

EARLY COOPERATIVE WORK EXPERIENCE: A COMPARISON FOR MALE AND FEMALE FRESHMAN ENGINEERING STUDENTS

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ABSTRACT

Because the vast majority of students at GMI Engineering & Management Institute major in engineering, female students are less likely to feel "isolated" than their peers at universities offering degrees from a variety of disciplines. Women student at GMI usually report a strong sense of "fitting in" while on campus. However, it is feared that the cooperative work experience which every student must undertake for one half of each academic year may be disproportionately stressful for young women engineers. Because research indicates that young women are more likely than young men to blame themselves for failure and to quit without complaint¹, there is concern that a segment of the prospective female engineering student population may leave before graduation due to stressful or difficult assignments in industry. These concerns have resulted in the creation of a survey for freshman students when they return from their first cooperative work experience. The results of this survey show differences in perception of work assignments based on gender. These results will assist in the design of an orientation program for female students about to begin working in industry.

BACKGROUND

Many studies have been conducted evaluating the experiences of women in engineering programs, and most return with disappointing results.¹⁻³ At the high school level, girls are less confident in their academic abilities than boys⁴ and research suggests that the disparity in confidence levels only increases throughout the undergraduate years.^{1,5,6} In a study reported in the *Journal of Engineering Education*¹ last year, a group of students were followed throughout their chemical engineering curriculum. While freshman, the women showed signs of being far more likely to succeed in the program (more educated parents, better entrance examination scores, better concentration and study skills.) Yet there was no statistical significance favoring their success in the undergraduate engineering program. On the contrary, they were more likely to drop out of the program while in good academic standing, and they were far less likely to retake a course in which they had failed. Experts agree that recruitment programs that boost confidence and mentoring programs that bolster retention are critical^{3,7,8}, and steps have been taken at GMI Engineering & Management Institute to provide these mechanisms within the academic setting on campus. The purpose of this study was to examine the differences in perception that men and women experience regarding their cooperative work experiences so that appropriate mechanisms of support could be provided to these students while at work as well.

RESULTS

Fifty five freshman students, all enrolled in the same Problem Solving (ENGR100) course, were given a questionnaire to complete via spreadsheet as part of an assignment in the Fall of 1995. All students had begun their cooperative work experience during the Summer term of 1995. Thirteen of the students were women (24%) with the mean age for both genders being equal (18.2 years).

Students were asked to identify the three job assignments they received most often during their first three-month work term. They were then asked to rate each of these assignments on a scale of 1-10 according to: Input, Preparedness, Enjoyment, Absence of stress, Level of Support, Self Evaluation, and Supervisory Evaluation. In all cases, a score of ten meant a positive feeling regarding that assignment and a score of 1 indicated a negative feeling.

The surveys were collected, and ten major job types were identified from the assignment described. These job types were: sitting, cleaning and painting, observing others, clerical tasks, machining and light assembly, testing and equipment calibration, reporting and conducting meetings, CAD/CAM support, customer support, and computer programming.

Examination of the distribution of job types showed that the five most frequently assigned tasks were the same for men and for women, in the same order. These were (1) reporting and conducting meetings, (2) clerical tasks, (3) testing and equipment calibration, (4) CAD/CAM, and (5) sitting. The least frequently assigned task for women was machining and light assembly and the least frequently assigned task for men was customer support.

When asked how much input they felt they had in determining their job assignments, women usually rated their level of input higher, even in the assignments they liked least. Because this survey examined the perceptions about work, this response may be biased by different expectations between men and women; perhaps women felt they had more input because they expected little input.

Women reported a high sense of preparedness in the areas of "sitting", "observing others", and "customer support", and a low sense of preparedness in the areas of "testing and equipment calibration", "CAD/CAM", and "computer programming". Men felt most prepared in the areas of "cleaning and painting", "clerical tasks", "CAD/CAM", and "computer programming". They felt a low sense of preparedness in "machining and light assembly" and "testing and equipment calibration".

When asked how much support they were given in undertaking their assignments, men tended to feel well supported for most assignments. Women felt particularly more supported in the areas of "observing others" and "customer support" and particularly less supported in the "cleaning and painting" and "machining and light assembly" areas.

Women reported high feelings of stress for the "cleaning and painting", "machining and light assembly", "CAD/CAM", and "computer programming" job assignments. They reported low levels of stress for the "sitting", "observing others", "clerical tasks", and "customer support" assignments (tasks which they tended to feel prepared for and supported in). Men found all tasks to be reasonably stress free.



When asked how much they enjoyed their work assignments, women responded less positively in all areas except for "reporting and conducting meetings" and "customer support".

When asked how well they felt they completed their assignments, men and women both responded favorably. When asked how well they expected to be evaluated by their superiors, again, men and women both gave positive responses for all tasks.

CONCLUSIONS

For all job types, even the ones which they liked the least, women were more likely to feel that they had input into determining their assignments than did their male peers. While this may indeed be the case, it should also be considered that women simply perceive that they have more input, based upon their level of expectation when entering into their work assignment. A followup survey is currently being conducted to measure how this perception might change with maturity and experience.

When drawing correlations between the stress experienced with a specific job type and other factors, a clear correlation was found for men between the level of stress they felt and a feeling of being unprepared. For women, a combination of two factors - feeling unprepared and feeling unsupported - correlated to feeling highly stressed.

Most assignment types were given as often to men as they were to women with a couple of notable exceptions. Men were more frequently assigned to "cleaning and painting" and "machining and light assembly", jobs identified by women as unsupported and highly stressful. Women, on the other hand, were more frequently assigned to the two jobs they reported enjoying most, "reporting and conducting meetings" and "customer support" job types. In addition to this, women responded positively regarding their level of preparedness, their level of support, and their freedom from stress in the area of "customer support".

These results will be used to design an orientation program for women about to undertake their first cooperative work experience. Areas where women tended to feel unsupported, unprepared, or stressed, will be targeted for discussion. In addition, followup surveys will be conducted with this specific group of students to identify how their perceptions change over time.

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