

## PERSPECTIVES ON EVALUATING CLASSROOM CLIMATE PROGRAMS FOR WOMEN

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Incorporating evaluation into the process of planning, developing and implementing classroom climate programs for women is important for many reasons. Program evaluation can allow a greater understanding of the impact of a program on its participants, provide information about the success of programs which can attract future funding, and help seed similar programs at other institutions. There are at least as many forms of evaluation as there are types of programs, with wide ranges in complexity. However, there are many different theories and definitions of program evaluation, with no universally accepted approach. This paper discusses one approach to evaluating classroom climate programs for women, based on the evaluation of several model programs for the Center for Women in Engineering (WIE) in the College of Engineering at U.C. Davis.

### Introduction

Over the past three years, the staff members of WIE have worked as a team to develop, implement, evaluate and disseminate information about several model programs aimed at improving the climate for women engineering students. These pilot programs, funded by the National Science Foundation (NSF) and the Fund for the Improvement of Post-Secondary Education (FIPSE), were designed to attract, recruit and retain girls and women into the field of engineering while at the same time addressing the impact of the "chilly climate." These programs were developed at two levels, K-12 and university. The K-12 programs include workshops for teachers and outreach activities for students. The university level programs include a "How Things Work" hands-on course for female undergraduate engineering students, and sensitizing workshops for engineering faculty.

The following sections of this paper discuss considerations in planning the evaluation design of these model programs, identification of evaluation challenges, examples of selected data collection methods, and useful program results. Finally, based on this evaluation, recommendations are offered to others who plan to evaluate similar programs for women.

### Planning the evaluation

Because our model programs were innovative and unique, it was determined that they required responsive, ongoing evaluation. A formative, process-oriented approach could provide the continual feedback necessary for program refinement to meet participants' needs and the program goals. Undertaking several evaluation steps early in program planning resulted in the selection of a formative evaluation design, and incorporated both qualitative and quantitative data collection methods.

A literature review revealed few other existing programs similar to those proposed at U.C. Davis. A series of meetings with WIE staff and principal investigators were held where program goals and objectives were reviewed and primary evaluation questions were identified for each individual program component. Finally, the group agreed on which questions were possible to answer within a three-year time period.

Some of the information to be sought through evaluation included:

- \* An understanding of female students' attitudes and feelings toward engineering
- \* An understanding of K-12 teacher and university faculty attitudes toward classroom climate issues
- \* Information necessary to modify programs over time to best serve female students
- \* Annual reporting information for our funding agencies
- \* Information about the programs for institutional decision makers
- \* Descriptive program information for dissemination to a wide variety of audiences, both during and at the end of the program
- \* Evidence of attraction, recruitment, retention or improved performance of female engineering students as a result of the programs.

In order to understand how the program components functioned and how our participants were impacted by them, it became clear that mostly exploratory and descriptive information was needed about our programs and participants. Ongoing feedback about our programs and participants was necessary in order to modify and improve the components each year. At the same time, it was not likely that much information about attraction, recruitment, retention or improved performance of students could be generated in such a short period of time.



### Evaluation challenges

There were a number of challenges to be addressed when designing evaluation for each program component:

- \* There were no prior survey instruments available which could be used "as is" to quantitatively measure the programs
- \* Some traditional evaluation designs, such as experimental, had to be ruled out because:
  - \* The programs involved mostly small, self-selected groups of students or teachers, making random sampling impossible
  - \* There was no one available for control or comparison groups
  - \* There were too many independent variables that could not be controlled
- \* Changes in the classroom climate are difficult to identify and affect, and may take a long time to assess
- \* Long-term program impacts on participants and on retention were not possible to measure in a three-year period
- \* Obtaining results which served funding needs might be different from those required for internal program information

Furthermore, obtaining accurate assessments of students' thoughts, feelings and attitudes when participating in classroom climate programs through the use of traditional quantitative methods such as surveys was challenging. At the same time, the value of statistical data about our programs for administrators, policy makers, members of the scientific community and funding agencies had to be considered.

The approach to evaluating classroom climate programs for women was, therefore, to incorporate multiple methods of data collection into the evaluation design. The evaluation was designed to generate as much qualitative, descriptive information about our programs and participants as possible before using or developing quantitative measures. Because of the need for some statistical data, quantitative measures were used wherever possible. These were used particularly in the evaluation of the K-12 programs, since there was more information available about similar programs. Quantitative measures were generally developed based on instruments and suggestions found in evaluation reference books, or were developed in the middle of the program from analysis of qualitative data.



### Evaluation methodology selected

Each program component was assigned a set of goals and objectives, and evaluation methodology was then tailored to provide the information recognized as most important for each component. Below is a brief description of the two university level program components, targeted participants, goals, and the evaluation methodology selected:

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- Program: Faculty Sensitizing Workshops, 1992 and 1993
- Level: University engineering faculty
- Primary Goals: To create faculty awareness of "chilly climate" and provide an environment for faculty to discuss and form a plan of action for addressing this in their own classrooms
- Methodology: Primarily qualitative: faculty presurvey, 1992 Engineering Student Climate Survey, workshop observation, evaluation at end of workshop, project team brainstorming, informal faculty feedback
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- Program: Engineering 25, "How Things Work," hands-on course in mechanical dissection for female engineering students, 1992 and 1993
- Level: University level undergraduate female engineering students
- Primary Goals: To address and overcome fear of hardware and increase confidence through hands-on activities
- Methodology: Primarily qualitative: presurvey, student journals, interviews with TA's and professors, "final exam" evaluation questions, some observation, teaching team brainstorming, focus groups
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For both of these university level components, primarily qualitative methods were selected because of the need for information about changes in attitudes and awareness of participants.

### Program results: The role of qualitative data

As expected, using multiple methods to evaluate model classroom climate program components yielded a variety of useful and

complementary information. In particular, some excellent results were obtained from analysis of various qualitative data. One example is the data collected from evaluation of the hands-on engineering course, E25.

In a two-year evaluation of E-25, written student journals emerged as the primary source of information about what happened in E25 and about the attitudes, feelings and behaviors of its female participants. An enormous amount of rich, deep data emerged from content analysis of these student journals. The journals constitute a descriptive record of how students developed throughout each quarter and how they felt they were impacted by the course.

In the first year of the course, students were asked to simply answer several questions each week in their journals, regarding the hands-on activities they encountered in their labs. Analysis of student journal entries led program planners to an understanding of their experiences while taking the course, and allowed for the identification of a number of variables to be studied with the group of students taking the course in the second year. The variables identified included:

- \* How the women students felt about whether men should be allowed to take the course
- \* Evidence of increases in students' self esteem and confidence with tools and hardware as a result of taking the course
- \* Students' increased awareness of the chilly classroom climate
- \* The value of including female role models in the course (female TA's and guest speakers).

In their journals, students also made many suggestions about the course activities which gave the professor feedback necessary to make modifications and improvements to the course.

In addition to the journals, the findings from each course were then confirmed and strengthened, using results obtained from other data collection methods. Prequestionnaires were given to each group of students prior to taking the course. Interviews were conducted with the professor and TA's immediately following each course. Focus groups of participants were held one year after each course. Like the journals, these methods also sought data about how students developed throughout each course, how they reported feeling about components of the course, and what improvements they would suggest.

The prequestionnaires gave some baseline information about how students coming in to the course initially felt about working with tools and hardware. Interviews with the TA's and professors revealed where there were discrepancies in perceptions of students feelings and course components, and confirmed students' impressions about what



was successful about the course. The focus groups confirmed, for instance, that each group of participants had lasting feelings of increased self esteem and confidence resulting from the course. At the same time, new ideas were generated from the participants. These findings were used to obtain additional funding from NSF, which will be used to offer and evaluate a future courses, with an all-women section and a coed section as comparison groups.

### Conclusions from evaluating model classroom climate programs

Based on the experience of evaluating model programs for women at U.C. Davis, here are some recommendations when undertaking evaluations of classroom climate programs:

- \* Include evaluation from the earliest moment possible in all stages of program planning, development, implementation and dissemination. A clear understanding and agreement of how evaluation results will be used and what questions the evaluation seeks to answer can save a great deal of time, effort, and avert misunderstandings.
- \* Limit the number of evaluation questions you want to pursue. It is possible to become overwhelmed with too much information, especially when using qualitative methods.
- \* Take into consideration both limitations and available resources, such as time needed to develop and implement evaluation strategies, money, ease of access to student records, available expertise both in-house and in the education community, and use or modification of existing measures vs. design and testing of new ones.
- \* Qualitative methods such as interviews, journals and focus groups can also be used to generate data which can lead to the development of survey instruments later in the program.
- \* Carefully combining qualitative and quantitative methods can strengthen and confirm program evaluation results. They provide more than one way to address evaluation questions.

Our formative, multiple-method approach to evaluating our model classroom climate programs was successful. Our evaluation was designed to be an integral part of program planning, implementation and dissemination. Evaluation methodology provided continuous feedback on program components, which allowed the program administrators to make modifications, continuously meet the needs of participants, and sustain ongoing impressions of what was successful about our programs.

