

CONDUCTING A NEEDS ASSESSMENT FOR A WOMEN IN ENGINEERING PROGRAM

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Introduction

Lafayette College in Easton, Pennsylvania, is a small liberal arts college with four accredited engineering programs. Lafayette has a total student population of approximately 2,000 students of which about 20 percent are engineering students. Lafayette's student population is recruited primarily from the Northeast United States, however students from all regions of the United States and over 48 foreign countries attend the college. There are no graduate programs at the college and the small size of the school encourages close contact between students and faculty. In the engineering programs there are no teaching assistants and all classes and laboratories are taught by the faculty.

Lafayette College's small size, strong liberal arts focus and the student's easy access to the faculty should make the school attractive to women engineering students. Currently, approximately 23 percent of the engineering students are women. Lafayette has no Women in Engineering or Science Program and the only formal program that exists to aid women engineering students is a student chapter of the Society of Women Engineers. Lafayette does have three women faculty members out of a total of 36 engineering faculty. None of the women faculty members are tenured. Lafayette's Assistant to the Director of Engineering is also a woman engineer.

In the fall of 1992, we initiated a study to determine whether Lafayette would benefit from a Women in Engineering program, and, if so, whether that program should direct its efforts at recruiting, retention, or programs to encourage young women to study engineering. This paper describes the steps taken to evaluate the needs of the college including developing a plan of action, obtaining statistics on women and men in engineering at the college, conducting a retreat for women students in engineering, and surveying the faculty.

Plan of Action

We attended a WEPAN training seminar in the fall of 1992 with the support of both Lafayette's Director of Engineering and Provost. It was at this seminar that

we realized that while the percentage of women engineering students at Lafayette was known, there was insufficient information available concerning the status of these students to make an argument for or against a Women in Engineering Program. We therefore developed a preliminary plan of action for conducting a needs assessment at the college.

The plan of action consisted of three steps: collecting statistics on the number of women engineering students over time and the retention rate of these students; conducting a women engineering student retreat to determine how the students view the engineering program and what needs they might have which are not being met; and conducting a survey of the faculty to learn if and how a Women in Engineering Program could benefit the faculty.

After developing the preliminary plan of action, we met with both the Director of Engineering and the Provost of the college. At this meeting, we obtained the full support of these individuals. This support included having the Provost contact the registrar of the college to insure his cooperation with obtaining the required statistics, having the Provost contact the Dean of the College to obtain his support in conducting a retreat and obtaining the financial support of the Director of Engineering to conduct the retreat.

The three phases of the plan were conducted sequentially. The required statistics were obtained first and this was followed by the retreat and the survey of the faculty.

Obtaining Statistics

Lafayette College has prided itself on the fact that women have comprised approximately one-quarter of the graduating engineering classes for the past decade. While this is an impressive statistic, compared to the 17% national average, it was achieved without any formal recruitment or retention programs geared toward women. Other than the much touted one-quarter figure, no statistics were available concerning the status of women in engineering at Lafayette. Therefore, we sent a memo to the registrar through the Provost's office requesting the following information and statistics:

1. Percentage of women graduating with B.S. Engineering degrees since 1974.
2. Number of male and female B.S. Engineering students in each class for past 5 years, and retention rates during those years.
3. Information on students leaving the engineering programs in the past 3 years, including gender, GPA at time of change, and the major to which they changed.

Statistics from question #1 would show the progress that Lafayette has made in attracting women to engineering since the advent of coeducation in 1971, and

also would confirm the 25% statistic we had often heard. Question #2 was designed to determine whether women had higher or lower retention rates than men. The information from question #3 would tell whether women were leaving engineering for different reasons than men, and whether their GPAs were higher or lower than the men who left engineering. We also hoped to interview women who had left engineering to determine if a formal women in engineering program might have helped prevent their departure. These interviews have not yet been conducted.

We received the results in about two weeks. The quick response can probably be attributed to Lafayette's small size and that the request came directly from the Provost. In general the results were encouraging and no serious retention or recruitment problems were identified.

Women Engineering Students Retreat

Although the statistics were encouraging, we were anxious to hold the retreat for the women students to determine how they felt about the engineering program. The purpose of the retreat was to better understand the academic and social climate for women engineering students, to pinpoint any specific concerns the women might have, and to learn from them what they would hope to gain from a Women in Engineering program.

When planning the retreat, we had four concerns: selecting a facilitator, determining the number of students to invite, providing incentive for the students to attend, and determining exactly what information should be gained from the meeting. The choice of facilitator was important because the students needed to be able to express their opinions and concerns freely. We felt that as the students' present and potential instructors, we would inhibit them from speaking freely about their experiences. Also, we have no experience in counseling or facilitating discussions. Therefore, a third party, preferably one with counseling experience was needed. The most logical choice for us was the Assistant Dean of the College, a woman with much counseling experience, especially with minority students. We sent a memo (again through the office of the Provost) to the Dean of the College requesting his Assistant's help with the retreat. The Assistant Dean, though already overworked, was very excited and enthusiastic about facilitating, and volunteered two of her student interns to help - one to co-facilitate, and one to take extensive notes during the retreat.

We selected a group of current women engineering students from each of the four classes, and each of the four engineering disciplines. When deciding the number of students to invite to the retreat, we were concerned that too few women would not give a good representation of the population of women engineers, yet too many would decrease the intimacy necessary to have productive discussions, and would make the quieter students more inhibited. Sixteen women, four from each of the four engineering disciplines (Electrical, Mechanical, Civil, and Chemical Engineering) were invited. Our facilitator claimed that in her experience, 12 to 16

was the optimal number of people needed for productive discussions. Since we are acquainted with most of the 100 or so women engineering majors, we invited what we believed to be a representative cross-section of the population. Eleven of the sixteen ended up attending the retreat.

Engineering students at Lafayette are very busy, and their spare time is precious. We knew that the location of the retreat, the time it was to be held, and the incentive of free food were all important in assuring good participation. Lafayette owns a chateau located about one half mile from the campus which was designed after the Marquis de Lafayette's chateau in France. Most of the students had heard of it, but few had been in it. It is used mainly for trustee and faculty functions. Choosing the chateau as the location of the retreat marked this gathering as an event important enough to the college to allow students access to this very interesting and impressive building. It also got the students off campus and away from their normal surroundings. We chose a starting time of 8:30 AM on a Saturday morning, an hour considered very early by the students, but one for which they typically had little else planned. A continental breakfast was provided, and after the retreat ended at noon, lunch was served.

To assure that the retreat would address our concerns, a meeting was set up with the facilitator beforehand. At this meeting we discussed the questions to be addressed at the retreat and what we hoped to gain from the feedback. All discussion at the retreat was to be kept confidential - even we would not be informed of particular names or courses discussed. We asked that the following topics and questions be addressed but the conversation be allowed to flow naturally, with the facilitator preventing it from straying too far from the topics.

1. Why did you choose Lafayette?
2. What is it like being a women engineering student at Lafayette?
3. What kind of support programs would you like to see?
4. Why do women leave engineering?
5. Have you felt harassment in any way?
6. How do you feel about entering a male dominated profession?
7. How can Lafayette recruit more women into the engineering programs?

The results of the retreat were very revealing to us. We were particularly made aware of the problems that our first-year engineering students have. We also found that the students wanted to have much more interaction with the engineering faculty, male and female, in situations outside of classes and laboratories so they could see what engineers are really like.

Survey of Faculty

By surveying the faculty, we wished to establish how a Women in Engineering Program might benefit the faculty and to determine what the faculty view as the problems faced by the women students. Based on the results of the retreat, we decided to focus on faculty members who deal with first-year engineering students. It is during this first year that the women engineering students feel the most isolated and unsure of their decision to be in engineering. It is also during this first year that the students take courses primarily in Math, Physics, Chemistry and English and do not have many opportunities to interact with the engineering faculty.

A survey was sent to all faculty members in Math, Physics and Chemistry. The survey contained the following questions:

1. What do you believe are some of the problems women engineering (and science) students face academically during their first year?
2. What suggestions do you have for how Lafayette could help the women in your classes?
3. If you believe it is necessary, how could Lafayette help you improve your interaction with women students in your classes?
4. Do you notice any differences in the participation levels of women and men in your lectures/laboratories? If so, what are these differences?
5. How would you like to see women students be better prepared for your classes? For example, could Lafayette provide workshops to help increase students' self assurance, confidence in asking questions, and participation in laboratory experiences?
6. What have you noticed about the interaction of male and female students in your classes or laboratory sections?

A total of 31 surveys were sent out and 16 responses were received. Initially the responses were divided into three groups: those which believed that the first-year women students had significant obstacles to overcome and that both faculty and students needed to be better prepared to deal with these obstacles; those which were unsure of whether any problems existed; and those which believed no problems existed. The number of responses in each group were 6, 4 and 6, respectively.

The survey provided us with evidence of both the concern and lack of concern shown by faculty teaching first-year engineering students. While there would be support for initiating a Women in Engineering Program from the faculty, we might meet an equal amount of resistance if the argument for such a program was not

persuasive. We also received many valuable insights into why the first-year women engineering students feel isolated and show a lack of confidence.

Conclusions

By conducting a needs assessment, we have been made aware of the strengths and weaknesses as they pertain to women students in Lafayette's engineering program. By involving the administration in our work we have received support for the study and encouragement. We are now in a better position, with statistics and feedback from both students and faculty to assess whether a Women in Engineering Program would benefit the college.

Lafayette is a small school and creating a full-time position for a Women in Engineering Program director is not realistic. In addition, the women faculty in engineering are untenured and need to put their primary efforts into professional development. These faculty provide the role models the students want and overburdening them with additional responsibilities would reduce the amount of time available for mentoring.

As an initial step, we feel that a quarter-time position should be created within the administration to meet the needs of women students in both engineering and the sciences. This person would be responsible for developing programs for women engineering and science students, particularly during their first year to give these students a network of support with other students and faculty. In addition, this person could coordinate with the admissions office to develop recruitment programs for women students. Because of the small size of Lafayette, we do not feel that development of more general programs to encourage young women to enter the sciences and engineering is warranted at this time.