls in high school. A summer program is one strategy to use. Currently, we are undertaking a longitudinal study of our efforts at the college level which is funded by the Exxon Education Foundation. Preliminary findings suggest that those students who came to Douglass College more committed to math or science were more apt to have participated in summer programs, especially programs for women.

I also point to the need because for the 1991 Institute we had 467 applications for this summer's 46 spots. These are young women who want to be in a program with other young women and gain from each other the confidence to pursue science, to say it is okay to be smart and like science. Thanks now to a gift from the Hoechst Celanese

Corporation we will be able to offer some academic-year programs to the 421 young women we could not accommodate in the summer program. Eventually, with more funding from the various sectors, we hope to offer more summer programs for this age group and for 9th and 10th graders. I should add that funding (either in dollars or in-kind donations) for the DSI since 1988 has come from the Hearst Foundation, the Geraldine R. Dodge Foundation, the Associate Alumnae of Douglass College, Merck & Co., AT&T Bell Labs, the Hoechst Celanese Corporation, the New Jersey Department of Higher Education, a private donor, and Rutgers University. This summer, we can add Schering Plough to the list since it is sponsoring a field trip to one of its facilities and covering the cost of transportation.

I truly believe that these programs have an impact because as one recent graduate of Douglass College said, "it's important for older women [herself included] to give the high school students courage,...it's important that they see a range of role models pursuing a variety of careers."