



The Effect of Skewed Gender Composition on Student Participation in Undergraduate Engineering Project Teams

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Introduction

Although women are well represented among the total undergraduate population at the University of Michigan, female students are outnumbered by male students in the College of Engineering. In 2009 and 2010, the incoming class in engineering was 23% female, consistent with national trends and reflective of gender stereotypes depicting engineering as a "male" domain. Because there are fewer female than male engineering students, the composition of small groups of students, including those assigned to complete class projects, is likely to be skewed in favor of men. In this study, we draw on research findings from psychology on the influence of gender stereotypes and skewed gender compositions on women working in male-dominated fields as well as research on self-efficacy and active participation to investigate the effect of skewed gender composition in small class project groups. We address the question of whether being in the gender minority has a detrimental effect on active participation in group project teams for female engineering students.



Figure 1. Sample screen shot of student group presentation.

Study Setting

In Engineering 100: Introduction to Engineering students are assigned to 4 to 6 person teams to complete a semester-long introductory engineering design project. Project teams are created based on several variables including gender, race/ethnicity, living location and skill sets. Overall teams are often skewed in favor of men, with a variety of team gender compositions within any given section.

At the end of each semester, teams are required to deliver a final oral presentation, which is videotaped (Figure 1). This research project explored the observation that in mixed gender teams, female students would more often present less technical material, while male students would more often present more technical material.

Research Methodology

There were two primary components to this research investigation:

- A systematic investigation of the roles adopted by male and female students as a function of gender composition of the presentation group in videotaped presentations
- A questionnaire administered to a subset of students immediately following delivery of their final oral presentations to assess student self-perceptions

Team Composition	Teams on Video	Women on Video	Women Surveyed (no video)	Men on Video	Men Surveyed (no video)
All Women	3	12	4 (0)	-	-
Female Dominated	29	89	6 (3)	43	2 (1)
Gender Equal	37	81	6 (0)	81	8 (0)
Male Dominated	73	86	31 (5)	191	66 (7)
All Men	33	-	-	77	99 (41)
Total	175	268	47 (8)	392	175 (49)

Table 1. Team and gender composition of videotaped presentation and survey respondents.

Study Variables

A preliminary analysis of this data set was performed using:

Dependent measures:

- Number of technical or non-technical slides each student presented
- Speaking time ratio (actual time/expected time)
- Number of questions answered by each student
- Leadership and effective speaker ratings assessed by two independent judges

Predictor variables:

- Student gender
- Group gender composition (male dominated, equal split, female-dominated)

Acknowledgements

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Results

Data were analyzed using a 2(student gender) X 3(group gender composition: male dominated, gender equal, female dominated) ANOVA.

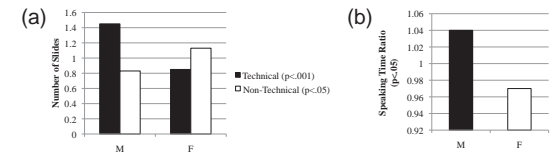


Figure 2. Women presented more non-technical material, and men presented more technical material (a) and women spoke for a shorter than expected period of time (b), regardless of the group gender composition.

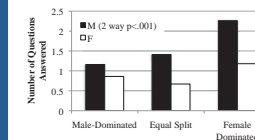


Figure 3. Men fielded more questions, particularly in female dominated groups.

Men were also rated as appearing more knowledgeable about the subject and as showing more leadership than women in their presentations, as rated by two independent judges.

Based on questionnaire responses, both men and women rate themselves as having performed well in female dominated groups. Students' self-perceptions of their leadership in the group showed that men considered themselves to be leaders most when in groups with more women. Women's self-rated leadership did not differ by group gender composition.

Conclusions

Results suggest that:

- Women were more likely to adopt passive, supporting roles, and present non-technical information,
- Men adopted active roles and presented more technical information in group presentations.
- When men were under-represented, their behavior aligned with the stereotype; they became more assertive in taking on questions posed to the group as a whole.
- Questionnaire responses showed that men rated their performance and leadership higher in groups with more women.
- Women rated their own performance as better in all-female groups than those in which the participant held solo status.