

PLANTING THE GRADUATE SCHOOL SEED: THE MARIAN SARAH PARKER SCHOLARS PROGRAM

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INTRODUCTION AND GOALS

There has been very little research on the reasons why women attend or avoid graduate programs in science or engineering. It is known that when offered at the junior or senior year, undergraduate research internships can encourage and motivate students to pursue graduate degrees. From the NSF Research Experience for Undergraduates (REU) program, 80 percent of REU students indicated increased interest in science and engineering as a result of their participation. A larger proportion of students planned to attend graduate school in science or engineering after REU involvement than before.¹ Another study, by Tidball, finds a direct relationship between the number of women faculty at an institution and the number of women students who pursue doctorates.²

The Marian Sarah Parker Scholars Program, named to honor the first woman to have graduated from the College of Engineering, is coordinated jointly by the College of Engineering Women in Engineering Office and the University of Michigan Women in Science and Engineering Program. The goal of the Parker Scholars program is to encourage high achieving undergraduate women students to pursue graduate studies. Each year, approximately fifty outstanding women students, currently in their junior year, participate in the program's activities.

The Parker Scholars program is multi-faceted and the first component occurs during the winter term (Jan - April). This consists of workshops focusing on graduate school and research careers, as well as "planning your future" groups. These workshops are planned and conducted by the University of Michigan Women in Science and Engineering Program and feature a variety of women faculty, professionals, and graduate students. There are 2 workshops and a four-week series of "Planning Your Future" discussion groups (meeting once/week). All of these sessions are planned to support and complement the internship component (described in the next paragraph).

The second component of the Parker Scholars program is an academic research internship for each student. Undergraduate research opportunities are one of the most effective avenues for encouraging students to pursue graduate degrees. All College of Engineering faculty are asked to consider serving as a research mentor for one or more Parker Scholars. Students may be given independent research projects related to the work of the

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mentor, or they can assist with ongoing research projects underway in the research group or laboratory. Some type of substantive research is important so the student can experience research methodology and assessment. The student is expected to learn significant research and laboratory techniques, have the opportunity to interact with other members of the research group, and attend meetings in which research data and results are discussed and evaluated.

Funding for the internship component of the program comes from the College of Engineering. Funds are available to pay 50 Parker Scholars. Students may choose to receive a stipend or academic credit. The stipend is given as a lump sum once the internship is underway. Academic credit is given as a 3-credit independent research course. The internship commitment is for 160 hours of work in a research position. Some scholars work for 40 hours/week over four weeks in the Spring term. Others work fewer hours per week over a longer period of time through the Spring/Summer or Fall terms. The time frame is based on what works best for the student and her mentor. The Women in Engineering Office is available to work with faculty to investigate the possibility of supplemental funding, such as REU supplemental grants from NSF, to permit scholars to continue their projects for an additional time period.

Background

In 1991, Cinda-Sue Davis, the director of the University of Michigan Women in Science and Engineering Program (WISE), and Erdogan Gulari, Professor of Chemical Engineering (and then Associate Dean for Undergraduate Education), received a grant from the National Science Foundation to begin this program as a joint project between WISE and the College of Engineering. The idea originated from interactions and conversations with women graduate students, many who stated that no faculty members had mentioned the possibility of graduate school for their future. It was felt that providing information about graduate school paired with research experience in a laboratory would give women a firm basis for considering that possibility.

PROGRAMMATIC COMPONENTS

The following paragraphs provide more detailed information about the Parker Scholars program components:

November

- The College of Engineering student data base is queried to find woman with junior standing of high academic achievement. To get 50 - 60 participants, approximately 140 students need to be invited, therefore the actual GPA cutoff varies each year. Nominations from faculty are also accepted, as well as self-nominations.
- The women from this list are sent a letter briefly describing the program and inviting them to an orientation program, in order to find out more specific information.
- The orientation meeting is held right before Thanksgiving. The program is described in more detail and expectations and time commitment are outlined. Questions are answered and pizza dinner is provided

January

- Students are contacted about the first session and the Planning Your Future groups (see descriptions in the month of February).
- A letter of invitation is sent to all College of Engineering faculty and research associates to invite them to participate in the Parker Scholars program by mentoring one or more scholars in their lab. This is referred to as the "internship" part of the program, and the College of Engineering provides the funds to support 50 Parker Scholars for 160 hours of work in a research position. The scholars may choose to do the internship for credit or stipend, but in either case, there is no cost to the faculty member. The time period when the internship takes place is negotiable between the student and the faculty member, but the most common time is during the summer or fall semesters.

February

- The first session is "'Career Choices and Graduate Degrees in Engineering'". It is a panel discussion, with a moderator and five panelists, usually two women CoE faculty, an engineering grad student, a medical student (with an undergraduate engineering degree), and a women with an engineering degree working in industry. The panelists are asked to address the following questions:
 - How did you decide to enter a graduate program in engineering?
 - Did someone, in particular, encourage you to do this? Discourage you?
 - What kinds of funding were available to you to finance your graduate degree?
 - What can you do with an advanced degree that you could not do without it?
 - Does having an advanced degree enable you to more easily balance your work and career with the personal aspects and responsibilities of your life?

A pizza dinner is also provided.

- "Planning your Future" groups begin and meet once a week for 4 weeks. These are lead by professional counselors from the Center for the Education of Women. Each week the groups will discuss a variety of issues related to planning for the future - academic, career, and personal goals are considered.

Week 1

1. Group introductions
2. Discussion of what life at the University has been like
3. Informational interviews with College of Engineering faculty or graduate student in a field of interest. Or someone in a job that is of interest in the community. **This is often the first time many participants have had this kind of discussion with a faculty member.*
4. Journal assignment.

Week 2

1. What is success?
2. Evaluation and measurement of success:
3. Achievement Analysis - recognition of skills
4. Assign journal topic.

Week 3

1. Discussion of communications and assertiveness - what does being assertive mean?
2. Discuss journal and make next assignment.

Week 4

1. Discussion about balance in relationships/work/family/other interests
2. Discussion of Informational Interviews (assignment from Week 1)
3. Closing - write down and discuss 3 things to do in the next 1-2 months to advance your plans for the future.

March

- “Going to Graduate School: What Every Undergraduate Needs to Know Before Applying” is the second program/panel planned. This program is intended to provide reliable information about the graduate school application process. Tips on how to find out what students need to know about a graduate department, funding for graduate school, letters of recommendation, the GRE, time frames for decision-making and many other topics are discussed. The panel usually consists of the College of Engineering Associate Dean for Graduate Education and Research, a representative from the graduate school admissions office, a College of Engineering faculty member and a current graduate student. A pizza dinner is provided.
- Scholars are asked to come to the Women in Engineering Office to look at the list of faculty members that have indicated interest in mentoring for the program. There are descriptions of the projects that are offered, and the students are asked to find one or more which are of interest to them. It is the responsibility of the student to set up an “interview” with the faculty member to see how they might work with the faculty and their lab. It is actually up to the faculty member to make the offer of placement to the student. Scholars are asked to find a placement by the end of classes. If the students are having trouble with some aspect of this process, we encourage them to speak to someone in the Women in Engineering Office.

At the end of the Internship...

- In order to help the Women in Engineering Office (and the student) evaluate the experience, the scholars are asked to write a brief summary (1-2 pages) about their research. They are not asked to go into great technical detail, but the basic project should be explained, as well as the role the student played in advancing the project toward completion.

PRELIMINARY RESEARCH FINDINGS

Preliminary findings from an ongoing study that began with the inception of the Marion Sarah Parker Scholars Program show some interesting statistics from program participants³:

Reasons for not attending or for hesitating to start graduate studies in engineering (students could select more than one reason)

- 40.3 percent want to pursue more people-oriented fields
- 37.3 percent are unsure what career path to pursue
- 25.4 percent are not interested in academic careers
- 23.9 percent feel they don't need a graduate degree to get a good job
- 23.9 percent are unsure graduate school would improve their opportunity
- 22.4 percent want to do more socially meaningful work

The Marian Sarah Parker Scholar Program is currently designing a follow-up instrument to be sent to all the past participants. The goal will be to find out what the former Parker Scholars are currently doing and if graduate school has played a role in their past, present, or future. We also hope to find out if they feel the Parker Scholars program had any affect on their graduate school decisions. From necessity, this evaluation will be formative only. Since all students who are interested in participating are selected, there is no control group. None the less, this follow-up study will provide important information and qualitative data.

CONCLUSION

The Marian Sarah Parker Scholars Program continues to be a rewarding effort for faculty, staff, and students. The upcoming follow-up instrument will help determine the effectiveness of the program and any ways in which it might be strengthened. Anecdotal evidence has told us that often faculty members retain their Parker Scholars beyond the initial 160 hour internship and that they have served as references for Parker Scholars applying for graduate school. The number of women earning graduate degrees in science, engineering, and math defines the baseline for their presence among top faculty and researchers. In most math-based fields, those numbers continue to be well under a quarter of the total.⁴ It is obvious that the number of women in the graduate pool must be increased if we hope to significantly improve the numbers of women faculty. The Marian Sarah Parker program is one effort toward that end.

¹National Science Foundation. (1990). National Science Foundation's Research Experiences for Undergraduates (REU) Program: An assessment of the first three years (NSF 90-58). Arlington, VA: Author.

²Tidball, E.M. (1986). Baccalaureate origins of recent natural science doctorates. *Journal of Higher Education*, 57, 606-620.

³Hollenshead, C., Wenzel, S., Lazarus, B., Nair, I., (1996). "The Graduate Experience in the Sciences and Engineering: Rethinking a Gendered Institution". In C. Davis (Ed.), The Equity Equation, San Francisco, Jossey-Bass Publishers.

⁴Vetter, B., (1996). "Myths and Realities of Women's Progress in the Sciences, Mathematics, and Engineering". In C. Davis (Ed.), The Equity Equation, San Francisco, Jossey-Bass Publishers.