Communication practices of women in undergraduate engineering classes

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Communication practices of women in undergraduate engineering classes

by

Sarah Michelle Brown

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Major: Rhetoric, Composition, and Professional Communication

Program of Study Committee:
Rebecca E. Burnett, Major Professor
Diane Price Herndl
Dorothy Winsor
Loren Zachary

Iowa State University
Ames, Iowa
2006

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For Mom, Dad, Richie, and Wilma

With my love and thanks
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Thank you to my family and friends for their continued love and support. I would especially like to thank my Major Professor, Rebecca Burnett, for being a great mentor, research partner, and co-author. I would also like to thank Kevin Saunders and my Program of Study Committee, Diane Price Herndl, Dorothy Winsor, and Loren Zachary for their critical support, feedback, and encouragement.
Communication Practices of Women in Undergraduate Engineering Classes explores ways in which women and men communicate in undergraduate engineering classes and ways to better attract and retain women in engineering programs. The data, gathered over three semesters, include classroom observations, surveys, and interviews. Seven classes were analyzed: four in engineering, two in history, and one in food science. This thesis brings together three articles written for various academic audiences: engineering education, leadership, and women’s studies. The individual articles focused on (1) class participation, leadership, and negative behavior in undergraduate engineering classes, (2) leadership styles of women and men, and (3) women’s voice and community in engineering, science, and liberal arts classes. Each article explores critical issues related to gender and offers suggestions to increase participation, leadership, community, and effective communication in engineering classes.
CHAPTER ONE. GENERAL INTRODUCTION

1.1 Grant Opportunity

I knew when I entered graduate school that I wanted to focus my research on gender and communication in some form. I didn’t enter the Rhetoric, Composition, and Professional Communication (RCPC) program with innovative ideas for research; in fact, I never anticipated doing my own research. I assumed I would be reviewing and compiling current literature, and that would be it. But in Fall 2004, I met Assistant Dean Loren Zachary who was meeting with Professor Rebecca Burnett in her office. He mentioned the need for women in engineering; my view about the research I would be doing at ISU changed completely.

Rebecca and I were both interested in the topic of women communicating in engineering. Though neither of us had extensive background in that specific focus, we decided to apply for internal mini-grant (Women’s Enrichment Mini-Grant) funding for on-campus research. Writing the grant together was a great learning experience in many ways, and though I really loved our idea, I never really believed it would get funded. It was the first grant I had been a part of, so I thought it would take more practice on my part. When we got our funding, I was astounded. Researching gender and communication in a relevant area felt and still feels important and exciting. But collecting the data was more difficult than I ever anticipated.

Rebecca was at Rice University during Spring 2005, which was the semester that all of the initial data in engineering were gathered. We were in regular contact, but I experienced

---

1 I have worked closely with Professor Rebecca Burnett. I am comfortable calling her by her first name, which is how I refer to her in this chapter.
a lot of trial-and-error learning when it came to meetings, observations, interviews, surveys, research certification, dealing with grant money, and problem-solving. So, Spring 2005 was a really difficult semester—frustrating, challenging, busy, but I learned a lot about researching and making decisions and figuring things out. I knew Rebecca could bail me out in a crisis, but I really wanted to do as much as I could on my own. And I really liked collecting data. I liked thinking about the classes and students and trying to piece things together and make sense of the study.

During the time that I collected data and began to categorize it, I really connected with many of the women I was observing and interviewing. The way they felt in class, things they had been told, unspoken rules they just followed were all things I understood. And though some of them were hesitant to share how isolated they felt, I really connected with their positive outlooks about the future and determination to succeed. In high school and well into my undergraduate years, I was that girl who didn’t participate; I always felt the pressure to be right or be silent. I was that girl who behaved by never asking questions and always keeping a formal relationship with my professors—never asking for help. Like many of the women I studied, I wasn’t ready to admit that the insecurities I had may have had anything to do with the environments I was in or some of the things I had been told because I am a woman.

Everyday I feel lucky that I got to participate in this study. I can’t begin to list the amount of knowledge I have taken from this research. Beyond my own research agenda and my interest in gender issues, I really feel a connection to this project. In hearing the experiences of other women and reflecting on my own experiences, the line between what I care about for my research and what I care about as a feminist have blurred, and I have found
myself really wanting to add to a discourse that could help to change the way women are marginalized in the classroom—the way that in the past I have been marginalized.

1.2 Summary of Articles

This thesis combines three articles written for various academic audiences. Though the audiences are very different, the foundation for each article is grounded in data collected from faculty and students from four engineering classes at Iowa State University in Spring 2005. The data—collected through classroom observations, surveys, and interviews—revealed how professors and students communicate in the classrooms and how they perceive their communication in the classroom. Each article focuses on how women are affected in undergraduate engineering classes and what can be done to improve the numbers and experience for women in engineering. I co-authored the first two articles with Rebecca, and I single-authored the third article. The overall research question for my thesis is, “How does gender affect participation, leadership, behavior, and community in engineering classrooms?” Each article has its own more specific research question.

The first article in my thesis, “Women Hardly Talk. Really! Communication Practices of Women in Undergraduate Engineering Classes,” was written for and published in the *International Conference on Engineering Education Proceedings*. I have also included the corresponding PowerPoint presentation and handout that I gave in Puerto Rico in July 2006; the trip was funded by the College of Engineering. Since the article was written for an engineering education audience, this article focuses on what can be done in the classroom to increase participation and leadership from women and decrease negative behaviors in the classroom.
My co-author and I focused our argument on the traits, qualities, and values women tend to bring to engineering that make them essential participants in engineering. We wanted to focus on the benefits of having more women in engineering, persuading colleagues who may not be particularly invested in reaching out to women. Communication was an important factor in our explanations of differences in women’s and men’s participation, leadership, and classroom behavior. We found that the majority of factors marginalizing women in the classroom are easily changed to create a fairer, more receptive environment for both women and men. We focused on teaching style, communication style, and community in the classroom to show the ways in which changes to the male-dominated environments can encourage more participation from women.

The second article, “‘She’s like the non-leader leader’: Leadership of Women in Teamwork in Undergraduate Engineering Classes,” was written for submission to *Leadership*. In shaping our argument for this article, we were able to draw from leadership literature (and its connection to gendered communication styles) and engineering literature, which shows low numbers of women in formal engineering leadership roles.

We focused on the ways leadership styles tend to be gendered and the ways we saw these gender roles play out in our study. Since increasing leadership is such an important issue in current engineering studies, we were able to link the need for women in engineering to the need for women leaders in engineering. Though we kept our argument focused specifically on gendered leadership styles and the engineering setting, we stressed the importance of leadership and progressive leadership styles.

The third article, “Creating Community: Gendered Participation in Engineering, Food Science, and History Classes,” is written for submission to *Gender and Education*. Since this
article is directed to a women’s studies audience, the argument is different than the other three articles. This article includes extra data collected in a woman-dominated science classroom, food science, and two liberal arts classrooms in history.

This article focuses on giving women a voice and a community in engineering in order to improve their experiences and attract and retain more women. This argument for a women’s studies audience draws on literature from feminist rhetoric. Rather than focusing on why engineering needs to attract women (one of the points in the engineering education article), this article argues why women need to enter engineering.

The three articles that comprise this thesis are different in their individual audiences, purposes, and contexts, but they all draw their data from the same research study. Each article differently addresses communication, engineering education, and gender studies. Though each takes a different approach in addressing the problem of the low numbers of women in engineering, they all battle the same problem of improving the experience and increasing the number of women in engineering. Each article is formatted to the specifications requested for the various journals. I provide a holistic view of the literature I reviewed for all three articles in a composite References section formatted in a modified Chicago style.

1.3 Thesis Organization

My role is varied in the three articles included in my thesis from co-author of two of the articles to single-author to the third article.
I co-authored two articles with Rebecca:

- “She’s like the non-leader leader’: Leadership of Women in Teamwork in Undergraduate Engineering Classes”

Both Rebecca and I created and edited text for these articles. We spent considerable time prior to drafting in discussions in which we planned the overall approach and organization of each article, read and re-read the collected data (separately and collaboratively), and determined criteria for selecting supporting evidence. We also worked collaboratively with the educational statistician, Dr. Kevin Saunders, who provided valuable data analysis and insights about interpretation of our data. When we reach the point of drafting, my role as co-author included doing more of the creation of the first drafts of each article. Rebecca’s role as co-author included editing and revising the texts. These roles have given me a good introduction to the processes and practices of academic writing.

I single-authored the third article, “Creating Community: Gendered Participation in Engineering, Food Science, and History Classes.” I created and edited the majority of text for this article, using the strategies and processes I learned in our collaboration on the first two articles.

The introduction I experienced into academic writing was unique. The process of writing and revising with Rebecca gave me the chance to receive regular feedback about my writing style. The process of revision included analyzing the text side by side and talking through what needed to happen and what changes would turn the text form a student paper to an article. Since I had no experience writing for publication, I was challenged to move from
my role of student to the role of author. My writing frequently slipped, and I found myself falling back on the comfortable role of student, trying to prove I knew the literature rather than using it to make an argument that supported my research. Working with Rebecca, I found myself becoming more aware of my writing style and more conscious of my choices in syntax. Using her writing as a model, I learned how to better structure an argument. Through the process of continually writing, reading, and editing these articles, I feel my writing and my awareness of my writing have grown. The productivity of this unique introduction to academic writing is evident as my writing continues to progress and become more scholarly.

As an exercise for the reflective process of this introduction, I have gone back and read samples of my writing from two years ago (the first draft of the grant), one year ago (the first draft of the methodology section for the proceedings article), and six months ago (the first draft of the leadership article). I see my writing improve as the drafts evolve. I feel that my writing style has progressed, specifically in the follow five areas: organization and structure, design (use of bullets and numbering), argument (clearer line of argument), coherence (I now choose words more carefully to link ideas), and use of sources (fronting the argument rather than the author).

Another benefit of our unique process of collaboration is my newfound comfort in asking for and receiving feedback. After having worked so closely with Rebecca, I feel less anxiety about asking for feedback on drafts of text, and I feel more confident in my ability to apply comments and criticism from others in my writing in order to make it better. Before working on this long-term collaborative project, I let the fear of someone else disliking my writing often keep me from asking for help. By being too anxious to show most people drafts of papers, I left myself little room for growth. Through writing these articles I have learned
that writing for publication is hard, and it’s hard for everyone, and it’s all right that it’s hard. I don’t expect my writing to change overnight, but I have moved forward and progressed in these two-and-a-half years. This collaborative project has shown me how beneficial readers and authors are to my writing and has given me the practice of taking in and applying feedback to thoroughly revise my writing.
CHAPTER TWO. “WOMEN HARDLY TALK. REALLY! COMMUNICATION PRACTICES OF WOMEN IN UNDERGRADUATE ENGINEERING CLASSES”

A paper published in the International Conference on Engineering Education Proceedings

Sarah M. Brown and Rebecca E. Burnett

Overview: Appendices B and D contain the data collected for this article.

Abstract – Many people agree that engineering needs more women since women may have different ways of conceptualizing and solving problems and different perspectives about applying engineering to social concerns. Traditionally, engineering classes have been male dominated, hierarchical, and competitive; they’ve emphasized conventional approaches to problem solving. While women can be highly successful in such environments, they often tend to be more successful in environments that are less hierarchical, more collaborative, and receptive to creative problem solving. To be more responsive to women students, engineering educators need to explore the kinds of communication that actually occur in classes; thus, we posed this research question: How does gender affect participation, behavior, and leadership in undergraduate engineering classes? Our semester-long study focused on the ways in which women and men engineering students communicate, specifically their class participation (actual vs. perceived), negative behaviors, and leadership and teamwork roles.

Index Terms – behavior, class participation, collaboration, engineering communication, gender, leadership, teamwork

Articulating the Problem

Increasing attention to communication in engineering will not only make engineering as a profession more appealing to women, but it will also improve the overall quality of engineering for both women and men. And one of the things that nearly everyone agrees on is that we need more women engineers and more women as leaders in engineering.

The percentage of women in engineering is gradually increasing, but, as Figure 1 shows, the increasing number of women in engineering in the past 20 years still leaves them woefully under-represented (the bottom segment of each bar) [1]. According to the Women’s Bureau at the U.S. Bureau of Labor in 2003, slightly over 12 percent of all engineers were women [2]. This is a considerable improvement from 1983 when 5.8 percent of engineers
were women [3] or 1993 when 7.85 percent were women [4].

Perhaps equally discouraging is that fewer bachelor’s degrees are awarded to women in engineering than in all major fields of science. Figure 2 shows how engineering fares in relation to the sciences: Engineering is the bottom line [5]. At our home institution, Iowa State University, our 2005 percentages are only slightly better than these national figures: approximately 15 percent of all engineering students are women (ranging from slightly over 5 percent to nearly 37 percent, depending on the department) [6].

It’s not as if young women don’t consider engineering as a career. Every year, 25-30
percent of U.S. students entering college intend to major in science or engineering; sadly, fewer than half complete a degree in those fields within five years [4]. Of those who complete engineering degrees, about 20 percent are women [7]. The trend is in the right direction, as shown in Figure 3, which has been adapted from data provided by the Commission on Professionals in Science and Technology; an increasing percentage of women at all levels are earning degrees in engineering [8].

![Percent of Engineering Degrees Earned by Women, 1975 to 2003](https://example.com/figure3.png)

FIGURE 3
PERCENTAGE OF ENGINEERING DEGREES EARNED BY WOMEN [8]

The concern about an insufficient percentage of women in engineering programs carries into the workplace. According to the National Science Foundation, women comprise 46 percent of the U.S. workforce and 48.6 percent of the total college-degreed workforce, but they comprise only 24.7 percent of the workforce in science and engineering [4].

This background leads to two critical issues—equity issues about increasing the percentage of women in engineering programs and quality issues about ways in which women strengthen the field of engineering. The equity issue suggests that the balance of girls and boys in many high school science and math classes needs to extend to colleges and universities [9]. But having equal numbers isn’t sufficient.
The classroom climate and pedagogical approach need to be receptive and encouraging to both women and men. If the climate and approach enable qualified women and men to thrive, then the profession will benefit. Many people believe that the real benefit of increasing the percentage of women in engineering is to engineering itself. Sherra Kerns, formerly president of the American Society for Engineering Education, explains a primary benefit: "We design. Design is a fundamental, a creative endeavor. Engineering is creation and implementation. If you have the best social mix and the most perspectives, then more likely you'll have the best design" [3].

Simply put, our overall goal is to open up participation, problem solving, and leadership in engineering classes in ways that encourage more thoughtful consideration of problems, offer more legitimate options, improve gender equity, reduce distracting behavior, and increase engineering quality. Toward this end, we ask, How does gender affect participation, behavior, and leadership in undergraduate engineering classes?

Literature Review

Engineering attracts and retains few women [9]-[11]. Does this really matter? Yes, because many women see engineering as a vehicle for addressing social problems. Women also tend to have interests that extend beyond the technical world to include arts and humanities that give them a broad view of engineering as part of the social fabric [12].

This breadth of perspective benefits engineering because many women have a different view of the world than men and often interpret, solve, and communicate problems differently [13]. Women’s alternative perspectives may well evolve from their skills as problem solvers.
and communicators [13]-[14]. Typically, women build relationships, have strong nonverbal skills, collaborate, and engage in group problem solving [11].

Current engineering classes and programs tend to privilege male approaches to communication. However, to increase the equity of engineering for women and to strengthen the quality of engineering programs, approaches to communication need to be expanded so that both women and men engineers can participate fully in solving complex problems, unlike the status quo, which too often marginalizes women [15]. Full participation means changing engineering so that women’s good ideas are not shut out, ignored, dismissed, marginalized, acquired, overlooked, or silenced.

Creating more inclusive communication in engineering requires a clear understanding of what characterizes and distinguishes communication in women and men and the ways these differences affect communication in engineering classes.

*Characterizing the Communication of Women*

Many women communicate in a distinct, collaborative style, making a “community of equals,” as noted by Mary M. Lay [16]. They often build community, establish relationships between equals, actively listen to one another, and form social connections [15]-[18]. Other studies suggest women’s communication begins very early. For example, infant girls in the United States are more vocal than boys and begin to speak earlier. Once they begin to talk, they tend to use more complex grammatical constructions, are more articulate, and are far less likely to have speech problems (such as stuttering), dyslexia, and reading problems [14].

Most girls grow up participating in collaborative games that tend to be characterized by “flat packs,” which are nonhierarchical groups [14]. Girls are often sensitive to each other’s
needs in their games. They often take turns, tend to use reason as a means of persuasion, and usually avoid using force as a result of conflict. When conflict arises, girls often make adjustments and exceptions to rules for the sake of the feelings of others. They build community as they interact [14], [19].

In school, girls are often sensitive to feelings of others—being more courteous than boys, disagreeing politely, and more frequently following conventions of participation (turn taking, hand raising) [14], [19]. Their communication also tends to include strong use of backchannel responses, qualifiers, and tag questions. And, they are often less vocal, making use of nonverbal cues such as smiling and head nodding [20]. As girls become women, most continue to be less vocal in class and are often interrupted by or answered by men in the class [14]-[15].

Because much of the communication women engage in is based on collaboration, they tend to be successful in building community in groups and teams [18]. This collaborative communication affects their class participation, creative problem solving, work in groups and teams, and perceptions and actions related to leadership roles [13]. In groups and teams, women often play active roles as facilitators and strong communicators. Their leadership tends to include facilitating activities, working towards team goals, and focusing on relationships between group and team members as a whole rather than each person individually [18].

Characterizing the Communication of Men

Men may be at a distinct disadvantage when it comes to communication. They begin competitive communication as young boys in “a structured hierarchy of peers” [16]. Many
grow up participating in competitive games, played in hierarchical groups. Competitive boys become competitive men who are often less articulate, less skilled at tongue twisters, and have more trouble finding appropriate “words, phrases, or sentences” than their female peers [14].

In general, boys tend to interrupt in conversation more, give and take more orders, and fight for status and rank in their hierarchical group. They are more focused on scores and winning in games and often do not stop playing games until clear winners and losers emerge. In school, they are often more outspoken in class, sometimes skipping conventions related to turn-taking and, instead, shouting out answers (both right and wrong).

The general pattern continues in college and the workplace. Men’s participation in classes is often competitive. Men are quick to ask and especially answer questions, and they are not shy about answering other students’ questions, particularly female students [14], [21]. They include less nonverbal communication than women (eye contact and head nodding), and fewer backchannel responses while interrupting conversation more often than women [20].

Men often compete for a range of related concerns: status, rank, and hierarchical position—all related in some way to dominance [14], [16]-[18]. They often view team or group leaders at the top of the hierarchy—positions of power that are able to delegate duties, finalize decisions, and situate themselves in ways that create the sense that they are responsible for the success of a project [22].

In summary, competitive communication affects the ways men participate in classes, solve problems, work in groups and teams, and perceive and assume leadership roles. For example, in groups and teams, men tend to function more as individuals than as part of a
network [14], [21]. The common practice of working as individuals suggests a reason that men do not create strong relationships as members of groups and teams through communication in the way women do.

*Characterizing Communication in Engineering Classes*

Communication in engineering classes is often competitive. Such communication emphasizes assertive interaction, hierarchies, and individual ranking. More specifically, assertive interaction includes frequent interruptions and shifts of topic [15]. Hierarchical, competitive communication is most often seen in groups and teams where individuals hold positions of varying power within the group or team rather than working as a holistic, collaborative unit [23]. Individuals are ranked in their various positions, creating a setting that enhances competition for power within the group or team [14].

Inattention to interpersonal communication is another feature of engineering classes, taking a number of forms in nonverbal communication, social connections, and report-talk. For example, in groups and teams, men tend to engage in little nonverbal communication such as eye contact, which is an important part of connecting to others [18].

Why does communication in engineering classes tend to privilege the competitive and neglect the interpersonal? While communication style is not the only reason, it’s a strong one: Women and men tend to communicate differently, gender-specific distinctions that begin at an early age [24]. Though class, age, race, and economic status are factors that affect communication style, women tend to communicate using rapport-talk, and men tend to use report-talk [14], [23]. Deborah Tannen explains that rapport-talk shows concern for personal feelings and experiences and builds relationships through stories and narrative experiences
In contrast, report-talk establishes control and power through monologues and abrupt topic shifts [15]; it often omits important social connections. Thus, engineering classes, which typically use report-talk, disadvantage women in two ways, both social constructions of long standing:

- Women tend to use rapport-talk, which is not typically used in engineering communication.
- Men in engineering typically use report-talk, which is not the typical conversation style of many women.

Women are often alienated in engineering classrooms, based on the norms of classroom culture. Not only do women’s communication styles usually differ from men’s, but differences in perceptions about participation have negative effects. For example, women contributing in discussions with both male faculty and students tend to be cut off as well as ignored because women are often looking to collaborate whereas men are looking to compete. Equally problematic, women are sometimes stereotyped as talkative and social (in comparison to men), but this perception draws attention to women’s talk, making them appear as if they talk much more than they actually do [15]. Typically, both women and men are unaware of these different communication styles and perceptions, which further reduce effective communication [18].

Women’s perceptions of leadership are also usually different from men’s, which has negative effects in the engineering classroom. Women tend to act as leaders by facilitating group and team projects, doing extensive writing, setting up meetings, and summarizing group and team discussions [18]. This approach to leadership conflicts with a competitive model, so women are perceived as incompetent or unconfident for trying to facilitate instead
of giving orders. However, when women step out of their expected role as facilitators, men (and other women, too) are often thrown off balance and unable to accept a more competitive approach; women are then seen as too aggressive [24].

Therefore, women are faced with a double-edged sword when dealing with communication in engineering. Collaborative forms of communication often leave them unheard, and competitive forms of communication may label them as too aggressive.

**METHODOLOGY**

Our in situ, observational research provided a natural setting for us to examine our research question: How does gender affect participation, behavior, and leadership in undergraduate engineering classes? In designing our methodology, we maintained strict standards: be rigorous but unobtrusive in collecting classroom data.

Our study has been designated as exempt by our University’s Institutional Review Board (IRB). As part of our IRB process, we created an informed consent announcement that was read aloud in class to all participants. We provided faculty and the Assistant Dean of Engineering with an opportunity to review the penultimate version of this article.

*Selecting Courses, Participants, and Setting*

Our study took place during the spring semester in the College of Engineering in Midwestern University (a pseudonym), a large, multi-college institution. The university as a whole enrolls about 27,000 on-campus students, slightly over 5,000 of whom are in the College of Engineering.

In this study, we focused on sophomore- and senior-level engineering courses in order to contrast students at the most frequently dropped level with those finishing their last semester.
In addition to investigating sophomores and seniors, we also wanted to focus on two engineering programs—one with the lowest percentage of women undergraduates and one with the highest percentage of women undergraduates. The Assistant Dean in the College of Engineering identified the mechanical engineering (ME) program as having among the lowest percentage of women: only 5.4 percent of ME students. ME is the largest engineering program at Midwestern University; two other engineering programs that have fewer than 5.4 percent women are far too small to accurately represent women in engineering. The Assistant Dean identified chemical engineering (ChE) as the program with the highest percentage of women: 37.6 percent.

The department chairs of both chemical engineering and mechanical engineering were given details of the study and asked to help choose two classes and faculty members to participate. The criteria for the classes in each program were (1) a sophomore-level course representative of a core course in the discipline and (2) a senior-level capstone course. The criterion for the faculty members was that they were willing to participate in the study. Specifically, would they permit class observations and participate in one 30-minute interview? The heads of programs each selected two faculty members in their program who were interested in both improving the retention of women in engineering in general and, more specifically, participating in our project. We use gender-appropriate pseudonyms for faculty participants. Table 1 summarizes each one’s teaching experience, percentage of time assigned to research, and percentage of time assigned to teaching, factors that may affect attitudes toward and styles of teaching. While the abbreviations ChE 200/ME 200 indicate the selected sophomore courses and ChE 400/ME 400 indicate the selected senior courses, these are not actual course numbers at Midwestern University.
TABLE 1
FACULTY TEACHING EXPERIENCE AND TIME
ASSIGNED TO TEACHING AND RESEARCH

<table>
<thead>
<tr>
<th>Course</th>
<th>Professor</th>
<th>Years teaching in College of Engineering</th>
<th>Percentage of time assigned to research</th>
<th>Percentage of time assigned to teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 200</td>
<td>Henry Schwartz</td>
<td>30</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>ME 400</td>
<td>Gerald Michaels</td>
<td>20</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ChE 200</td>
<td>Daniel Richards</td>
<td>15</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ChE 400</td>
<td>Connie Stokes</td>
<td>1</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Altogether, 123 students from four classes were eligible and agreed to participate in our study. Table 2 shows the number and percentage of women and men participating from each class.

TABLE 2
NUMBER AND PERCENTAGE OF STUDENTS
SEPARATED BY PROGRAM, LEVEL, AND SEX

<table>
<thead>
<tr>
<th></th>
<th>Women Students</th>
<th>Men Students</th>
<th>Total Students</th>
</tr>
</thead>
<tbody>
<tr>
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From the total 123 students enrolled, 20 percent in each class—an equal number of women and men from each class for a total of 12 women and 12 men—were invited to participate in individual interviews that took place in Sarah’s office or a conference room. The random sample of students interviewed was stratified by sex and, when possible, class performance as determined by grades:

- 10 students from 53 in the sophomore-level ME course
- 4 students from 21 in the senior-level ME course
- 4 students from 18 in the sophomore-level ChE course
• 6 students from 31 in the senior-level ChE course

Professors provided information about the level of student performance. Students in the ME courses showed a relatively normal distribution in performance; we chose students from both the upper and lower halves of these courses. ChE professors told us that the performance of students in the two ChE courses was approximately level, so we randomly selected students without regard to performance. All 24 students invited to participate in the interviews received, signed, and returned an IRB-approved informed consent form.

Observations

We conducted classroom observations to learn more about the environment, culture, and dynamics of these engineering classrooms, including professor-student and student-student interactions. All of our classroom observations took place in engineering classrooms and labs (when labs were a part of the course). Our observation questions focused on both the amount and kind of oral (verbal) and paralinguistic (nonverbal) attention given by professors and students to women and men during the classes in a range of communication activities, including lectures, group work, and class discussions.

The observation questions focused on the ways in which both oral and paralinguistic communication were used in the selected courses and the ways in which gender affected each. After we drafted the observation questions, we reviewed their focus as well as our methods for using them with the director of the University’s foundational communication courses, who has extensive experience in classroom observations. Based on her feedback and suggestions for revision, we narrowed our observation to focus on these six areas: eye contact; vocal pitch/tone; frequency, direction, and length of responses; use of gendered
pronouns; use of title in addressing the professor; and classroom climate. In this article, we report on the frequency and direction of responses as well as the general classroom climate.

Sarah attended four courses during the spring 2005 semester, spending 10 percent of the total class time in each course. This meant that she spent four full class periods in the courses that met three days a week and three full class periods in courses that met twice a week.

On the same day of the class observation, Sarah transcribed her handwritten notes and used a printout of the notes to write a preliminary analysis of that day’s observations. This analysis identified the frequency and dynamics of professor-student interaction. We analyzed the observations by first calculating the number of times women answered questions from professors compared to the number of times men answered questions from professors. We then calculated the number of times women asked professors questions and the number of times men asked professors questions. We recorded these numbers for each course. In addition to these numbers, we wrote a detailed analysis of specific instances from each course that accurately portrayed the role that gender and communication played in that classroom and recorded them as examples of classroom dynamics.

*Interviews*

Faculty members and students were interviewed near the end of semester. During the interviews, Sarah asked direct, open-ended, and discourse-based questions that focused on each student’s individual analysis of her or his participation, performance, satisfaction in the course, and comparison to the rest of the class. Faculty members and students were also asked their opinion about the role that they believe gender plays in engineering communication.
After we drafted the interview questions, we pilot tested them on students not in the engineering courses, gauging students’ comprehension, level of comfort and ease in answering the questions, and the time needed to respond. As a result of this pilot testing, we deleted two questions in order to keep the interviews to about 20 minutes.

We conducted individual, face-to-face interviews with each of the four faculty members and a 20 percent stratified random sample of students, except for one student who was interviewed via email because of time constraints. All interviews were tape-recorded. Each interview was analyzed preliminarily the day it was conducted by listening to the tape in order to identify each faculty member’s and student’s view about the ways in which gender affects communication in their courses.

We used this preliminary analysis in order to learn more about the role of gender and communication in each course and as a starting point for in-depth analysis of the transcribed responses. When the interviews were transcribed, all student participants were given a gender-specific pseudonym to be used in all presentations and publications resulting from this study. The transcribed interviews were analyzed to identify categorical responses about gender and group and team communication.

DATA AND DISCUSSION
This study provides numerous examples of remarkable student engagement and equally notable examples of lack of engagement, both inside and outside of their engineering classes. During class, students communicated with professors by asking and answering questions, and they communicated with one another both when the professor was lecturing and during times designated for teamwork. Outside of class, students interacted in a variety of ways as
members of groups and teams. The data have helped us create a picture of communication in
four engineering classes, drawn from results that include student and faculty communicative
behaviors that we have quantified as well as our class observations and interview data. As we
have read and re-read these data, they separate into three categories:

- Actual participation vs. perceptions of participation
- Negative behavior in the classroom
- Leadership and teamwork roles

These categories frame the presentation of our data as well as the discussion and
interpretation of ways in which women and men differ in their communication strategies in
engineering classes.

**Actual Participation vs. Perceived Participation**

For this study, we consider class participation to be asking and answering questions. Our
results make clear that actual participation and perceived participation were often
considerably different.

We compared the observed frequencies of women participating in class discussions to the
expected frequencies based on the proportion of women enrolled in engineering courses.
Specifically, we were interested in determining if the frequency of questions asked by
women and the frequency of responses to instructor questions by women differed
significantly from the expected frequencies based on the percent of women enrolled in the
course. In other words, did women participate less frequently than expected in engineering
class discussions?
The results summarized in Table 3 display the number and percentage of women and men who asked and answered questions during each class period observed in sophomore and senior classes in chemical engineering and mechanical engineering.

In this analysis, the null hypotheses are that the frequency of women who asked questions and the frequency of women who answered professor questions are equal to the expected frequencies based on the percent of women in the course. We conducted a chi-square test for frequencies. The level of significance was set at 0.05. There is one degree of freedom in the analysis, resulting in a critical value of $\chi^2 = 3.841$.

For each individual course, as well as the combined ME and ChE courses, the difference between the observed and the expected frequencies of women asking questions was attributable to chance fluctuation.

However, for each individual course (except ME 400, which had no observations), as well as the combined ChE courses, the frequency of women who answered faculty questions is not equal to the expected frequency.

Part of Table 3 displays zeros across several cells for ME 400. Students in this class were involved in semester-long group projects that they worked on during nearly every class. The professor seldom lectured; instead, he spent class time working with each group—answering questions, guiding them in their work, and evaluating their progress. Though the students and the professor engaged in a great deal of interaction during the class, formal questions were not posed by the professor to the whole class in the same manner as the other classes. This class provides an excellent contrast to the other three more traditionally organized ones.

While participation represented by the percentages of women and men asking and answering questions is quantified in Table 3, other participation was addressed in the
interviews with professors and students. Some of them recognized how much more men were participating in class than women. A surprising number of others, however, perceived participation differently. The interview responses about participation were separated into three categories:

- Respondents said women and men participated equally
- Respondents said men participated more than women
- Respondents said women participated more than men

**TABLE 3**

<table>
<thead>
<tr>
<th></th>
<th>Total students</th>
<th>Percent of women</th>
<th>Percent of men</th>
<th>Total questions asked</th>
<th>Percent women asked</th>
<th>Percent men asked</th>
<th>Total questions answered</th>
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* Statistically significant at the 0.05 level
** In ME 400, the professor was gone for the April 11 class observation; students came to class and worked in their teams, but they did not engage in whole-class discussion.

Despite the quantified, observational results, most students expressed the view that women and men participated equally in class. In fact, three of the four professors and 67 percent of students said that women and men participated equally. (Percentages have been
rounded, so they don’t necessarily total 100 percent.) This belief was expressed by Jason, in the senior-level ChE class, when he asserted that, “I think women and men participate equally.” Jacob, in the sophomore-level ME class, agreed: “As for participation, it’s pretty much... 50-50.”

Even though the majority of professors and students thought the women’s and men’s participation was equal, one professor and 24 percent of students thought men participated more than women. Betsy, in the senior-level ME course, was typical in her comment that “The men do tend to be a little bit more vocal than women.” Her assessment of participation was reinforced by other students. For example, Jeremy, in the senior-level ChE class observed that “Women are not as vocal in class a lot of times.” Students such as Jacob, in the sophomore-level ME class, explained that “The males seem to participate more, and I don’t know if it’s just because there are more of them obviously, but I think they are more outgoing and just like to participate and kind of voice their opinion more.”

Surprisingly, a few students did not realize that class participation was dominated by men. None of the professors thought that women participated more than men, but 10 percent of students did. “Overall women ask more questions than men when it comes to lecture and new topics and things like that” said Anne, in the senior-level ChE class. Chad, also in the senior level ChE class, agreed: “I think the women participate more. They were usually the more academic focused people.” Other students agreed with the academic focus of women, explaining that women’s participation was more memorable, more intellectual. “I hear girls ask questions..., but usually they are more intellectual questions to be honest,” said Teresa, in the sophomore-level ME class.
Students’ inaccurate perceptions of participation are confirmed by other researchers. For example, Joanna Wolfe and Kara Poe Alexander describe students who not only inaccurately perceived how much women and men participated in their teams, but also they played down women’s participation and played up men’s participation [25]. However, we found the students in our study were more likely to respond in the opposite manner by perceiving women as participating more than they actually did. One possible reason for these perceptions is that women are stereotyped as talkative, so students and faculty may assume women talk more than they actually do, based on socially constructed stereotypes. Also, women are often quieter in public, participatory settings, so when they do talk they (and others) may perceive their own (and other women’s) participation as being more substantial than it is [15].

**Negative Behaviors in the Classroom**

While some participation in the classes was characterized by asking and answering questions, some behaviors were negative—behaviors that interrupted and distracted both professors and students. We define negative behaviors as inappropriate or unnecessary comments to the professor and/or other students as well as other interruptions that deter attention from the professor, other students, and course content. Negative behaviors prevent students from attending to course content and deter or destroy classroom community.

Our observation notes indicate that many class periods included a great deal of negative behavior from students, yet only one of the 22 students who were interviewed addressed this problem. Alison, in the sophomore level ChE class, commented on the amount of negative behavior by male students who were disruptive, inattentive, and impolite:
There are three guys who always...talk; they ask a lot of questions, but there are a lot of disruptive questions. They will ask the same question, they won’t listen to the answer.... Our teacher [in another class] doesn’t speak very good English, so then they mock him,...so I don’t always see... a lot of participation as even being good...in some classes.

Our observation notes from 15 class sessions include 28 instances of negative behavior, virtually always (26 of the 28 examples) from men. Thirteen of the 28 instances of negative behavior (46 percent) occurred during the senior-level ChE course, which was the only course taught by a woman who was new to the university and in her first year of teaching.

For example, a number of students completely disregarded Professor Stokes as she lectured. Studies suggest that both women and men students “talk more in classrooms led by female instructors” [15]. Studies also suggest men may see less of a status difference between themselves and the professor if the professor is a woman [15]. Therefore, they are apparently more comfortable interrupting and drawing attention away from a woman professor as well as answering questions for other students.

In contrast, no instances of negative participation occurred in the sophomore-level ME course taught by a man with a great deal of authority, seniority, and 30 years of teaching experience. What were some of the critical differences between the sophomore ME class and the senior ChE class? Professor Schwartz called on students by name and stayed focused on the students’ understanding of the material rather than the material itself. He modeled good nonverbal communication (eye contact, gestures, movement in front of the class) that connected him closely with his students, engaging their attention. He also kept this connection while lecturing with notes projected, which was a strong contrast from Professor Stokes who lost eye contact with her students while she focused on her transparencies, which is when the most negative participation occurred in her class.
We include two examples of typical negative behaviors from our observation notes. The first example of negative behavior, in Professor Richards’ sophomore-level ChE class, shows a male student who is inattentive, rude, and distracting.

Month 3 of the course: Professor Richards plans to get the students into groups today to begin work on their final group project. He puts the material they will need on the Elmo and begins lecturing. Four students come in late. Professor Richards begins to give students detailed instructions about the group project. A male student hands gum to two men sitting near him and throws another piece at a woman at the end of his row. Professor Richards mentions the relationship of the group project in relation to the final exam; a boy screams “All right!” signifying his excitement about the end of the course. Professor Richards continues explaining details of the final group project and presentation that must accompany it. When the lecture segment of the class ends, Professor Richards gets students into groups by having them raise their hands to signal who they are to the other students. One student raises his leg instead of his hand, laughing and high-fiving his friends.

A second example of negative behavior, in Professor Stokes’ senior-level ChE class, showed students who are unfocused on their class work. This behavior was representative of the student reactions to each of Professor Stokes’ lectures observed in this study.

Month 3 of the course: The weather is nice out today. Professor Stokes begins lecturing but is interrupted seven different times as seven students enter class late. She doesn’t address their tardiness. And, they seem unapologetic. She continues her lecture with her transparency as usual and apologizes about the students having to be in class with phrases like “we’re almost done here,” “hang in there,” and “you are restless, and I don’t blame you” when she notices they are getting antsy. Their chairs are squeaking so loud as they fidget in their seats that Professor Stokes becomes hard to hear. She remains focused on her transparency, finishing her lecture as the students grow more impatient, are more fidgety, and finally begin talking to one another even before she is finished.

Students’ perceptions about the actual amount of participation from women and men in the classroom generally ignored negative behavior. The majority of negative behavior in the classroom, as the above data show, was by men. A great deal of negative behavior made men’s presence even stronger than their dominance in asking and answering questions in
class. Negative behavior includes vocal visibility and attention to the participator, making the men, who are distracting attention from the professor, even more obvious as vocal agents.

Leadership and Teamwork Roles

Professors and students commented how often they saw women and men taking on leadership roles as well as the kinds of roles women seem to take on in teams. In general, the interview responses for about leadership roles can be separated into three categories:

- Women and men take on leadership roles equally
- More men take on leadership roles than women
- More women take on leadership roles than men

Most students felt women and men took on leadership roles equally when working in teams. In fact, two of the four professors and 52 percent of students believed that women and men participated equally in leadership roles. This belief was expressed by Susan, in the sophomore-level ME class, when she stated “how often they take leadership positions—that’s pretty much equal.” Cale, in the senior-level ChE class, agreed, stating “between male/female I don’t think there’s too much difference, honestly.”

Not all students agreed; 38 percent felt that men took on leadership roles more often than women. This belief is affirmed by Steve, in the sophomore-level ChE class: “The guys always kind of want to lead.” Jason agreed: “in groups, men have definitely taken the leadership positions.” Jacob also agreed and offered this insight about why men tend to be formal leaders: “You know, we’ve got three girls in our group and stuff, and so it’s male
dominated out of 12 people there. So, like, obviously, you know, the males are going to take the leadership role.”

Carolyn agreed that men took on leadership roles more often than women but had a different reason, suggesting that women are not as valued by men as leaders:

A lot of time people are more willing to listen to the man who’s leading, or if the woman is leading and giving directions or delegating duties then you know, she is being pushy where if the man is leading then he is a natural leader.

Susan, in the senior level ME class, agreed with Carolyn, noting that women’s contributions often receive more criticism:

There is a slight difference in the way people take what’s coming out of [a] woman’s mouth in a group. Sometimes a guy will say something and everybody will be “okay, let’s go with that,” whereas sometimes myself or another female will say something and it’s a little more . . . It’s critiqued a little more before it’s an accepted answer.

Two professors and only 10 percent of the students believed that women were more often in the leadership roles. Anne, in the senior-level ChE class, hinted that women do leadership work: “Women more often take the leadership positions or are sort of recognized as the leaders.” Stephanie, in the senior-level ChE class, seemed to agree in suggesting that “women have stepped up a little more often into leadership positions.”

Leadership roles were more often taken by men. Of the 18 groups and teams we observed, 83 percent had men as the official leader. This leadership defined many aspects of team dynamics, including the roles that women ended up taking.

Typically, in all of the 18 groups and teams we observed that included women, women assumed roles that involved organizing tasks, planning schedules, facilitating group activities, and completing secretarial duties. Nearly half of the students (48 percent) believed
that women and men assumed different roles in groups and teams. All of the students believed that women were stronger communicators, better facilitators of activities, and more skillful writers. Teresa, in sophomore-level ME class, gave examples of her experiences with groups and leadership in her interview, labeling women as “cheerleaders” and “organizers”:

> It [the official leader] just always ends up usually being a guy . . . . I usually see girls taking more [of] the organization. Yeah, more behind the scenes like organizing, so they are . . . I can see like us being leaders as far as like organization definitely, because without us they'd be all over the place.

Anne, in the senior-level ChE class, confirmed this perspective of women as organizers and facilitators:

> Women do more of the organizational getting together and forming groups to work on projects, work on homework, things like that . . . . I see women working more to organize groups of students getting together to work on stuff.

In the groups and teams we observed, women tended to take on the roles of communicator, facilitator, and writer; they kept the focus on the task at hand, set up times to meet, kept track of materials, and made sure students knew when and where to meet. Women frequently worked as managers and men as engineers. Unfortunately, this role for the women also came with less recognition. In their more vocal and visible role, men articulated processes, progress, and decisions (often ones they did not make), thus influencing other students as well as professors to see them as the capable leaders. Men tended to focus on the details of the task/problem given to the group, not on the process of addressing that problem.
Team dynamics tended to put men in the position of spokesperson and leader for groups. Other researchers have noted that qualities such as aggression, domination, and competition, stereotypically associated with men, are often preferred in leadership positions [22].

**Implications**

Women are valuable to the currently male-dominated field of engineering; many define different problems than men and use alternative approaches to problem solving [13]. Our findings about participation, negative behaviors, and leadership and teamwork roles suggest some of the challenges for women students in engineering, who make up about 17 percent of undergraduate engineers [21].

*Actual Participation vs. Perceived Participation*

The current dynamic in engineering classes marginalizes women, just as engineering working environments often exclude women [26]. Men are often advantaged when they assume socially constructed traits of many engineers: assertive, aggressive, competitive, and independent, whereas women are often disadvantaged when they take on socially constructed traits of either women or engineers. Engineering classroom communication could be strengthened by focusing more on collaboration, community building, discussion, and nonverbal communication. Encouraging such communication has two likely benefits: (1) increase the participation of women and, thus, increase gender equity and (2) improve the overall quality of engineering education by extending communication strategies used by all students.
Negative Behavior in the Classroom

Some students felt they could interrupt and distract attention from the course. Classes with fewer negative behaviors were ones in which the professors modeled skillful professional communication and articulated boundaries and expectations of professional behavior.

Leadership and Teamwork Roles

In our study, the men often assumed roles as explicit leaders, and women as behind-the-scene facilitators. Our data show that professors acknowledged team leaders as responsible for project success, even if these leaders were not doing the actual work. Two critical changes could engage more women as explicit leaders and equitably share the facilitation tasks necessary for productive team activities: (1) rotate leadership roles during projects and (2) evaluate projects by assessing the product, process, and participation.

Acknowledgments

We would like to thank Iowa State University’s Women’s Enrichment Fund for supporting this research. We would also like to thank William Jeffries, Donna Niday, Kevin Saunders, Loren Zachary, and the four faculty participants whose classes we observed for their critical support of and contributions to this project at various stages in its development. And, of course, we thank the students for their cooperation and participation.

References


PDFdocs/BEST_BridgeforAll_HighEdDesignPrincipals.pdf


2.9 PowerPoint Presentation

The following are the PowerPoint slides and corresponding text for the International Conference on Engineering Education presentation. This presentation was given on 25 July 2006 in San Juan, Puerto Rico.
Good afternoon. My name is Sarah Brown, and I am a researcher at Iowa State studying Rhetoric, Composition, and Professional Communication. My specialization is Women’s Studies and gender in communication. I have been working with Rebecca Burnett for the past two years on a research project, which is the basis of the following presentation “Women Hardly Talk. Really! Communication Practices of Women in Undergraduate Engineering Classes.”

Let me tell you a story. Six years ago, my boyfriend in high school was heavily recruited by college engineering programs. I think it was because he liked cars and was good in his auto mechanics classes; maybe colleges thought if he liked cars he’d be good at engineering. He was confident he’d get into a good engineering program. And he did. My guidance counselor in the same high school suggested that I think about secondary education as a college major, so I’d have summers off to take better care of my future children. She never considered that I earned a B in my calculus class (a class my former boyfriend dropped out of because it was too hard). She never considered that I earned A’s in physics and chemistry (my former boyfriend wasn’t interested in science and didn’t take either one). My guidance counselor never mentioned engineering or science as career options for me, and I never thought of them either—despite the courses I took and the grades earned. No wonder engineering programs have a difficult time recruiting women. No wonder few women imagine themselves as confident, highly skilled leaders in engineering.
This is my co-author and the Principal Investigator for this research project, Rebecca Burnett.

She is a University Professor at Iowa State in Rhetoric and Professional Communication.

Unfortunately, she couldn’t make it to Puerto Rico but is enjoying all that an Iowa summer has to offer, which unfortunately doesn’t include the ocean.
Research Question

How do women and men engineering students communicate—specifically, what characterizes their class participation, negative behaviors, and teamwork and leadership roles?

Engineering classes tend to be male dominated, hierarchical, and competitive. While women have been and can continue to be highly successful in such environments, they often tend to be even more successful in environments that are less hierarchical and foster more collaborative environments.

Engineering educators need to explore the kinds of communication that actually occur in classes; thus we posed this research question, which is focused on three main points: class participation, negative behaviors, and teamwork and leadership roles.

This research question has evolved through the process of data collection and analysis.

The College of Engineering at Iowa State University, where this research project was conducted, has read drafts of the work resulting from this research project and is concerned with the issue of gender and communication because they are working to increase gender equity in their programs and classes.
Articulating the Problem

- Engineering needs to attract and retain more women.
  - About 12% of engineers are women.
  - About 15% of engineering students at Iowa State University are women.
- More women in engineering will increase
  - Equity in engineering
  - Quality in engineering

The percentage of women in engineering is gradually increasing, but as we know this increasing number of women still leaves them significantly under-represented.

According to the Women’s Bureau at the U.S. Bureau of Labor in 2003, slightly over 12 percent of all engineers were women. This is a slight improvement from 1993 when approximately 8 percent of engineers were women, which is only a very small jump from 1983 when approximately 6 percent of engineers were women.

Even now, fewer bachelor’s degrees are awarded to women in engineering than in all major fields of science.

Even at Iowa State, a school working hard to increase equity, the 2005 percentages are only slightly better than these national figures: approximately 15 percent of all engineering students are women.

Beyond the nicety of social equity, engineering programs need women because women tend to have different ways of problem-solving, communicating, and designing, which are all important aspects of engineering.
Women’s communication has been labeled “rapport-talk” by Deborah Tannen, a leading linguist in gender and communication. Rapport-talk tends to have a connected style creating a community of equals.

Studies suggest women’s communication includes a lot of nonverbal communication such as eye contact, nodding, and smiling (Helweg-Larsen et al.).

Women also tend to have a lot of responsive types of communication such as backchannel responses, qualifiers, and tag questions (Helweg-Larsen et al.).

As problem solvers, women tend to be holistic—looking at problems and taking into consideration the given and possible other contexts. (Faulkner 2000).

Women’s communication style was infrequently practiced in the engineering classes we studied in this research project.
<table>
<thead>
<tr>
<th>Literature Review, Part II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characterizing communication of men (report-talk)</td>
</tr>
<tr>
<td>- Competitive, hierarchical, independent style</td>
</tr>
<tr>
<td>- More verbal, less nonverbal communication</td>
</tr>
<tr>
<td>- More interruptions [regardless of gender or hierarchy]</td>
</tr>
<tr>
<td>- More responses to questions</td>
</tr>
<tr>
<td>- Frequent practice in engineering classes</td>
</tr>
</tbody>
</table>

Men’s communication has been labeled “report-talk” by Deborah Tannen, and it tends to have an independent style creating hierarchies.

Studies suggest men’s communication includes little nonverbal communication such as eye contact, nodding, and smiling (Helweg-Larsen et al.).

Men tend to have a lot of verbal communication such as interruptions as well as responses to questions asked by both professors and other students (Fisher; Rosser).

As problem solvers, men tend to be individualistic, focusing on specific problems or details.

Men’s communication style was frequently practiced in the engineering classes we studied in this research project.
Methodology

- **Courses**
  - Two sophomore courses
  - Two senior courses

- **Participants**
  - Students
    - Mechanical engineering (5.4% women)
    - Chemical engineering (37.6% women)
  - Professors: one from each course

<table>
<thead>
<tr>
<th></th>
<th># of Total Students</th>
<th>% of Women Students</th>
<th>% of Men Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 200</td>
<td>53</td>
<td>13%</td>
<td>87%</td>
</tr>
<tr>
<td>ME 400</td>
<td>21</td>
<td>14%</td>
<td>86%</td>
</tr>
<tr>
<td>ChE 200</td>
<td>18</td>
<td>28%</td>
<td>72%</td>
</tr>
<tr>
<td>ChE 400</td>
<td>31</td>
<td>42%</td>
<td>58%</td>
</tr>
</tbody>
</table>

We wanted to get a broad view of the students in the College of Engineering, so we focused on sophomore- and senior-level engineering courses in order to contrast students at the most frequently dropped level with those finishing their last semester.

In addition to investigating sophomores and seniors, we also wanted to focus on two different engineering programs—one with among the lowest percentage of women undergraduates, mechanical engineering, which has 5.4 percent women at Iowa State, and the one with the highest percentage of women undergraduates, chemical engineering, which has 37.6 percent women at Iowa State. We also included professors from each of the four courses selected.

The chart displayed shows the breakdown of students in each course as well as the ration of women to men. You can see that the sophomore-level ME course has 13 percent women, and the senior-level has 14 percent women. And the sophomore-level ChE course has 28 percent women, and the senior-level ChE course has 42 percent women. Though each class is dominated by men, the ME classes show the biggest divide.
Methodology, continued

- Observed four courses for 10% of total class time for each course
- Interviewed 24 students (12 women and 12 men) and four professors

The four selected courses were observed in the classes and labs for 10% of their total class time. We conducted classroom observations to learn more about the environment, culture, and dynamics of these engineering classrooms.

We observed both oral and paralinguistic communication focusing on the amount and kind of communication from women and men.

Detailed field notes were taken in, which were later analyzed.

The four faculty members and 20 percent of the students were interviewed near the end of the semester. From each of the four classes were interviewed. Students were chosen by a random, stratified sample. During the interviews, I asked direct, open-ended, and discourse-based questions that focused on each student’s individual analysis of her or his participation, performance, and satisfaction in the course.

Interviews lasted about 20 minutes and were tape-recorded to be later transcribed and analyzed.
## Data: Class Participation

Questions answered by students in each class

<table>
<thead>
<tr>
<th></th>
<th>Total Students</th>
<th>% of Women</th>
<th>% of Men</th>
<th>Total Questions Answered</th>
<th>% Women Answered</th>
<th>% Men Answered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 200</td>
<td>53</td>
<td>13%</td>
<td>87%</td>
<td>66</td>
<td>6%</td>
<td>94%</td>
</tr>
<tr>
<td>ME 400</td>
<td>21</td>
<td>14%</td>
<td>86%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ChE 200</td>
<td>18</td>
<td>28%</td>
<td>72%</td>
<td>48</td>
<td>12%</td>
<td>88%</td>
</tr>
<tr>
<td>ChE 400</td>
<td>31</td>
<td>42%</td>
<td>58%</td>
<td>3</td>
<td>0</td>
<td>100%</td>
</tr>
</tbody>
</table>

Let's take a look at some of the data collected over the semester-long observations and expand on the first part of our research question: participation.

You'll notice there are zeros displayed for ME 400, which are the result of the dynamics of the class, which was a senior-level capstone course. The students were working on a semester-long project, and during class time the professor spent time working with each group—answering questions, guiding them in their work, and evaluating their progress. Though the students and the professor engaged in a great deal of interaction during the class, formal questions were not posed by the professor to the whole class in the same manner as the other classes and is therefore not comparable in this portion of the analysis.

We expected the percentage of women and men answering questions to be equal to the percentage of women and men in each course. But, as you can see that wasn't the case in any of the courses. The sophomore ME course had 87 percent men who then answered 94 percent of the questions. The sophomore ChE course had 72 percent men who then answered 88 percent of the questions, and the senior ChE course had 58 percent men who then answered 100 percent of the questions.

In our statistical analysis we conducted a chi-square test. We found statistical significance in the sophomore-level courses, which means the probability shows there is less than a five percent chance these numbers would be different if this research were recreated or expanded. These numbers are not accidental.

Additional data also indicates women were more likely to ask questions than answer questions.
Next, we can discuss the second point, negative behavior.

Some students (such as the female quoted on the slide) saw some of the behaviors in class. Negative behaviors include students coming to class late, sometimes thirty and forty minutes late, students reading the newspaper, talking on their phones, doing homework, or engaging in conversations that don’t include course content.

Of the 15 total class sessions observed in this study we found 28 instances of negative participation. An overwhelming number, 93%, of negative behavior was from men. And 46% was found in the ChE 400 course, which is the only course instructed by a female.

Current research shows both women and men students tend to talk more in classes with female instructors. Studies also suggest men may see less of a status difference between themselves and the professor if the professor is a woman (Hayes et al.).

So, we saw men in the classes shifting themselves to a dominant position by attracting attention away from the teacher and to themselves therefore disrupting the class community.
Of the 18 groups and teams observed, 83% had men as the official leader.
- 52% of students interviewed believed women and men take on leadership roles equally.
- 38% of students believed men took on leadership roles more.
- 10% of students believed women took on leadership roles more.

And next we come to our third point, leadership and teamwork roles.

Current research also shows many of the students’ and faculty members’ perceptions of communication differ significantly from actual communication in the classroom (Wolfe and Alexander).

Of the 18 groups and teams observed, 83% had men as the official leader. The official leader is the person both the professor and team identify as leader. They may not necessarily fulfill all leader functions, such as facilitating activities, setting up times to meet, taking care of team materials.

Engineering students shows a lack of usually astute observational skills in their analysis of women and men as leaders.

Surprisingly, though in each class leadership was overwhelmingly dominated by men, 52% of students interviewed believed women and men take on leadership roles equally. 38% of students believed men took on leadership roles more. And oddly 10% of students actually believed women took on leadership roles more.

In addition, 2 of the 4 professors believed women and men take on leadership roles equally. The other 2 professors actually believed that women were more often in leadership roles, which wasn’t the case in any of the classes observed.
Implications

- Focus more on collaboration, community building, discussion, and nonverbal communication.
- Marginalize negative behavior by articulating expectations of professional communication and behavior and clarifying boundaries.
- Rotate leadership and evaluate projects by assessing product, process, and participation.

In general, in order to improve the equity and quality of engineering, we recommend that women be included rather than marginalized through communication practices.

Our research shows participation, negative behaviors, and leadership and teamwork roles present three challenges for women students in engineering, who make up about 17 percent of undergraduate engineers.

First, we believe that in order to increase participation from all students, engineering classes need to focus more on collaboration, community building, discussion, and nonverbal communication.

Second, we believe that in order to decrease negative behavior, engineering classes need to articulate expectations of professional communication and behavior and clarify boundaries.

Third, we believe that in order to increase leadership roles for women, engineering classes need to rotate leadership and evaluate projects by assessing product, process, and participation.
We would like to acknowledge some of the resources funding and supporting our research study.

This study was funded by Iowa State University Women’s Enrichment Fund. To the right is a picture of our campus at Iowa State in the summer.

Also, the help received from William Jeffries, Donna Niday, Kevin Saunders, Loren Zachary, the four faculty members and all student participants, and the readers for the ICEE Proceedings were all important resources for all stages of this research study.
Thank you. Are there any questions?
2.10 Handout

The following is the handout given at the ICEE presentation.

Women Hardly Talk. Really!
Communication Practices of Women in Undergraduate Engineering Classes

Sarah M. Brown and Rebecca E. Burnett, Iowa State University
sarbrown@iastate.edu, rburnett@iastate.edu

Research Question
How do women and men engineering students communicate—specifically what characterizes their class participation, negative behaviors, and teamwork and leadership roles?

Problem
Women are underrepresented in engineering at the college level, and studies show an increase in the equity of women will increase the quality of engineering (Society of Women Engineers 2005; Burack and Franks 2004; Fisher 1999; Florman 1994).

Communication of Women
Most women communicate with what Deborah Tannen labels rapport-talk (1990). The following characteristics tend to be seen in women’s communication.

- Collaborative, connected community-building (Hayes and Flannery 2002; Ingram and Parker 2002; Eisenhart and Finkel 1998; Lay 1989)
- Eye contact; nodding; smiling (Helweg-Larsen and Cunningham 2004)
- Backchannel responses; qualifiers; tag questions (Helweg-Larsen and Cunningham 2004)
- Holistic problem-solving skills (Faulkner 2000)

Communication of Men
Most men communicate with what Deborah Tannen labels report-talk (1990). The following characteristics tend to be seen in men’s communication.

- Competitive, hierarchical, independent style (Ingram and Parker 2002; Eisenhart and Finkel 1998; Lay 1989)
- More verbal, less nonverbal communication (Helweg-Larsen and Cunningham 2004; Fisher 1999; Rosser 1997)
- More interruptions (Helweg-Larsen and Cunningham 2004)
- More responses to questions (Fisher 1999; Rosser 1997)

Methodology
Courses
- One sophomore and one senior mechanical engineering course
- One sophomore and one senior chemical engineering course

Participants, students, and faculty
- 53 students in sophomore ME course (13% women, 87% men)
- 21 students in senior ME course (14% women, 86% men)
• 18 students in sophomore ChE course (28% women, 72% men)
• 31 students in senior ChE course (42% women, 58% men)
• Professors, one from each course

Observations and Interviews
• Each course was observed for 10% of the total class time
• 24 students were interviewed (12 women and 12 men) and four professors

Findings
Women’s participation in class, answering questions, was significantly lower than the men’s participation in each class.

The majority of negative behavior observed in the study was from men (93%).

The majority of groups and teams observed (83%) were lead by men. Though the majority students and faculty members (52% of students and 2 faculty members) surprisingly thought leadership was equally dispersed.

Implications
Focus more on collaboration, community building, discussion, and nonverbal communication.

Marginalize negative behavior by articulating expectations of professional communication and behavior and clarifying boundaries.

Rotate leadership, and evaluate projects assessing product, process, and participation.

Acknowledgements
We would like to thank the Iowa State University Women’s Enrichment Fund for supporting this research. We would also like to thank William Jeffries, Donna Niday, Kevin Saunders, Loren Zachary, the four faculty and all student participants, and anonymous readers for the ICEE Proceedings.

References


CHAPTER THREE. “‘SHE’S LIKE THE NON-LEADER LEADER’: LEADERSHIP OF WOMEN IN TEAMWORK IN UNDERGRADUATE ENGINEERING CLASSES”

Sarah M. Brown and Rebecca E. Burnett

A paper to be submitted to Leadership

Overview: Appendices B, C, and D contain the data collected for this article.

Abstract: This article explores gendered leadership styles in undergraduate engineering classes. Current research shows contemporary forms of effective leadership such as collaboration, motivation, inspiration, and community-building are associated with female leadership styles. But because women are underrepresented in engineering, many teams and students do not have the benefit of learning and experiencing female leadership styles. How does gender affect leadership in selected undergraduate engineering classes? To answer this question, we collected and analyzed observational data, survey responses, and interviews in undergraduate engineering classes. We found women were consistently underrepresented as leaders, their team roles were undermined, and they faced more opposition than their male counterparts in taking on leadership roles.

Keywords: collaboration / communication / engineering / gender / leadership / teams / women

Around the world, women are assuming critical leadership positions, changing the nature of leadership style. Forbes tells us that women in leadership positions make a difference in an organization’s culture, reputation, and productivity:

Women take organizations to achievement beyond [the] traditional…by elevating its corporate consciousness. They emphasize the development of trusting and trusted relationships and open communication….Transformative results are gained by allowing divergent points of view, an activity which requires an introspective look at how an organization cultivates and sustains open dialogue. By stoking the vitality of internal collegial interactions, profound results with lasting financial and socioeconomic benefits are possible. (Couglin, 2005)
*Forbes* calls this “enlightened power—the leadership practice of embracing the perspective and experience of diverse, authentic individuals and giving them the environment for unbridled collaboration with respect for personal values.”

Awareness of the transformative power of women in leadership positions not only affects government, industry, and entertainment, it also affects engineering and engineering education where general agreement exists that too few women are in leadership positions (WELI, 2006). Why are women important in engineering? The short answer is that women are important everywhere, but in engineering the consensus is that society as a whole loses if the intellectual and social capabilities of women are not equitably represented in a key profession on which we depend both for safety and for technological innovations (Wirasinghe, 2000).

We can’t expect to have equitable representation of women in engineering leadership if we don’t have equitable representation of women in engineering. The sad truth is that women are dramatically underrepresented in engineering, despite remarkable increases in the past 20 years. Specifically, the Women’s Bureau at the U.S. Bureau of Labor in 2003, reported slightly over 12 percent of all engineers were women (USDL Women’s Bureau, 2003), which is a considerable improvement from 1983 when 5.8 percent of engineers were women (SWE, 2005) and ten years later in 1993 when 7.85 percent were women (Lehr, 2003).

The pipeline in college engineering classes worries many in engineering education. Fewer bachelor’s degrees are awarded to women in engineering than in all major fields of science. As an example, at our home institution, Midwestern University, approximately 15 percent of all engineering students are women, ranging from slightly over 5 percent to nearly
37 percent, depending on the department (Midwestern Registrar, 2005). Our university, like many across the United States, is actively engaged in efforts to put engineering leadership at the forefront of engineering education. Encouraging young women to assume leadership roles is part of the effort—for example, academic programs that give special attention to leadership, funded projects that focus on leadership roles, and industry-sponsored programs than attempt to involve more women students as leaders. For the women who do get involved in leadership roles, support is available. Both women students and women professionals can seek support from long-standing organizations such as the Society of Women Engineers (SWE, 2005)\(^1\) as well as from more recent organizations such as Women in Science and Engineering (WISE, 2006)\(^3\) and the Women in Engineering Leadership Institute (WELI, 2006).\(^2\)

The results are starting to show: Women are taking on leadership roles in record numbers; for example “the proportion of women in executive, managerial, and administrative roles nearly tripled during the last three decades of the 20th century” (Vecchio, 2002: 643). However, despite the high visibility of some women leaders in engineering and industry and the remarkable resources available in some academic programs to support women, the reality is that in many engineering classrooms, the message that women make powerful, successful, creative leaders had simply not reached many professors and students. The kind of peer networking available from SWE, WISE, and WELI is invaluable but does not directly address leadership attitudes and behaviors identified in this study (part of a larger observational study examining gender in undergraduate engineering classes). The following aspects of leadership signal business as usual in some engineering classrooms we observed:
• Young women students are not recognized as leaders—by their classmates, their professors, or even by themselves.

• Women, even those who excel academically in engineering courses, rarely seek or assume roles as leaders.

• Conventional roles of leadership are assumed by men.

• Subordinate, supporting roles are assumed by women.

• Women are not acknowledged or rewarded for managerial and facilitation skills that are critical to team success.

• Definition of leadership in engineering classrooms is narrow.

• Opportunities for leadership in engineering classrooms are limited.

By observing teamwork dynamics in selected engineering classrooms at Midwestern University, a medium-size land grant institution with a College of Engineering, we characterize the current state of women engineering students in classroom leadership roles. Specifically, we ask this research question: How does gender affect leadership in selected undergraduate engineering classes? In exploring this question, we characterize the communication of women students as well as their leadership styles.

**Literature Review**

While engineering programs are working to attract and retain women (Johnson, 1997; Long, 2001; and Rosser, 1995), once women are enrolled and engaged, programmatic energies must include helping women assume leadership roles, which is often a problem. Why?
Women assume a disproportionately low percentage of leadership roles in engineering (WELI, 2006). Simply put, leadership is gendered (Yoder, 2001)—that is, women and men tend to have different styles of communicating and leading teams (Tannen, 1990; Fisher, 1999), and women’s styles are sometimes dismissed or ignored. More contextually, social constructions of gender influence many women to assume conventionally female styles of leadership and many men to assume conventionally male styles of leadership (Matusak, 2001). Women’s gendered style, while valuable for getting work done, is often not acknowledged as “leadership” in the classroom. Women students are often shut out of publicly identified roles as leaders because they are seen as less competitive, less hierarchical, less power driven, less commanding.

Ironically, many of the women students in this study don’t see themselves as disadvantaged or disenfranchised. Instead, they see themselves working hard and actively participating—which in their minds makes them equal, and if they work harder and make critical decisions that facilitate, shape, and even direct the team’s work, they see themselves as leaders. However, getting public acknowledgement doesn’t seem to be important to them; they’re intimately involved in the problem solving and critical decision making, which they see as being fully involved. Many of them do not believe that they are marginalized. They see their own facilitative behavior as essential leadership without necessarily realizing that other people see those facilitative behaviors as fulfilling support roles rather than leadership roles. We address these gendered differences in four broad categories with fuzzy, overlapping boundaries:

• Definition
• Social perceptions

• Affect

• Behavior

These categories move us beyond traditional leadership studies that “have typically
drawn on a narrow range of functionalist theories (based mainly on psychological studies and
perspectives limited primarily to social psychology), using positivist methodologies, and
producing quantitative findings” (Collinson & Grint, 2005).

**Definitions of Leaders and Leadership**

Let’s take a step back to define leaders in general. Leaders influence the efforts of a
team working toward a common goal; they are, in fact, often identified as the most influential
team member (Denmark, 1993). Their role is to be aware of the needs of the other team
members and understand the context in which they are working (Denmark, 1993). They plan,
organize, and lead activities (Denmark, 1993) as well as function as bridge builders who
“understand the creative power of partnership” (Bell & Patterson, 2006: 14). They often
broker partnering relationships that includes “keeping agreements, telling the truth, showing
respect, and demonstrating a commitment to the relationship” (Bell & Patterson, 2006: 14).

Current engineering classes and programs tend to privilege a view of leadership that is
narrow, stereotyped, and male (Ahmadi et al., 2006). Teams, which tend to be hierarchical
and competitive, with differentiated roles, tend to favor male leadership styles. Our primary
argument is that we need to change the way we view leaders and leadership so that women
have an equal chance, which benefits both men and women as well as the organization to
which they belong (Rosener, 1990). Increasing the equity of engineering for women and
strengthening the quality of engineering programs requires that both women and men assume leadership roles.

The literature clearly demonstrates that “leadership” has a spectrum of definitions, roughly 35,000 in academic literature, according to Dubrin (2000). One way to categorize definitions is by gender.

What is typically identified as male leadership is the status quo in many organizations and classrooms. More specifically, traditionally, male leadership tends to be characterized as competitive, unemotional, dominant, controlling, directive, and even autocratic (Eagly & Johnson, 1990; 2001; Vecchio, 2002). This view of leaders as dominating, all powerful, and forceful—characteristics most often displayed by men—is becoming passé in the contemporary studies of leadership (Glaser, 2006). Male communication styles are too often unconnected to community and focus on hierarchy, on the large status difference between leaders and subordinates. If a hierarchy doesn’t exist, many men are motivated to create one (Eagly & Johannesen-Schmidt, 2001). Men as leaders tend to pay attention to flaws in their subordinates, wait to solve problems until they become severe, and are often absent when needed (Eagly & Johannesen-Schmidt, 2001). Despite these characteristics, male leaders are frequently given high authority (Eagly & Johnson, 1990).

More contemporary definitions of leadership tend to favor female leadership styles, including cooperation, collaboration, and motivation (Vecchio, 2003). In contrast to male leaders, female leaders are often concerned with the welfare of others, what is referred to as “enlightened” leadership at beginning of this article. Many women practice a leadership style that is “affectionate, helpful, kind, sympathetic, interpersonally sensitive, [nuturing], and gentle” (Eagly & Johannesen-Schmidt, 2001). As leaders, women tend to be interpersonal,
democratic, participative, cooperative, democratic, and transformational, often interested in the individual needs of their subordinates (Eagly & Johannesen-Schmidt, 2001; Vecchio, 2002). Women leaders often motivate and inspire their subordinates to be respectful and proud of their membership on a team, which are important parts of any leadership style (Kotter, 2006). Typically, women leaders tend to show excitement about future goals (Eagly & Johannesen-Schmidt, 2001). And they tend to communicate with animation, detail, feedback, and tag questions (Vecchio, 2002). Despite their positive leadership attributes and their long history in certain kinds of leadership (for example, in home and community), women usually receive little to no recognition for these roles (Carli & Eagly, 2001).

**Social Perceptions of Leaders**

Most people agree that women face more challenges than men in order to become leaders (Eagly & Johannesen-Schmidt, 2001; Glaser, 2006). For example, some people tend to be prejudiced against women, often believing they are less competent and skillful as leaders than men (Eagly & Johannesen-Schmidt, 2001; Heilman, 2001; Carli & Eagly, 2001; Eagly and Carli, 2003). Though many women and men may believe they judge leaders based on their individual merits, often deep-rooted stereotypes, including gendered stereotypes, are powerful and unintentional. Assumptions and prejudices about women and men as competent or incompetent leaders are often unconscious (Ridgeway, 2001), and they continue to hurt women’s opportunities to gain leadership roles (Carli & Eagly, 2001). In order to retain roles as leaders, women are required to meet higher standards than men and have to perform at higher levels (Eagly & Johannesen-Schmidt, 2001; Heilman, 2001; Ridgeway, 2001; Denmark, 1993). Asking women to work harder to get the same leadership opportunities is
unfair, and even if women succeed, they face continued comparison to their male counterparts who are often considered natural leaders.

Overall, men tend to be socially favored as leaders over their female counterparts (Dobbins, 1985). Men have been accepted as leaders (Dobbins, 1985), and stereotypes equate good leadership qualities with male leadership qualities, which creates one of the main challenges women face as leaders (Schein, 2001; Heilman, 2001). When viewed as binary opposites, because men are viewed as good leaders, women are viewed as bad leaders (Heilman, 2001). People, most often males, tend to dislike highly skilled and successful women and may reject them as leaders (Carli & Eagly, 2001; Heilman, 2001; Denmark, 1993). Being disliked and rejected can affect the confidence of a female leader and decrease her effectiveness in leading her team.

Affect of Leaders

Transformational leadership (TL) “is characterized by a leader’s ability to articulate a shared vision of the future, intellectually stimulate employees, and attend to individual differences in employees” (Brown & Keeping, 2005). A number of aspects of affect appear to be a factor in transformational leadership—liking, for example. Douglas J. Brown and Lisa M. Keeping summarize literature indicating “that liking may be an important precursor of leadership ratings” (2005: 247). In their own research, Brown and Keeping found that “liking not only substantially influenced” working students who completed Multifactor Leadership Questionnaire’s transformational leadership scales but also influenced the relationships with other outcomes such as job satisfaction (2005: 266).
Women tend to be socially sensitive, as strong community builders, so resistance and hostility from team members can be damaging to their self-esteem, which is a necessary element needed to increase the number of women as leaders in engineering (Ahmadi et al., 2006; Mulla-Feroze & Krishnan, 2000). Women face even more opposition as both male and female managers still describe successful leaders as possessing male leadership styles, such as self-confidence, competitiveness, decisiveness, aggressiveness, and independence (Vinnicombe, 1999). Other factors contribute to the hostility and resistance that many women leaders face, such as male leadership styles and male-dominated environments.

When women as leaders take on male leadership styles, such as being hierarchical, competitive, and authoritative, they face rejection (Heilman, 2001; Denmark, 1993). Further, they are often met with resistance and dislike, which then negatively affects how others respect them as leaders, and they attain less influence over the group rather than women who take on female leadership styles (Ridgeway, 2001).

Another factor that increases prejudice against women as leaders is a male-dominated environment (Eagly & Johannesen-Schmidt, 2001; Heilman, 2001; Eagly & Carli, 2003). The more male-dominated a team environment (in numbers) the more likely a woman is to face hostility as a leader. Women are in danger in male-dominated environments, such as engineering, because their leadership style tends to lose authority in such environments (Eagly & Johnson, 1990; Mulla-Feroze & Krishnan, 2000). If the environment is overwhelmingly male-dominated, such as engineering, the tokenism women experience can add to the stress of leadership. Women who participate in groups and teams with 85 percent or more men tend to have negative experiences as “tokens” of the group including more visibility, performance pressure, isolation, and gender stereotyping (Yoder, 2001). The
dynamics in female-dominated and male-dominated environments are usually significantly different because women and men tend to display gendered behavior as leaders.

**Behavior Displayed by Leaders**

Women tend to act as leaders by facilitating group and team projects, doing extensive writing, setting up meetings, and summarizing group and team discussions (Ingram & Parker, 2002). These qualities highlight women’s abilities as leaders without creating a dominating hierarchical structure. Women tend to lead by collaborating rather than by delegating. In contrast to the more hierarchical leadership qualities men tend to have, women tend to form more connected relationships between leaders and subordinates (Eagly & Johnson, 1990). As more democratic leaders, women are participatory, seeing more value in collaborative efforts rather than competitive efforts within a team. Their collaborative quality tends to be one of the most distinguishing qualities of female leaders (Eagly & Johnson, 1990). Men tend to be more competitive, hierarchical leaders focusing on leadership as a power position. As leaders, men are often less involved in collaborative work and more focused on delegating tasks to subordinates.

Women, in addition to being collaborative, also tend to be highly interactive leaders (Matusak, 2001). They tend to lead using principles of caring, making intuitive decisions, and connecting their work and life (Ahmadi et al., 2006; Vinnicombe, 1999). This connection between work and life is yet another example of how most women take the context of community into consideration in their communication and leading.

**Reflections on Literature Review**
Though women bring many diverse aspects of leadership, such as community-building, collaboration, and micro-managing, they are often unable to show these skills in engineering. They tend to build relationships, have strong nonverbal skills, and collaborate with leaders and subordinates (Rosser, 1995). As leaders, women are valuable because they often have interests that include arts and humanities, which means they focus on the larger-scale community and context aspects of leadership (Florman, 1994). As we have argued elsewhere, “Full participation [for women] means changing engineering so that women’s good ideas are not shut out, ignored, dismissed, marginalized, acquired, overlooked, or silenced” (Author, 2006: 2). Here, we extend this position to argue that full participation means changing engineering so that women assume a broad range of team roles and responsibilities and also assume an equitable share of leadership.

Methodology

As we have reported previously (Author, 2006), our in situ, observational research provided a natural setting for us to examine our research question: How does gender affect leadership in selected undergraduate engineering classes? This inquiry is part of a larger study (Author, 2006) examining gender in undergraduate engineering classes in which we maintained strict standards for classroom research: be rigorous but unobtrusive in collecting classroom data. We provided the faculty involved in this study and the Assistant Dean of Engineering with an opportunity to review the penultimate version of this article. The discussion that follows about selecting courses, participants, and setting and then collecting observations, survey data, and interviews provides a clear sense of our qualitative approach. We are more
interested in the ways in which people actually behave in team leadership situations than in what they say they might do in such situations.

**Selecting Courses, Participants, and Setting**

This study took place during the spring semester 2005 in the College of Engineering at Midwestern University. The university enrolls about 27,000 on-campus students, slightly over 5,000 in the College of Engineering.

The overall atmosphere of the College of Engineering is strongly supportive of leadership opportunities. For example, the College gives special attention to engineering leadership, thanks in part to a corporate grant that enabled the College to initiate an Engineering Leadership Program “to address the growing need for leaders trained in technology.” Students who are accepted into this special program—about 15 percent of them women—learn about “the impact of policy, diversity, and ethics on engineering and technology [and] also develop the skills needed to influence” their peers, country, and world (Engineering Leadership Program, 2006). The College of Engineering is also strongly supportive of women, encouraging recruitment efforts, offering learning communities and mentoring, supporting women’s involvement in the local WISE and SWE chapters, and just recently establishing an engineering diversity program.

In our overall study, we focused on core sophomore-level courses and capstone senior-level engineering courses in order to contrast students at the most frequently dropped level with those finishing their last semester. We also wanted to focus on engineering programs with the lowest and the highest percentage of women undergraduates. The Assistant Dean in the College of Engineering identified the mechanical engineering (ME)
program as having among the lowest percentage of women (only 5.4 percent of ME students) and chemical engineering (ChE) as the program with the highest (37.6 percentage of women) in 2004.

Both department chairs were given details of the study and asked to help choose two classes and faculty members to participate. Participating faculty members agreed to permit class observations, complete a brief survey that included questions about team roles and leadership, and participate in one 30-minute interview. We use gender-appropriate pseudonyms for faculty participants. Previously (Author, 2006), we have reported the teaching experience of the faculty participants; Table 1 summarizes their teaching experience, percentage of time assigned to research, and percentage of time assigned to teaching, factors that may affect attitudes toward and styles of their own leadership. We use the abbreviations ChE 200/ME 200 to indicate the selected sophomore courses and ChE 400/ME 400 to indicate the selected senior courses; these are not actual course numbers.

<table>
<thead>
<tr>
<th></th>
<th>Professor</th>
<th>Years teaching in College of Engineering</th>
<th>Percentage of time assigned to research</th>
<th>Percentage of time assigned to teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 200</td>
<td>Henry Schwartz</td>
<td>30</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>ME 400</td>
<td>Gerald Michaels</td>
<td>20</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ChE 200</td>
<td>Daniel Richards</td>
<td>15</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ChE 400</td>
<td>Connie Stokes</td>
<td>1</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

We also reported that 123 students from four engineering classes were eligible and agreed to participate in our study. Table 2 shows the number and percentage of women and men participating from each class.
Table 2. Number and Percentage of Students Separated by Program, Level, and Sex

<table>
<thead>
<tr>
<th></th>
<th>Women Students</th>
<th>Men Students</th>
<th>Total Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>ME 200</td>
<td>7</td>
<td>13%</td>
<td>46</td>
</tr>
<tr>
<td>ME 400</td>
<td>3</td>
<td>14%</td>
<td>18</td>
</tr>
<tr>
<td>ChE 200</td>
<td>5</td>
<td>28%</td>
<td>13</td>
</tr>
<tr>
<td>ChE 400</td>
<td>13</td>
<td>42%</td>
<td>18</td>
</tr>
</tbody>
</table>

A total of 123 students were enrolled in the four classes; we invited 20 percent of the students in each class—an equal number of women and men, for a total of 12 women and 12 men—to participate in individual interviews outside the class. The random sample of students interviewed was stratified by sex and, when possible, performance as determined by grades in the particular engineering course:

- 10 students from 53 in the sophomore-level ME course
- 4 students from 21 in the senior-level ME course
- 4 students from 18 in the sophomore-level ChE course
- 6 students from 31 in the senior-level ChE course

Professors provided us with information about student performance. ME students showed a relatively normal distribution in performance; we chose students from both the upper and lower halves of these courses. Chemical engineering students, according to the professors, were approximately level, so we randomly selected students without regard to performance.
In-Class Observations

We conducted in-class observations to learn more about the environment, culture, and dynamics of these engineering classrooms, including professor-student and student-student interactions. All of our classroom observations took place in engineering classrooms and labs (when labs were a part of the course). Our observations focused both on the amount and on the kind of oral (verbal) and paralinguistic (nonverbal) attention given by professors and students to women and men during the classes in a range of communication activities, including lectures, group work, and class discussions. We were particularly interested in the interactions during their group work and team activities.

Based on suggestions from the director of the University’s foundational communication courses, who has particular expertise in classroom observation strategies, we focused our observations on six areas: eye contact; vocal pitch/tone; frequency, direction, and length of responses; use of gendered pronouns; use of title in addressing the professor; and classroom climate. Here, we report on the frequency and direction of responses as well as the general classroom climate related specifically to group work, teams, and leadership.

Sarah attended four courses during the spring 2005 semester, spending 10 percent of the total class time in each course; thus, she spent four full class periods in the courses that met three days a week and three full class periods in courses that met twice a week. On observation days, Sarah transcribed her handwritten notes and used a printout of the notes to write a preliminary analysis of that day’s observations (Miles & Huberman, 1994). This preliminary analysis identified the frequency and dynamics of interaction related to teamwork and leadership.
Surveys

The 14 survey questions (11 multiple choice and 3 short answer) asked for feedback from each student about how often and at what level they and other students participated in class. Faculty members were asked similar questions about the frequency and level of student participation. After we drafted the survey questions, we pilot tested them on students not in these engineering classes, gauging the students’ comprehension of the questions, their level of comfort and ease in answering them, and the time they needed to complete the survey.

Students in all classes completed the survey in their regular classroom and faculty members in their offices. Sarah told students and faculty members about the purpose of the research and that their participation was voluntary. Altogether, we surveyed 86 students from the four classes. We tabulated the results to find the mean for each of the first eleven questions, only six of which were relevant to group work, teams, and leadership. We then analyzed the open-ended answers to the last three questions looking for details that address the role of gender in communication and leadership in their courses. A series of independent samples t tests were conducted to evaluate the hypotheses that student self-ratings of leadership differed by demographic categories (i.e., gender, course, faculty gender, and classification).

Interviews

Near the end of semester, faculty members and students were interviewed by Sarah who asked direct, open-ended, and discourse-based questions that focused on each student’s individual analysis of her or his participation, performance, satisfaction in the course, and
comparison to the rest of the class. Faculty members and students were asked about what they believe is the role gender plays in engineering communication and leadership.

We pilot tested the interview questions on students not in the engineering courses, gauging students’ comprehension, level of comfort and ease in answering the questions, and the time needed to respond. We conducted individual, face-to-face interviews with each of the four faculty members and a 20 percent stratified random sample of students, except for one student who was interviewed via email because of time constraints. All interviews were tape-recorded. Each interview was analyzed preliminarily on the day it was conducted by listening to the tape in order to identify views about the ways in which gender affects communication and leadership in their courses.

We used this preliminary analysis in order to learn more about the role of gender in relationship to communication and leadership and as a starting point for in-depth analysis of the transcribed responses. When the interviews were transcribed, all student participants were given gender-specific pseudonyms to be used in all presentations and publications. The 88 single-spaced pages of transcribed interviews were analyzed to identify categorical responses about gender, communication, teamwork, and leadership. Our data have led us to a grounded theory approach that depends on our careful, close reading of the observational notes, survey data, and interview transcripts.

**Data and Discussion**

This study provides surprising instances of male dominance and female insecurity in relation to leadership. It also provides insight into the range of definitions for leadership. The data help create a picture of communication, gender, teamwork, and leadership in four
engineering classes, drawn from survey results that characterize student and faculty leadership behaviors as well as our class observations and interview data.

In answering our research question—How does gender affect leadership in selected undergraduate engineering classes?—we have separated our analysis into four sections that parallel our review of literature: definitions of leaders and leadership, social perceptions of leaders, affect of leaders, and behavior displayed by leaders.

**Definitions of Leaders and Leadership**

We asked the engineering students three survey questions related to the frequency of group work, teams, and leadership, which we chunked together as questions related to definition. These questions asked about the frequency of in-class group work, leadership roles, and out-of-class group work. The questions enabled us to identify situations in which opportunities for leadership existed. Simply put, if group work or teams don’t exist, opportunities for leadership are far less likely to exist.

In our analysis of the survey questions according to whether the students had a male or female professor, only one of these three questions (How often do you work in groups?) approaches significance: \( t (85) = 1.98, p = .051 \). The analysis shows that students with a female professor \((M = 3.57, SD = 0.51)\) indicated that they worked more often in groups than students with a male professor \((M = 3.24, SD = 0.70)\). Our analysis of this same survey question according whether the students were in a sophomore or senior course is clearly significant, \( t (85) = -3.97, p = .000 \). Sophomore-level students \((M = 3.08, SD = 0.71)\) indicated that they worked less often in groups than senior-level students \((M = 3.62, SD = 0.49)\).
Observations and the follow-up interviews provide further evidence that definitions shape action. Specifically, in this discussion, we consider students and professors who draw on tacit definitions and depend on prior knowledge.

**Drawing on Tacit Definitions.** Everyone interviewed in this study had a tacit definition of leadership that appeared to contribute to the disproportionate number of men who were labeled as leader—despite the widespread view among the students and professors that gender equity existed in their classes and teams. This tension—the belief that gender equity existed and the reality that male dominance prevailed—is not easy to explain. For example, one of the chemical engineering professors commented in his interview about his sense that because women comprised a small percentage of students in his class, the percentage of women who were leaders was probably equal or higher than the percent of men who were leaders:

...if there is a difference [of men and women in leadership positions], it is not noticeable....Given the fact that there are fewer women in my classes, they are on the average probably taking a greater percentage of the leadership roles. But it probably has to do something with the fact that the GPA of the women students is higher, so...their classmates are going to tend to let them take the lead.

In this professor’s class, 60 percent of the teams had women facilitating the project team activities; however, no women observed were identified as team leaders. As the professor notes, women in his class consistently outperformed men in grades.

This observed pattern was typical of women in this study. While women often defined themselves as leaders, they were not typically defined as leaders by the men on their team. Despite the disproportionately large amount of facilitative work done by women in the
engineering classes we observed and the lack of women explicitly defined as leaders, the
definition of leadership was not explicitly discussed in any of the observed classes. Nor was
leadership defined as a role that should be equally assumed by both women and men. Nor
was leadership defined as something that goes beyond facilitative functions.

*Depending on Prior Knowledge.* Students were left to draw on their prior knowledge and
experience in defining leadership and determining leadership functions. Many of the models
of leadership students drew from their prior knowledge characterize a leader as the “front
person,” the one in the spotlight, the spokesperson for the team.

Students appeared to see the leader as an ultimate decision maker—not an arbitrator
or mediator or facilitator but the person who votes up or down when a decision has to be
made. The sense of a leader being “in charge” is inherent in this comment from a mechanical
engineering senior, Derek, who said gender equity in leadership existed, but the example he
provided was a woman in ROTC:

*I don’t know, I guess I have seen it from all areas of the spectrum. I know a girl who
is really involved with the ROTC, and she like takes charge of the group and she kind
of ends up leading the group just because she takes a lot of initiative, and there are
some girls who just are pretty laid back and just kind of go with the flow.*

The fact that he referred to a team leader as a “girl” simply reinforces his bias about women
in leadership roles; he acknowledges that, yes, some girls can be leaders, but they’re likely to
be in the military.
Social Perceptions of Leaders

On the survey, we asked students a question to assess their social perceptions of their own leadership: “Are you comfortable with leadership roles in groups?” An analysis of the data showed no significant results by gender of students or professors or the level of the course. However, our observations and the follow-up interviews provided evidence that social perceptions appear to be a critical factor in team leadership. We found clear indications that the social perceptions of the amount of leadership roles women and men took on were often inaccurate. The actual leadership roles for women and men and the perceived leadership roles for women and men revealed conflict in social perceptions about leaders.

Actual Leadership. Table 3 shows the percentage of project teams with women facilitating team activities and assuming the public role of project team leader in each of the four classes we observed.

<table>
<thead>
<tr>
<th></th>
<th>Professor</th>
<th>Total Students in Class</th>
<th>Percentage of Women in Class</th>
<th>Number of Project Teams</th>
<th>Project Teams with Women Facilitating Activities</th>
<th>Project Teams with Women as Team Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 200</td>
<td>Henry Schwartz</td>
<td>53</td>
<td>13%</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>ME 400</td>
<td>Gerald Michaels</td>
<td>21</td>
<td>14%</td>
<td>6</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>ChE 200</td>
<td>Daniel Richards</td>
<td>18</td>
<td>28%</td>
<td>5</td>
<td>60%</td>
<td>0%</td>
</tr>
<tr>
<td>ChE 400</td>
<td>Connie Stokes</td>
<td>31</td>
<td>42%</td>
<td>7</td>
<td>71%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Table 3 shows that ME 400 had no project teams, but group work was a critical part of the class; in fact, students were engaged in a great deal of group work, but it wasn’t comparable to the established, on-going teams working on large projects in the other courses. Instead, in ME 200, the class sessions observed had pairs of students working on specific critical-thinking and problem-solving activities in class. As Table 3 shows, leadership roles
in project teams for the other three classes were more often taken by men. Although men comprised slightly more than 75 percent of the students in the four classes observed, they were official leaders for 83 percent of the 18 project teams.

**Perceived Leadership.** In the classes we observed, men tended to be the spokespersons and acknowledged leaders for project teams. We observed preferences that paralleled those reported in the research literature indicating male leadership qualities as preferred over women’s, qualities typically associated with aggression, domination, and competition (Buzzanell, 2000). Professors and students commented how often they saw women and men taking on leadership roles in teams. We separated interview responses about leadership roles into three categories, previously reported (Author, 2006):

- Women and men take on leadership roles equally
- More men take on leadership roles than women
- More women take on leadership roles than men

Students and professors alike have the U.S. cultural expectation that gender equity is desirable (even if not practiced). Their cultural preferences and their expectations appeared to have overridden the actual experiences, causing them to ignore that gender equity simply wasn’t present in any class we observed. Specifically, as we have previously reported (Author 2006), two professors (of the four in this study) and 52 percent of the students believed that women and men participated equally in leadership roles. Student comments during interviews made clear that equity was a blind spot:
• Susan, sophomore-level ME class: “How often they take leadership positions—
that’s pretty much equal.”

• Cale, senior-level ChE class: “Between male/female I don’t think there’s too much
difference, honestly.”

Despite the majority opinion we’ve reported, some students recognized the inequity,
with 38 percent believing that men took on leadership roles more often than women. Student
comments during interviews reflected the actuality of the disproportionate number of men in
leadership positions:

• Steve, sophomore-level ChE class: “The guys always kind of want to lead.”

• Jason, senior-level ChE class: “In groups, men have definitely taken the leadership
positions.”

• Jacob, sophomore-level ME class: “You know, we’ve got three girls in our group
and stuff, and so it’s male dominated out of 12 people there. So, like, obviously,
you know, the males are going to take the leadership role.”

As the previous data show, students and professors alike had difficulty accurately
assessing how often women were leading in engineering classes. This misperception was
extremely far off when two professors and 10 percent of the students believed that women
were more often in the leadership roles. Student comments during interviews illustrated the
lack of awareness:

• Anne, senior-level ChE class: “Women more often take the leadership positions or
are sort of recognized as the leaders.”
• Stephanie, senior-level ChE class: “Women have stepped up a little more often into leadership positions.”

Affect of Leaders

On the survey, we asked students a question to assess their perception about affects of their own leadership: “Do your group members/classmates listen to your input?” While an analysis of the data showed no significant results by gender of students or professors or the level of the course, our observations and interviews provided support for our interpretation that affect appears nonetheless to be a critical factor in team leadership. We found clear indications that factors such as being liked, high visibility, and tokenism provide some explanation for the low number of women leaders we observed in engineering classrooms.

Being Liked. A stereotype that we saw played out in engineering project teams is that women leaders aren’t typically liked—perhaps tolerated, respected, and followed, but not necessarily liked. This experience is difficult for many women who grow up in a “girl” culture where cooperative and collaborative interaction is the norm and interpersonal relationships are central to being part of a community. Being a leader sometimes means being set apart, which reduces the sense of being part of a community.

Women sometimes equate being liked with being listened to. For example, Carolyn, a sophomore studying mechanical engineering, describes the pressure she feels as a female leader for group work in her male-dominated engineering classes: “I think a lot of [the] time people are more willing to listen to the man who’s leading, or if the woman is leading and giving directions or delegating duties then you know, she is being pushy where if the man is
leading then he is a natural leader.” Carolyn believes that men are seen as natural leaders, and, unfairly, women must fight a stereotype of being pushy or bossy—of being not liked.

Susan, in the senior level ME class, indicated she felt that women’s contributions as leaders often receive more criticism than men’s contributions as leaders:

There is a slight difference in the way people take what’s coming out of [a] woman’s mouth in a group. Sometimes a guy will say something and everybody will be “okay, let’s go with that,” whereas sometimes myself or another female will say something and it’s a little more . . . It’s critiqued a little more before it’s an accepted answer.

This additional criticism can make a more challenging environment for women as project team members and an uninviting environment for women as team leaders.

**High Visibility.** Minorities often receive undue attention. One black engineer or one woman engineer or one physically challenged engineer on a project team might receive disproportionate attention. Because engineering classes have so few women, the women have more attention focused on them; they are visually prominent and culturally distinctive. For example, Alison, a sophomore studying chemical engineering, said during our interview with her that she was isolated and made fun of; she was the only woman in her engineering classes. She explained her visibility: “Usually when you work in a group, a lot of times the guys can be kind of jerky and make fun of you.” Alison believed she was negatively singled out simply because she was a woman.

The visibility sometimes has remarkably negative effects. For example, Angie, a sophomore studying mechanical engineering, said she was hesitant to even participate in class, in group activities, or in project teams unless she was positive that she was correct: “I won’t speak up if I am not sure because I am sure there is somebody who will tell me I’m
wrong.” Angie, like many women engineering students, indicated that she felt pressure to always be correct because women constantly fight stereotypes of incompetence and hostility from group members when their contributions are less than perfect. A woman who is unwilling to speak unless she’s always right is not going to function as an effective leader.

Working with the stigma of being a part of a minority and of being perceived as less competent leaders than men means that many women engineering students believe they have little room for error in their work. Melinda, a sophomore studying mechanical engineering, is a strong student at the top of her class; she’s very organized and driven. She admits the visibility of being a woman in engineering produces a lot of pressure for her. When she makes a mistake or misses a class, she says she feels that everyone notices. She doesn’t think that men in engineering have the same pressure. She feels that as a woman engineering student, she has higher standards to live up to.

**Tokenism.** Tokenism tends to overemphasize differences and suggests insincere rather than genuine inclusion. Women in engineering classes often face tokenism and hostility because the classes are usually male-dominated. Dan, a sophomore studying mechanical engineering, explains how he sees women in his classes and their reactions to being marginalized, “Females tend to hold back a little bit more because they are, I think, afraid that being the minority, that if they are wrong, it’s already hard for them to kind of step up.” The women we observed were always in a minority position and expressed anxiety and stress because of their tokenism. If these women take on leadership roles and fail, they are subject to even more criticism.
Teresa, a sophomore studying mechanical engineering, elaborates on her feelings about tokenism: “Coming into class sometimes, like in the beginning of the semester, when you walk in the class and you are the only girl that walks in, like the first couple of days you just have eyes [on you] like ‘oh, there’s a girl in the class.’” Teresa’s experience shows an immediate consciousness of being a minority and being highly visible as a woman in a male-dominated environment. She even thinks of herself in a token “girl” role rather than in a woman engineer role. Her sense of discomfort reduces the likelihood that she will be willing to assume a leadership role.

**Behavior Displayed by Leaders**

Our analysis of the survey question related to team behavior (Is your group work dynamic supportive?) by the gender of the professor was significant, $t(81) = 2.39, p = .019$. Students with a female professor ($M = 3.67, SD = 0.48$) indicated that they had more supportive group dynamics than students with a male professor ($M = 3.29, SD = 0.66$).

The irony of these results is not lost on us. If students report a group work dynamic that is more supportive with a female professor, why doesn’t that extend to having women team leaders? In this section discussing the behavior displayed by team leaders, we have identified three factors that appear influential: acknowledgement of leaders, facilitative functions, and writing and recording.

**Acknowledgment of Leaders.** Our observations affirmed that women students were not always recognized as leaders—by their classmates, their professors, or sometimes even by themselves. Conventional team roles were assumed by both women and men in this study.
Jeremy, a senior in chemical engineering, describes the roles taken on by some members of a project team he participated with. “The girl came up with the schedule of what to do and everything, and we were like we have a leader, but she ended up asking the other guy at one point. She was like ‘Will you be the leader?’ so she’s like the non-leader leader.” Jeremy’s description of his female group member who seemed more comfortable as the non-leader leader illustrates exactly the way most of the team dynamics worked in the teams we observed.

Jeremy explains the lack of active participation and leadership roles associated with most women in his classes by noting “most of these girls already believe, you know, they can take on the world, and they can’t.” Jeremy’s apparent lack of confidence in women’s ability to take charge is the mentality that continues to label women as incompetent leaders and men as natural leaders.

**Facilitative Functions.** Women were typically identified as facilitators, roles women themselves frequently defined as leadership functions but male team members and professors generally did not. In the groups and project teams we observed, facilitative functions included keeping the focus on the task at hand, setting up times to meet, keeping track of materials, and making sure group members knew when and where to meet.

Women frequently worked as facilitators, group/team managers, and writers and men as engineers. For example, a chemical engineering senior, Anne noticed that she and other women most often facilitated team activities:
In our upper-level chemical engineering classes, I think that women do more of the organizational getting together and forming groups to work on projects, work on homework, things like that.

Women’s role as facilitator was evident to a number of women students, such as Teresa (also quoted earlier), a sophomore studying mechanical engineering. She sees herself assuming the roles most women assume in her classes: an organizer, someone who works behind the scenes. She does a lot of writing, keeping notes for the team, and giving feedback on ideas others have begun.

Leadership appears to be narrowly defined both by students and professors. As vocal and visible leaders, men articulated processes, progress, and decisions (often ones they did not make themselves), thus influencing other students as well as professors to see them as capable leaders. Men tended to focus on the details of the task/problem given to the group, not on the process of addressing that problem. As facilitators, women tended to focus on the doing. The following example shows a woman acting as an important, responsible force for her team, focusing team efforts on tasks that will get the job done.

The students have been working on their group projects together, and their flow charts are due today. Sitting outside the room waiting for the other class to finish, two students who are in a group together are talking. One student complains to other about the fact that she had to keep the chart for the group, telling him that she had to get up early for work and was up late and wouldn’t have come to class, but her group had pressured her into maintaining the chart. She said she realized it was unfair that she had to keep it for the group because she had all the responsibility of getting it there. After another group member shows up, he tries to make an excuse to ditch the next meeting. She tells him that he needs to start taking the group project more seriously. (observational notes ChE 200 18 April 2005)

Though she is seen by the other team members as more of a doormat than a leader, she realizes her role as a responsible team member is important. She motivates her fellow team members and reiterates the importance of taking teamwork seriously. She displays many
leadership qualities in her dependable, responsible behavior, but rather than being rewarded, she is left to pick up the slack of her team.

Typically, in this study, women’s roles included organizing tasks, planning schedules, and facilitating group and team activities. Almost half of the students interviewed (48 percent) believed women and men assumed different types of roles in teams. All of the students interviewed about team facilitation believed women were better facilitators of activities than men, but they didn’t see that as a leadership function. Teresa, in the sophomore-level ME class, shared her experiences with leadership and teamwork roles in her interview, labeling women as organizers:

It [the official leader] just always ends up usually being a guy . . . . I usually see girls taking more [of] the organization. Yeah, more behind the scenes like organizing, so they are . . . I can see like us being leaders as far as like organization definitely, because without us they’d be all over the place.

Anne, in the senior-level ChE class, confirmed the perspective of women’s teamwork roles as organizers/facilitators:

Women do more of the organizational getting together and forming groups to work on projects, work on homework, things like that . . . . I see women working more to organize groups of students getting together to work on stuff.

In the teams observed, women roles were most often as either facilitators/organizers or writers/recorders.

**Writing and Recording.** Women often took on roles as writers and recorders in the groups and project teams we observed in this study. All of the students interviewed who mentioned communication and writing believe that women are stronger communicators and more
skillful writers than their male counterparts. For example, this woman in ME 200 immediately became the writer for her group:

Today the students are reviewing for their exam tomorrow. Professor Schwartz has them get into groups of two or three students and write on one piece of paper the material for a given chapter that was most important. Two men and one woman next to me work together. One of the men gets a sheet of paper out in preparation to write, so I assume he will be recording for the group. As I turn back to look a minute later, the woman in the group is taking notes as the two men tell her what to write down. (observational notes ME 200 15 April 2005)

Women’s roles, as writers and recorders, were not only confining but also most women were not acknowledged or rewarded for their abilities that were critical to team success. For example, a woman is left to take the role of writer in her group in ChE 400:

Students have just gotten to the computer lab to begin work on their new projects. They have been assigned new groups by Dr. Stokes. Two men and an woman begin work on their project. They have a sheet to fill out as an icebreaker and then get to work. One of the men expresses his distaste for writing, blatantly saying “I hate it.” So, the woman in the group says she doesn’t mind writing and would be fine taking that role on for their group. She seems almost relieved that she will be doing the report writing for her group. (observational notes ChE 400 17 February 2005)

Her group doesn’t seem to realize how important writing is, but she realizes the importance of her role and her ability to write effectively since she is relieved to have the position as writer. She doesn’t seem to trust the other (male) students to write well for the group. Melinda, a sophomore studying mechanical engineering, faces the same problems. She believes writing is an important part of teamwork; she finds herself doing quite a bit of her teams’ writing. She admits she’s not sure anymore whether she does so much writing because she likes it, is good at it and needs to help her team, or whether she gets suckered into it.
Many students in engineering see writing as a mechanical function, unfortunately viewing it as unrelated to cognition, problem solving, or creativity; to many students writing is simply a task that facilitates the technical work. They are uncritical in accepting the adage, “Do the work. Write it up,” not realizing that writing is a way of thinking about the technical problems. Ryan, a sophomore studying mechanical engineering, notes that the women in his class are “much more willing to be the secretary” than men. By “secretary,” Ryan means the group member who does the writing rather than the one who is the vocal leader or who makes the engineering decisions. Ryan doesn’t see writing as an engineering function. Team talk matters, but for Ryan, writing is strictly mechanical. The important writing role assumed by many women in this study did not appear to be viewed by male students, professors, and sometimes the women themselves as related to leadership.

Our study revealed that students (female and male) and professors had differing definitions of leadership, social perceptions of team dynamics, consideration of the affect of leaders, and leadership behaviors. These conflicting ideas left women’s leadership styles often ignored, men’s leadership styles overemphasized, and team dynamics static, leaving little room for change and growth in leadership and teamwork roles.

**Implications**

To encourage people to expand their definitions and social perceptions, to shift their affect, and to change their behavior, we recommend seven changes in engineering classrooms. Asking that women themselves work twice as hard for equal the recognition is unfair and often times ineffective (Yoder, 2001). The problem is clear: The women in the classes we observed frequently assumed facilitative roles, completing tasks that they defined as part of
leadership but that neither the professors nor the other students perceived as leadership because they were drawing on male models of leadership. Further, the socialization of women to work productively in cooperative, supportive communities results in affect and behavior that generally makes a male leadership model uncomfortable.

While the workplace may benefit from leadership that uses “enlightened power,” in too many engineering classrooms, that enlightenment needs to be encouraged. Our results clearly show the need for changes in definition, opportunity, team formation, support, and behavior in order to let women in engineering classes assume more leadership roles.

First, we encourage faculty in engineering to directly address definitions of leader and leadership. They can encourage students to explore the ways in which individual’s definitions, perceptions, expectations (and biases) affect team interaction. They can encourage explicit discussions to address what characterizes a leader in different situations and what actual leadership skills—ones displayed both by women and men—are critical to successful teams (Ridgeway, 2001). Letting students depend on their prior knowledge and experience increases the likelihood that they will perpetuate stereotypes in their own work and teams. Developing definitions of leadership that acknowledged different leadership styles would be a good start for classes. We need to encourage a definition of leader as someone who is participatory and focused on the team as a whole (Yoder, 2001).

Second, we encourage faculty and students to be open to forms of leadership outside conventional male models. Teaching women to be leaders in the male model isn’t the only solution; students need to recognize that individual leader’s approaches need to be trusted. Students must be sensitized to be responsive the approach the leader chooses to use—even if
it’s unfamiliar or uncomfortable or different than the way they’ve worked in the past. Trusting a new leadership style and cooperating could be productive.

Third, we encourage faculty to establish more leadership opportunities in classes—for example, establish new roles of discussion leader, discussion facilitator, or homework leader. We encourage opportunities for various leadership models. And we encourage faculty to rotate leadership positions often, giving all students (even those reluctant and/or inexperienced) opportunities to become comfortable, confident leaders. When creating new opportunities for leadership, professors need to give leadership positions to women; this is one of the most important factors in decreasing the negative prejudices against women and increasing students’ acceptance of women as leaders and of female leadership styles (Denmark, 1993).

Fourth, we encourage faculty to provide explicit, public support for women in leadership positions in engineering classrooms. Women—especially young women—often need external support to help them develop leadership skills (Yoder, 2001; McDonald et al., 2004). More specifically, endorsement from a professor in a classroom or superior in the workplace can greatly increase a woman’s ethos as a leader (Yoder, 2001; McDonald et al., 2004). What might a professor say? For example, when assigning a team leader, “Team One, Marissa will be your leader. I am confident she will make a great leader for your team.” Professors also need to acknowledge good work in front of others, especially from women, which can help gain confidence from other students and fight the stigma against women as leaders (Rosener, 1990).

Fifth, we encourage faculty to design groups and teams that reduce the effects of tokenism. This means that well-intentioned decisions to put one woman student in each
group or on each team can backfire by increasing isolation and visibility, both of which increase anxiety. Janice Yoder explains (2001) that when women make up at least 35-40 percent of groups and teams, they are less anxious about being singled out or isolated. A professor would probably create more productive teams and higher performance by making sure women, and any other minorities, are not victims of tokenism in groups and teams.

Sixth we encourage faculty to be attuned to the nature of the interaction in class groups and on project teams. Faculty should articulate a zero-tolerance policy for hazing and cruel teasing of women students (or other minority team members). Similarly, they should articulate a zero-tolerance policy for isolating and marginalizing women students so that their participation is only perfunctory.

Seventh, we encourage faculty to help all students, but especially women, overcome the resistance, bias, and prejudice against them as ineffective or incompetent leaders. A number of researchers have identified strategies people can use to increase their effectiveness as leaders. Faculty can present these strategies in class and encourage all students to use them, especially with team members who resist or challenge their leadership (Eagly & Johannesen-Schmidt, 2001).

Acknowledgments

We would like to thank Midwestern University’s Women’s Enrichment Fund for supporting this research. We would also like to thank William Jeffries, Donna Niday, Kevin Saunders, Loren Zachary, and the four faculty participants whose classes we observed for their critical support of and contributions to this project at various stages in its development. And, of course, we thank the students for their cooperation and participation.
Notes

1. The Society of Women Engineers (SWE), founded in 1950, is a not-for-profit educational and service organization...that establishes engineering as a highly desirable career...for women. SWE empowers women to succeed and advance in those aspirations and be recognized for their life-changing contributions and achievements as engineers and leaders.” Source: The Society of Women Engineers http://www.swe.org/.

2. In 1993, “the National Academies created the Women in Science and Engineering (WISE) group as a ‘sister effort’ to existing WISE groups in federal agencies. The WISE members search for ways to increase the participation and visibility of women in Research Council activities and in the scientific community as a whole.” Source: The National Academies http://www.nationalacademies.org/wise/.

3. The Women in Engineering Leadership Institute (WELI) was established in 2000. WELI’s mission is to provide support, including training, mentoring, and networking opportunities in academic leadership, for women engineering faculty. Source: Women in Engineering Leadership Institute http://www.weli.eng.iastate.edu/.

References


token women leaders’ expectations about leading male-dominated groups *A Journal of Research* 50(5-6), 401-410.


Vecchio, R. P. (2002) Leadership and gender advantage *The Leadership Quarterly* 13, 643-


Overview: Appendix F contains the data collected for this article.

Abstract Undergraduate engineering classes lack equitable representation of women’s voices. A better understanding of ways to increase women’s voices in engineering classes through classroom participation comes from looking at the current situation of women’s participation in classes that have varying gender balances and course topics. Thus, I pose the following research question: How do the differences in the number of women and academic subject in engineering, food science, and history classes affect women’s participation and sense of community in the classroom? This study found classroom community helped increase women’s participation in the classroom.

Keywords: communication; community; engineering; participation; pedagogy; women

The number of women in colleges is steadily increasing. Women significantly outnumber men in college enrollment and are now the majority, making up 57 percent of college students (Marklein 2005). For all races and socio-economic classes, “National statistics forecast a continued decline in the percentage of males on college campuses” (Marklein 2005, 1). Currently, women are more likely to get their bachelor’s degrees, obtain them in four or five years, and get better grades than their male counterparts (Lewin 2006). Studies suggest the decline in men’s university enrollment has several causes.

One of the main causes is behavioral differences between men and women. Most college men socialize more and study less than most college women. From a young age, men are also more likely to be suspended, expelled, have a learning disability or emotional problem diagnosed, drop out of high school, commit suicide, or be incarcerated (Lewin
Class slackers are more often male. Men are more likely to skip class, not complete their homework, turn it in late, and brag about not having to work hard to earn mediocre grades. One study focused on science labs found that women complained of men’s distracting and disrupting behavior in lab, which resulted in halting experiments and wasting class time (Blickenstaff 2005). Overall, men tend to make up the majority of problem students and disciplinary actions (Lewin 2006).

Women, on the other hand, are excelling in college. On average, women work harder in school and care more about their grade point average than men. From an early age, they tend to do better in reading and writing through senior-level high school. Overall, women tend to make up the majority of focused college students (Lewin 2006).

Though women are excelling in enrollment numbers in universities, gender inequities continue. Women are still under represented in college science and engineering programs. According to the Women’s Bureau at the U.S. Bureau of Labor in 2003, slightly over 12 percent of all engineers were women (U.S. Department of Labor 2005). At my home institution, Midwestern University, a science and engineering research one institution, the 2005 percentages were just over the national percentages, with women comprising approximately 15 percent of engineering students. Since men still dominate in science and engineering, this means more money and, therefore, power are kept in fields that women are not entering (Lewin 2006). In fact, a pay gap still exists; women graduates earned 77 cents to the dollar of their male counterparts in 2004 (Marklein 2005). In order to create more opportunities for women in engineering, we need to increase the numbers of women students in engineering.
Increasing the number of women in engineering will put more women in high-paying fields and diversify the discipline. Beyond increasing women’s equity and diversity, another benefit exists. Women make good engineers; they tend to have different ways of leading, communicating, designing, answering questions, and problem-solving, which are all important parts of engineering (Blicktenstaff 2005, Society of Women Engineers 2005; Burack and Franks 2004; Fisher 1999; Florman 1994). Women’s perspectives are important to engineering because improvements in engineering depend on diverse perspectives that provide a rich and full view of the world.

No one argues about the lack of women in engineering. Attracting women has become particularly challenging since the field has few women role models and is rumored to have a chilly climate. In the effort to provide a broader look at the problem of low numbers of women in engineering classes, I am beginning with previous research, which focused on the communication practices of women in undergraduate engineering classes (Author 2006). Rebecca E. Burnett and I have reported on our observations, surveys, and interviews with faculty and students in four engineering classes to determine their communication practices. We identified the frequency and type of participation by women and men as well as the ways in which participation, leadership, and negative behavior affected women’s experiences and success in engineering. We found that women were less likely to participate than men (especially in answering questions from professors), took on leadership roles less frequently than men, and engaged in negative behavior far less frequently than men (26 of the 28 documented incidents were from men). In this article (and in Author 2006), I define negative behavior as behaviors that interrupt and distract both professors and students, drawing attention away from course content, such as talking on cell phones, reading the newspaper,
doing homework for other classes, and talking with friends. These negative behaviors decreased the classroom community and affected women’s comfort in participating (Author 2006). In order to determine if these classroom behaviors were isolated to engineering or if they exist at the same level in all classes, I extend the research beyond engineering classes and into food science and history classes. Comparing the engineering classroom environment, which has few women, to other classroom environments, which have more women, provides a better understanding of how much impact community and communication have in attracting and retaining women.

In this article, I characterize student communication in history classes, which is fairly gender balanced, and a food-science class, which is female-dominated. I use the terms female-dominated and male-dominated in reference to the numbers of women and men enrolled in the classes. These differences help characterize the participation of women and community building in food science classes and history classes. I then compare the participation and community to engineering classes that I previously studied, which are male-dominated. Understanding the differences among the female-dominated food science classes, gender-balanced history classes, and the male-dominated engineering courses can help provide strategies for increasing women’s participation in engineering.

Thus, I pose this research question: How do the differences in the number of women and academic subject in engineering, food science, and history classes affect women’s participation and sense of community in the classroom? This information can improve our understanding of ways to increase the voice of women in engineering classes.
Literature review

My previous investigation is reinforced by other current research, which reports that women participate in class less than expected (the expectation being that women participate equal to their percentage in the class) (Author 2006; Rodd and Bartholomew 2006; Blicktenstaff 2005; Tannen 1990). Women participated less than expected, but, again, in accordance with current research, were perceived as having participated more than they actually did (Author 2006; Wolfe and Alexander 2005). Faculty and students misperceptions about the amount of participation from women was likely due to the low numbers of women in the class, which makes any participation from women more memorable. Also, women tend to be less talkative than men in public, so, again, any participation appears to be more substantial than it actually is (Hayes and Flannery 2002; Tannen 1990). The historical trend of women as silent still continues in today’s social perceptions. Women’s level of comfort communicating as a part of a community reveals the influence environment has on participation.

Women’s silence

Women have a long history of being silenced, perpetuated by creating the social illusion of women as voiceless. This historical silencing is described by Cheryl Glenn who writes “for the past twenty-five hundred years in Western culture, the ideal woman has been disciplined by cultural codes that require a closed mouth (silence)” (1997, 1). Rhetoric and public discourse have a long tradition of leaving women out—silencing them as a weaker sex (Glenn 2004; 1997). In this context, I focus not just on women but on socially constructed gender differences. Gender adds to the complexities of analyzing social power and structure
and the ways many women are penalized for their gender-socialized qualities in the form of being shut out of discourse (Glenn 2004). In the effort to identify ways to give women more of a voice in engineering classes, I analyze the kinds of environments that make women more comfortable participating in class.

**Community and participation**

The idea that most women and most men communicate differently has been longstanding (Fisher 1999; Hayes and Flannery 2002; Lay 1989; Ingram and Parker 2002). One of the leading linguists to address the topic of gendered discourse is Deborah Tannen. I draw frequently from her work about environments that create more discourse opportunities for a feminine style of communication, or in her words—rapport-talk (Tannen 1990).

We know that increasing the numbers of women in engineering classes (or any setting) increases the level of comfort for women who are communicating. One of the reasons women may feel more comfortable communicating with women is because they may feel they are in a more intimate, personal setting when no (or fewer) men are around (Tannen 1990). In male-dominated environments, such as engineering, women may feel more self-conscious and be more cautious about their behavior and participation, causing them to hesitate or second guess participation (Tannen 1990). This self-consciousness and caution can affect the amount women participate in class because of anxiety that can be caused in a male-dominated environment. The numbers of women in a classroom need to be increased to make a more receptive environment for women to communicate. In addition, a strong sense of community creates an environment where women feel more comfortable participating.
Most women view communication as a community task within a network (Hayes and Flannery 2002; Eisenhart and Finkel 1998; Tannen 1990; Lay 1989). Therefore, women tend to be more comfortable participating and communicating in settings where they feel they are a part of a community. Using rapport-talk, women tend to be more comfortable speaking as part of a community (Tannen 1990). Since most women view communication as a way to convey feelings and create community, private or comfortable settings tend to be more conducive to rapport-talk.

Rhetorical and feminist theory seem to agree that women’s voices have long been ignored and their place in discourse marginalized and/or misunderstood (Glenn 2004; Tannen 1990). Using the literature, which shows women tend to communicate collaboratively, as part of a community, and in a way separate from most men, my research is designed to identify classroom environments that help to foster female (and male) participation. My research methods are designed to help find how the differences between most women and men in their communication styles affect how they participate in various classes.

Methodology

This in situ, observational research provided a natural setting for me to examine my research question. The faculty members in this study had an opportunity to review the penultimate version of this article. The discussion that follows—about selecting courses, participants, and setting and then collecting observations—provides a clear sense of my approach to this study.
Selecting courses, participants, and setting

This study took place at Midwestern University, which enrolls about 27,000 on-campus students. The comparison data I use comes from Spring 2005 in the College of Engineering (slightly over 5,000 students) (Author 2006). The current study took place during the spring semester 2006 in the College of Agriculture (slightly over 3,000 undergraduates) and in the College of Liberal Arts and Sciences (over 5,600 undergraduates).

This study compares classes in two disciplines: food science and history. Food science, while science-based, is female-dominated, which contrasts with the Spring 2005 engineering classes, which were science- and math-based but male-dominated. History is a liberal arts discipline, and of the courses in this study was the most gender balanced. One of the history classes, which has 64 percent women and 36 percent men, is the closest of the courses studied to the national averages of college enrollment by gender, which are 57 percent women and 43 percent men (Marklein 2005).

This study also focuses on three different levels of courses: a 200-level sophomore course, a 300-level junior course, and a 400-level senior course. Both department chairs were given details about the study and asked to help choose classes and faculty members to participate. Participating faculty members agreed to permit class observations. Gender-appropriate pseudonyms were used for faculty participants. Professor Schroeder (male) taught Food Science 200, a course about the fundamentals of human nutrition. Professor Lin (male) taught History 300, a history of Modern China. Professor Brooks (female) taught History 400, a history of medicine, gender, and the body.

A total of 119 students from the three food science and history classes participated in this study. Table I shows the number of students in each course as well as the number and
percentage of women and men in each class. The numbers do not indicate the actual course numbers, just the level.

<table>
<thead>
<tr>
<th></th>
<th>Women Students</th>
<th>Men Students</th>
<th>Total Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>FSHN 200</td>
<td>73</td>
<td>95%</td>
<td>4</td>
</tr>
<tr>
<td>HIST 300</td>
<td>2</td>
<td>10%</td>
<td>18</td>
</tr>
<tr>
<td>HIST 400</td>
<td>14</td>
<td>64%</td>
<td>8</td>
</tr>
</tbody>
</table>

In-class observations

In-class observations were conducted to learn more about the environment, culture, and dynamics of these food science and history classes, including professor-student and student-student interactions. All of the classroom observations took place in food science and history classrooms. Observations focused both on the amount and on the kind of oral (verbal) and paralinguistic (nonverbal) attention given by professors and students to women and men during the classes in a range of communication activities, including lectures and class discussions.

Following advice from the director of the University’s foundational communication courses who has expertise in classroom observation strategies, I focused on six areas: eye contact; vocal pitch/tone; frequency, direction, and length of responses; use of gendered pronouns; use of title in addressing the professor; and classroom climate (as in Author 2006). Here I report the frequency and direction of responses as well as the general classroom climate.
I attended selected classes in the three courses during the spring 2006 semester, spending 10 percent of the total class time in each course; thus, I spent three full class periods in each of the courses, since they each met twice a week. On observation days, I transcribed my handwritten notes and then printed the transcription that I used to write a preliminary analysis of that day’s observations (Miles and Huberman 1994). In this preliminary analysis, I identified the frequency and dynamics of interaction related to gender.

Results

The observational data in Table II shows the amount of class participation in the three food science and history classes that I studied:

- number of students in each class
- percentage of women and men in each class
- number and percentage of questions asked and answered by women and men in each class

In this statistical analysis of the classroom participation, the null hypotheses are that the frequency of women who asked questions and the frequency of women who answered questions posed by professors are equal to the expected frequencies based on the percent of women in the course. A chi-square test identified frequencies. The level of significance was set at 0.05 with one degree of freedom in the analysis, resulting in a critical value of $X^2 = 3.841$. This process (also used in the previous study, Author 2006) compares the amount of participation in food science and history classes to the amount of participation in engineering classes.
Table II. Classroom Participation in Three Selected Classes in Food Science and History

<table>
<thead>
<tr>
<th></th>
<th>Total number of students</th>
<th>Percent of women</th>
<th>Percent of men</th>
<th>Total number of questions asked</th>
<th>Percent women asked</th>
<th>Percent men asked</th>
<th>Total number of questions answered</th>
<th>Percent women answered</th>
<th>Percent men answered</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSHN200</td>
<td>77</td>
<td>95%</td>
<td>5%</td>
<td>14</td>
<td>100%</td>
<td>0</td>
<td>23</td>
<td>87%*</td>
<td>13%</td>
</tr>
<tr>
<td>Mar. 24</td>
<td>77</td>
<td>95%</td>
<td>5%</td>
<td>5</td>
<td>100%</td>
<td>0</td>
<td>4</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>Apr. 14</td>
<td>48</td>
<td>94%</td>
<td>6%</td>
<td>8</td>
<td>100%</td>
<td>0</td>
<td>9</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Apr. 28</td>
<td>65</td>
<td>98%</td>
<td>2%</td>
<td>1</td>
<td>100%</td>
<td>0</td>
<td>10</td>
<td>89%</td>
<td>20%</td>
</tr>
<tr>
<td>HIST300</td>
<td>20</td>
<td>10%</td>
<td>90%</td>
<td>19</td>
<td>47%</td>
<td>53%</td>
<td>3</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>Apr. 13</td>
<td>17</td>
<td>12%</td>
<td>88%</td>
<td>6</td>
<td>67%*</td>
<td>33%</td>
<td>1</td>
<td>100%*</td>
<td>0</td>
</tr>
<tr>
<td>Apr. 18</td>
<td>17</td>
<td>12%</td>
<td>88%</td>
<td>6</td>
<td>67%*</td>
<td>33%</td>
<td>2</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Apr. 20</td>
<td>19</td>
<td>5%</td>
<td>95%</td>
<td>7</td>
<td>14%</td>
<td>86%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HIST400</td>
<td>22</td>
<td>64%</td>
<td>36%</td>
<td>25</td>
<td>81%</td>
<td>19%</td>
<td>53</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>Mar. 2</td>
<td>19</td>
<td>74%</td>
<td>26%</td>
<td>16</td>
<td>89%*</td>
<td>11%</td>
<td>22</td>
<td>55%*</td>
<td>45%</td>
</tr>
<tr>
<td>Mar. 23</td>
<td>20</td>
<td>60%</td>
<td>40%</td>
<td>6</td>
<td>60%</td>
<td>40%</td>
<td>10</td>
<td>90%*</td>
<td>10%</td>
</tr>
<tr>
<td>Apr. 11</td>
<td>17</td>
<td>65%</td>
<td>35%</td>
<td>3</td>
<td>75%</td>
<td>25%</td>
<td>21</td>
<td>48%</td>
<td>52%</td>
</tr>
</tbody>
</table>

*Statistically significant at the 0.05 level

Participation—a statistical look

Analyzing the number and type of questions asked and answered by women and men in each of these classes shows how frequently women’s voices were heard in everyday classroom conversation.

For Food Science 200, the difference between the observed and the expected frequencies of women asking questions was attributable to chance fluctuation. But, in each class period the percentage of women asking questions in class was always higher than the percentage of women in the class. So, women were consistently, actively participating in the form of asking questions. The total frequency of women answering questions is lower than the expected frequency. Women made up 95 percent of the class but answered only 87 percent of the questions. In two of the three class periods, the percentage of women answering questions was lower than the percentage of women in the class. But these individual classes did not have a large enough gap to reach statistical significance independently.
For History 300, the frequency of women asking questions on April 13 and 18 is higher than the expected frequency. Women made up only 12 percent of the class but asked 67 percent of the questions. In the third class period and overall in History 300, the percentage of women asking questions was higher than the percentage of women in the class. So, women were actively participating by asking questions. The frequency of women answering questions on April 13 is much higher than the expected frequency. Women made up only 12 percent of the class but answered 100 percent of the questions. For the other two class periods, women did not answer any questions. So, women were participating by answering questions but not consistently high enough to reach the expected frequency each time.

For History 400, the frequency of women asking questions on March 2 is higher than the expected frequency. Women made up only 74 percent of the class but asked 89 percent of the questions. For the rest of the class periods, women consistently asked a percentage of the questions that was more than or equal to their expected frequency. So, women consistently participated by asking questions. The frequency of women answering questions on March 2 and 23 is not equal to the expected frequency. Women made up 74 percent of the class on March 2, but they answered only 55 percent of the questions. Women made up only 60 percent of the class on March 23 but answered 90 percent of the questions. In the third class period, women answered fewer questions than expected. So, women’s participation by answering questions was active but not consistent.

The numbers and percentages of women and men asking and answering questions reveal only a slice of the classroom participation. Many of the aspects of participation had to
do with classroom community and engagement. The following observational data gives a broader view to the statistical data by painting a picture of the community in each classroom.

Women participating in Food Science 200—a female-dominated science course

Food Science 200 had a very different classroom dynamic than the engineering classes observed in the previous study (Author 2006). The students had a great rapport with each other, and the professor created a strong classroom community. And, even with the large class (77 students) and talkative environment before class, no negative behavior was observed in the classroom. As the following transcriptions from in-class observations show, the students demonstrated respect for the professor, who was approachable and created a friendly, highly professional atmosphere.

Before class starts, the students (today 73 women and 4 men) are talking very loudly. They chat about social events as well as homework and classes. They turn around in their chairs and lean in to talk to one another. They gesture and laugh a lot, and the noise is incredible. Professor Schroeder walks in a few minutes before class starts. He writes the agenda for the day on the blackboard then walks to the end of the room to make sure it’s visible for the students in the back, even asking “Can you read that?” to the students in the last row. It’s time for class to begin, and within minutes the students are completely silent. You could hear a pin drop, and class remains silent, except for the professor’s lecture and students asking and answering questions. (observational notes 24 March 2006)

Professor Schroeder was an engaging teacher. He used a number of effective communication strategies to engage his students with the information. And, he made his control of the class look effortless.

Professor Schroeder makes a lot of eye contact during his lecture. He uses notes on the blackboard as well as transparencies, but he keeps his focus on the students (today 45 women and 3 men—the low numbers are probably due to the fact that this was a Friday before a holiday weekend). He has a strong, clear voice but is very approachable and, in fact, has not an ounce of command in his tone or manner. The students don’t act out in his class; they are all paying attention, listening, taking notes, and remaining silent, except to ask and respond to questions and participate in class activities. Professor Schroeder is in control of his class, though it seems to be a control without intimidation; it works. (observational notes 14 April 2006)
Professor Schroeder’s style of teaching worked well in Food Science 200, and the class as a whole had a good sense of community. However, the more male-dominated liberal arts course, History 300, showed a deep lack of connection, and the students were not completely receptive to the professor’s teaching style.

Women participating in history 300—a male-dominated liberal arts course

History 300 showed some of the same classroom dynamics seen in some of the engineering classes previously studied (Author 2006). Some negative behaviors were captured in this in-class observation.

Professor Lin begins lecturing as usual. The class is small and silent, but little positive, productive interaction occurs between the professor and the students. One student surfs on the internet for the first half of class (about 40 minutes); he is mostly blogging and chatting online on his personal laptop. The students are for the most part are inattentive and only physically present. No real engagement is evident between the professor and the students or among the students themselves. (observational notes 20 April 2006)

The negative behaviors in this class were less intrusive than those found in the engineering classes (Author 2006). In this history course, the students were withdrawn rather than acting out or interrupting class lecture or activities. No sense of community or interaction was observable:

Professor Lin is lecturing today. He has a lot of effective communication strategies in his delivery style: good eye contact, good movement, a strong, fluent voice. But the students don’t seem engaged. The connection between the professor and the students is nonexistent. Many of the students are inattentive. They are not distracting, but they don’t seem to be paying attention. They seem to be tuning out rather than acting out. (observational notes 18 April 2006)

Professor Lin lectures a lot in class. He doesn’t seem to encourage interaction between himself and the students. He moves around a lot and has good eye contact, but a disconnect exists with student participation and involvement; there just isn’t any. Some of the students seem to be paying attention to the lecture, but others seem to just be spacing out. (observational notes 13 April 2006)

The communication in History 300 definitely lacked community and a network of individuals. The students and the professor did not form a connection in the class. Before
Professor Lin got to class, the students were isolated, each working individually or listening to their ipods or reading. And, when Professor Lin arrived in class, the lack of community remained throughout the period. In contrast, in History 400, the students were very engaged by the professor, who had an effective teaching style that worked to involve students.

*Women participating in history 400—a female-dominated liberal arts course*

Professor Brooks has a very connected form of teaching and communicating in the classroom. As the following observations show, she engages her students in conversation and utilizes many forms of communication in order to connect to her students and create a strong classroom community.

Professor Brooks talks directly to the class, making good eye contact as she writes notes on the board. She talks while using appropriate gestures and moving around the class. She really engages the students and connects the information with a lot of relevant examples. She has an obvious connection with her students. She calls on them by name, gives them verbal feedback and nonverbal feedback, and communicates effectively in the classroom. (observational notes 2 March 2006)

Professor Brooks connects directly with her students when she speaks. She uses a lot of “you’s” as she explains concepts and refers to the material as interesting and still relevant, really making the content important and exciting for students. She uses stories, visuals, and gestures. And the students respond to her by participating actively and keeping focused on her and the course content. The class feels like a community. When Professor Brooks tells a joke, everyone laughs; when she is explaining a concept, students ask good questions that show they are paying attention. (observational notes 23 March 2006)

As the above in-class observations show, History 400 created a strong classroom community that influenced women and men to participate actively. What’s interesting is that the classroom community did not really begin until Professor Brooks arrived in class. Food Science 200 also had a good community, but it was there before Professor Schroeder arrived in class. As the following example shows, Professor Brooks really ignites the community feeling in the classroom. Professor Brooks may not necessarily be the only factor that creates
community in the classroom, but she is obviously a major player in the creation of classroom community for History 400:

The students are very quiet before class begins. They all attend to their own work, newspapers, or ipods. Students aren’t talking before class begins. But when Professor Brooks comes to class, the students are focused on the class and engaged in the information. The community aspect of the course seems to center around the ways in which Professor Brooks communicates with the students. (observational notes 11 April 2006)

The importance of the professor’s communication and connection in creating classroom community is apparent in History 400. Therefore, in attempting to increase the participation from and number of women in engineering, the role the professor plays in creating community is essential.

Discussion

The differences in the number of women and type of subject in food science and history classes appeared to affect women’s participation, which was overall better than in the engineering classes previously studied. Both Food Science 200 and History 400 had a stronger sense of community.

Food Science 200 was very different from the male-dominated engineering courses previously observed; women participated more and a stronger sense of community existed. In the engineering classes observed (Author 2006), the professors’ teaching styles were highly influential in students’ behavior and participation. In Food Science 200, the students were respectful, the classroom community was strong, and the professor was able to keep the environment productive without having a domineering teaching style. The strong community and welcome environment for female participation was considerably influenced by the fact
that this class was female-dominated. Research consistently shows women tend to be better behaved in classrooms than men, and female-dominated environments are more comfortable for women to create a community, which is important to their participation (Lewin 2006; Ingram and Parker 2002; Hayes and Flannery 2002; Tannen 1990). The role of the professor is also important: Professor Schroeder did not have a domineering teaching style; he did have an approachable attitude, which worked really well with the classroom community the students set up.

History 300’s professor had a number of mechanically effective communication strategies to his teaching style. He used gestures well, spoke clearly, and kept his eye contact focused on his students, but the class did not demonstrate any appreciable sense of community. Students (especially male students) seemed to engage in the negative behavior documented in the engineering courses previously observed and in current research about student behavior in class, which in both cases are male-dominated (Author 2006; Lewin 2006).

The negative behavior in the classroom certainly hurt the classroom community, but the nature of the negative behavior was slightly different than the behavior in the previous engineering classes. The engineering classes included many male students who acted out and took a dominant role in the class through negative behavior (Author 2006). In History 300, the male students acted out by withdrawing and spacing out, which left an open space for the few women in the class to take control and participate. Women in History 300 displayed the drive to succeed that current research shows they have (Lewin 2006).

History 400 had active participation from women and a strong classroom community. The professor of History 400, Professor Brooks, was very connected to the students and
ignited engagement between the students and the professor as well as the students among
themselves. She connected course information with current events, engaged in a dialogue
with the students by asking for and welcoming their participation, and encouraged students to
respond to one another, creating a classroom discussion. Women had a strong voice in this
course, and both women and men helped build community in the classroom. The
environment in History 400 was woman-dominated, which research shows adds to the
comfort level of women to participate and feel like a part of a community (Tannen 1990;
Eisenhart and Finkel 1998; Hayes and Flannery 2002; Fisher 1999). In this class, the students
and professor participated and created a strong classroom community and comfortable
environment for all students (Tannen 1990).

Implications

In this study of one food science class and two history classes, women participated more and
classroom communities were stronger than the previously observed engineering classes
(Author 2006). Some of the factors that may have influenced women’s more active and
consistent participation are female-dominated classrooms, more community, less dominating
negative behavior from students, and more effective communication from professors.

Female-dominated classrooms

Studies show women are more comfortable participating in classrooms with more women
(Tannen 1990). But, this is not always an option in engineering classes. For example, some
of the programs at Iowa State have less than six percent women. But, the actual number of
women is a factor in participation because that number can be more easily manipulated for group and team work. For example, when students are separated into groups and teams, professors can be sure to assign more than one woman in each group or team, even if this means some groups or teams have no women. Increasing the comfort level of participation is another benefit of increasing the number of women in engineering: more women students probably means more active participation.

More community

Classroom community is a major factor in women’s participation (Tannen 1990; Hayes and Flannery 2002; Ingram and Parker 2002). Two of the classes in this study had much more community than the previously observed engineering classes (Author 2006). The more respectful, collaborative, connected communities observed created a more comfortable environment for women and men to participate and a more respectful environment for the professors to teach without the distractions of negative behavior.

Less dominating negative behavior from students

No dominating negative behavior was recorded in this study. In the engineering classes, the majority of negative behavior was from men: it gave the men a dominant place in the classroom, disrupting any potential community and drawing attention away from the professors. In this study of food science and history classes, even though one of the classes had some negative behavior, it was more withdrawn, which was still negative but was not distracting and overpowering. The infrequency of negative behavior increased the classroom
community and improved the overall class environment, thus increasing the frequency of participation from all students (Tannen 1990).

**More effective communication from professors**

The professors in this study had effective communication and teaching techniques. Some of the professors in the engineering study also had effective communication and teaching techniques, but some did not (Author 2006). The more active participation of women in this study suggests that effective communication from professors sets a tone for the classroom community and creates an environment where students’ voices can be heard. Specifically, History 400 was a class that saw the most participation and a very strong classroom community. The professor played a large role in setting the tone of the class. The class was a completely different environment before she arrived.

Implementing the following suggestions is likely to increase participation from women (and men) and build a better classroom community.

- Faculty can encourage community in a classroom. Discussion about the importance of community and the collaborative, professional behavior required to achieve a strong classroom community can encourage students to participate.
- Faculty can encourage participation from all students equally. Many women are still given less thorough answers to questions than the answers given to men (Blickenstaff 2005). Why would a woman want to continue participating when she is being undermined?
• Faculty can create a discourse that draws in examples from current events and world issues. Women are especially likely to connect problems in technical classes such as engineering to larger-scale societal problems (Blickenstaff 2005; Florman 1994).

• Faculty should be models of effective communication. Their use of gestures, eye contact, clear speaking, use of visuals, and responses to students’ questions can model expected communication.

• Faculty can explicitly and directly address negative behavior. Students should not be allowed to distract others from the course content or professor’s attention. Standards of professional behavior should be articulated and posted for review.

Acknowledgments

I would like to thank Rebecca E. Burnett for her support, feedback, and encouragement. I would also like to thank Diane Price Herndl, Kim Rogers, and Kevin Saunders for their critical support of and contributions to this project at various stages in its development. I would also like to thank the three faculty participants whose classes I observed and the student participants for their cooperation and participation.

References


Society of Women Engineers from NSF and Census Data (2005) *Statistics about women in engineering in the u.s.a.* Available online at:


APPENDIX A. IOWA STATE UNIVERSITY WOMEN’S ENRICHMENT FUND MINI-GRANT APPLICATION

Iowa State University
Women’s Enrichment Fund Mini-Grant Application Form

Project title: Communication Practices Affecting Women Students in Undergraduate Engineering and Science Classes at ISU

Submitted by Rebecca Burnett (University Professor) and Sarah Brown (M.A. Student)
Contact Name Rebecca Burnett, University Professor
Department/Program Department of English, Rhetoric & Professional Communication
Address 325 Ross Hall
Telephone 294-5654
E-Mail rburnett@iastate.edu

Amount of funding requested: $5,000

Type of funding requested:  √ Programming  ____ Seed Funding

1. Description of the proposed project
Retaining women students in engineering and science and giving them positive classroom experiences are always desirable. This project will analyze the classroom environment for women at Iowa State University who are pursuing programs in engineering and science. Specifically, this project will examine the ways in which information is communicated to women students in entry-level and capstone courses in four programs in engineering and science:

College of Engineering
- department with the highest percentage of women students: focus on the entry-level course and capstone course
- department with the lowest percentage of women students: focus on the entry-level course and capstone course

College of Liberal Arts & Sciences
- science department with the highest percentage of women students: focus on the entry-level course and capstone course
- science department with the lowest percentage of women students: focus on the entry-level course and capstone course

We are interested the ways in which the faculty and students (women and men) perceive barriers affecting women in their academic work. Information will be gathered by
(a) interviewing all faculty and a stratified random sample of women students in these eight courses
(b) analyzing the syllabi, textbooks, and websites for all eight courses
(c) observing faculty-to-student and student-to-student interaction in these eight science and engineering classrooms.
We plan two deliverables: (a) a report for the involved colleges, departments, and faculty members and (b) a booklet and information for college/department websites suggesting strategies for success for women students in engineering and science at ISU.

2. Project Timeline

November 14, 2004 – January 10, 2005
(a) Work with Loren Zachary, Assistant Dean for Undergraduate Programs in the College of Engineering, and Zora Zimmerman, Associate Dean in the College of Liberal Arts & Sciences to select specific ISU departments and courses to study.
(b) Review literature about both leading-edge practices for encouraging women in engineering and science and about barriers restricting access for women.
(c) Seek Human Subjects Approval from the IRB.
(d) Design interview questions.
(e) Design matrixes for analyzing syllabi, textbooks, websites, and class observations.
(f) Seek Human Subjects Approval from the IRB.
(g) Schedule class visits and interviews.

January 11 – May 1, 2005
(a) Analyze syllabi, textbooks, and websites in courses for gendered text and images.
(b) Interview selected faculty and student, using face-to-face and email interviews with direct, open-ended, and discourse-based questions.
(c) Observe all eight classes to identify patterns of questioning, responding, collaborating.

May 2 – June 30, 2005
(a) Analyze collected data.
(b) Prepare required one-page report for Women Enhancement Fund Mini-Grant Committee.
(c) Prepare report for the involved colleges, departments, and faculty members.
(d) Prepare document for women students in engineering and science at ISU, suggesting strategies for success.

3. Two benefits

- Characterize programs in engineering and science that attract a high percentage of women students contrasted with those that attract a low percentage of women.
- Provide information for women about strategies for success in two forms: print booklet that colleges could duplicate and information that colleges or departments can add to their own websites.

4. Affected women

The women who will be most directly affected by this project will be the faculty and students in engineering and science here at ISU. We anticipate the following involvement:
(a) eight faculty members
(b) a stratified random sample of first-year students both from the College of Engineering (approximately 16% of whom are women) and from science courses in LAS (approximately 33% of whom are women)
(c) a stratified random sample of capstone students from the College of Engineering and from LAS

As a result of this project, the entire student body in the College of Engineering and the College of Liberal Arts & Sciences has the potential to benefit if faculty implement the suggestions and materials for the students are widely disseminated by the departments and colleges.
5. **Collaborators**
   This project will be a collaborative effort between Rebecca Burnett (University Professor) and Sarah Brown (M.A. student), both in the Department of English, and selected administrators, faculty, and students in the College of Engineering and the College of Liberal Arts & Sciences.

6. **Budget**
   - Stipend for M.A. researcher $2,500.
   - Tape recorder, microphones, tapes 500.
   - Transcriber (estimate $20/hour for 40 hours) 800.
   - Course textbooks for eight selected science and engineering courses 800.
   - Photocopying and printing 400.
   **Total** $5,000

**Signatures**

Rebecca E. Burnett
Researcher
Signature
Date

Sarah Brown
Researcher
Signature
Date

Charles Kostelnick
Department Chair
Signature
Date

Loren Zachary
Assistant Dean
Engineering
Signature
Date

Zora Zimmerman
Associate Dean
LAS
Signature
Date
APPENDIX B. OBSERVATION DATA SPRING 2005

ME 200  
Professor Schwartz  
16 February 2005

<table>
<thead>
<tr>
<th>Observational Notes:</th>
<th>Observer’s Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Class:</strong></td>
<td>Female student only seemed comfortable talking to her group members</td>
</tr>
<tr>
<td>At first very quiet</td>
<td></td>
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<tr>
<td>Two women in class-one read paper while the other listened to headphones</td>
<td></td>
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<tr>
<td>Girl with headphones talked with her group members immediately</td>
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<tr>
<td>Students chatted louder and louder as they trickled in</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>0-10:</th>
<th>Students seem very comfortable and chatty in groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Got in their distinguished groups did homework and chatted (3 per group usually 1 woman in each)</td>
<td>Talked about assignment mostly</td>
</tr>
<tr>
<td>One female asked a question</td>
<td>I was surprised that the male student didn’t want to ask the professor and discouraged his group member from asking for help</td>
</tr>
<tr>
<td>Two males asked questions</td>
<td></td>
</tr>
<tr>
<td>Group next to me had one female and two males-female wanted to ask professor something, but one of the males said no we can figure it out ourselves</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10-30:</th>
<th>It wasn’t surprising to me that mostly men spoke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each group said one thing they learned doing the homework while professor wrote it on the board-explained a lot-lots of gestures</td>
<td>I didn’t understand the point when the Prof asked the male if he understood</td>
</tr>
<tr>
<td>Group 1-male spoke</td>
<td>I figured it must’ve been an inside joke within the class</td>
</tr>
<tr>
<td>Group 2-male spoke</td>
<td></td>
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<tr>
<td>Group 3-female spoke</td>
<td></td>
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<tr>
<td>Professor couldn’t hear her so he asked her to repeat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Professor probed</td>
</tr>
<tr>
<td>Group 4-male spoke</td>
<td></td>
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<tr>
<td>Group 5-male spoke</td>
<td></td>
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<tr>
<td>Group 6-male spoke</td>
<td></td>
</tr>
<tr>
<td>Professor probed</td>
<td></td>
</tr>
<tr>
<td>Professor asked him to repeat because he couldn’t hear</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>00-01:</td>
<td>Group 7-male spoke</td>
</tr>
<tr>
<td>01-02:</td>
<td>Group 8-male spoke</td>
</tr>
<tr>
<td>02-03:</td>
<td>Group 9-male spoke</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03-04:</td>
<td>Group 10-female spoke</td>
</tr>
<tr>
<td>04-05:</td>
<td>Group 11-male spoke</td>
</tr>
<tr>
<td>05-06:</td>
<td>Group 12-male spoke</td>
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<tr>
<td>06-07:</td>
<td>Group 13-male spoke</td>
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<tr>
<td>07-08:</td>
<td>Group 14-male spoke</td>
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<tr>
<td>08-09:</td>
<td>Group 15-male spoke</td>
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<tr>
<td>09-10:</td>
<td>Group 16-male spoke</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10-11:</td>
<td>Group 17-male spoke</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>30-32:</strong></td>
</tr>
<tr>
<td></td>
<td>Professor asked a question</td>
</tr>
<tr>
<td></td>
<td>Male answered</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>32-33:</strong></td>
</tr>
<tr>
<td></td>
<td>Looked in text with groups for what he may put on exam (in two days)</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td><strong>33-36:</strong></td>
</tr>
<tr>
<td></td>
<td>Lectures about chapter</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>36-45:</strong></td>
</tr>
<tr>
<td></td>
<td>Question time</td>
</tr>
<tr>
<td></td>
<td>Professor asks question</td>
</tr>
<tr>
<td></td>
<td>Male answers</td>
</tr>
<tr>
<td></td>
<td>Male answers</td>
</tr>
<tr>
<td></td>
<td>Professor Probes</td>
</tr>
<tr>
<td></td>
<td>Another male answers and professor agrees</td>
</tr>
<tr>
<td></td>
<td>Discusses time limits on the text and how to keep up with the time</td>
</tr>
</tbody>
</table>
**After Class:**
Questions from students  
Men gather around his desk while a woman waits two rows behind  
Male asked question  
Male asked question  
Male asked question  
Two males asked question  
Male asked question  
Professor gets his coat on  
Female asked question  
They leave room and building while still talking

<table>
<thead>
<tr>
<th><strong>Observer’s Comments:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Woman (non native speaker) was obviously intimidated by the other males in the class and probably somewhat by the professor</td>
</tr>
</tbody>
</table>

**ME 200**  
**Professor Schwartz**  
25 March 2005

**Observational Notes:**

<table>
<thead>
<tr>
<th>0-30:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. talks about the fact that today is the last day to drop.</td>
</tr>
<tr>
<td>Prof. didn’t get test from Wednesday graded yet.</td>
</tr>
<tr>
<td>Prof. says they will continue their journey as if on a train trip.</td>
</tr>
<tr>
<td>Goals for the day are displayed on a transparency.</td>
</tr>
<tr>
<td>Prof. asks open-ended question-students are silent.</td>
</tr>
<tr>
<td>Prof. asks students to discuss question with their neighbor.</td>
</tr>
<tr>
<td>Prof. asks question again.</td>
</tr>
<tr>
<td>Male answers.</td>
</tr>
<tr>
<td>Prof. jokes with answer then asks for clarification.</td>
</tr>
<tr>
<td>Male answers.</td>
</tr>
<tr>
<td>Prof. jokes.</td>
</tr>
<tr>
<td>Question was a trick question.</td>
</tr>
<tr>
<td>Prof. tells engaging story about Winnie the Pooh.</td>
</tr>
<tr>
<td>Male comes in late.</td>
</tr>
<tr>
<td>Another male comes in late.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Observer’s Comments:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>I was so interested by his “talk to your neighbor about your question” method. It gave students the ability to talk about their concerns while taking away the pressure of “Am I going to sound stupid in front of everyone?”</td>
</tr>
<tr>
<td>The students seem much more respectful of Prof. Schwartz than of Prof. Stokes. They don’t talk while he talks, and they don’t make jokes and talk back to him. There is definitely a clearer level of professionalism and respect in this class. Prof. Schwartz also seems to respond with more eye contact and authority whereas Prof. Stokes seems less confident in front of the class (making little eye contact and being interrupted by students).</td>
</tr>
</tbody>
</table>
Another male comes in late.  
Prof. asks question to whole class-two males raise their hands.  
Prof. makes jokes about students not doing the reading.  
Female comes in late.  
Prof. puts graph on transparency.  
Students do not talk to each other when Prof. talks.  
Prof. makes great eye contact as he speaks to class-not looking at transparency.  
Prof. gestures a lot as he speaks and walks around class.  
Transparency has main points and graphs.  
Prof. says if you have any questions to ask your neighbor first.  
Students talk together quietly when he asks them to talk in groups.  
Prof. makes joke about subject matter moving to the Daily.  
There are no questions for the Prof.  
Prof. jokes about reaching students in the back (his hands are over his eyes like binoculars).  
Female and male next to me take detailed notes.  
Student interest seems divided (some focused and some zoned out).  
Male student is zoned out-Prof. asks him if he’s set (calls him out by name).  
Prof. asks rhetorical question and answers himself.  

<table>
<thead>
<tr>
<th>30-50:</th>
<th>Prof. did not encourage female student with question in the same manner he had others. There was a distinct difference in his level of encouragement.</th>
</tr>
</thead>
</table>
| Prof. asks them to calculate a problem.  
Prof. answers male’s question.  
Students work, talking quietly together.  
Prof. says the first to be correct within a minute gets a treat.  
Male answers incorrectly.  
Male answers correctly.  
His treat is that everyone gives him a hand.  
Prof. asks a question.  
Male answers.  
Prof. puts another graph on the transparency. |
Prof. gives a problem to the students. Prof. asks male (by name—they have name tags) if he can see the graph from the back row. Students work talking little with one another. Male asks a question, and Prof. answers it. Prof. explains answers. Prof. asks question and asks for class response. A few males answer. Prof. asks if there’s confusion. Prof. puts diagrams on transparency are a constant as professor speaks. Prof. asks “with me?” or “alright?” very often-rhetorical no one answers. Prof. asks question. Female answers—prof. probes her but answers his own probe right away. He does not wait for her to reassess and answer. For Monday individual homework was assigned. Prof. says he may or may not collect homework. Prof. asks them not to copy solutions if they have them. Prof. hints to a possible quiz on Monday-threat?

**General Climate:**
Very professional
Always focused on course material
If any social aspects creep in (story, jokes) it is all done by the Prof. and not carried on by students at all.

<table>
<thead>
<tr>
<th>Before Class:</th>
<th>Observer’s Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I asked some students to schedule interviews—two scheduled, and then I ran out of time as class started.</td>
<td>Sophomores are much harder to schedule than Seniors. I have really had to track down the few that I’ve gotten so far.</td>
</tr>
</tbody>
</table>
0-31:
 Prof. greets class and gives date for the next test.
 Male comes in late.
 Prof. says he’ll start with student questions.
 Male asks Prof. question.
 Male comes in late.
 Female comes in late.
 Projector has homework that was due today on it as well as the answers and equations.
 Male continues with another question.
 Prof. writes what male says about problem.
 Male comes in late.
 Prof. moves around as he lectures/answers questions.
 Male asks question.
 Students are silent.
 Male comes in late (looking really guilty).
 Male comes in late.
 Prof. makes eye contact with students.
 Prof. asks question-Male answers.
 Prof. moves down both sides of classroom.
 Prof. assigns a problem and tells the students to check with their neighbor for answers.
 Prof. asks Female (by name) to answer-she does.
 Prof. explains problem.
 Prof. moves, talks, keeps good eye contact.
 Prof. wears nametag.
 Prof. lectures.
 Man coughs-and leaves.
 Prof. tells students to tell neighbors what some symbol means.
 Prof. asks question-Male answers.
 Prof. calls Male out (by name) and asks a question-Male answers.
 Prof. asks a question-two males answer.
 Prof. asks a question-Male answers.
 Prof. asks a question-two males answer.
 Prof. asks Male a question-he answers.
 Prof. asks Male a question-he answers.
 Coughing Male comes back.
 Prof. tells them to figure it out (a problem) and then talk to your neighbor about it.

Prof. did not address the late students.
 I really like that he integrates group interaction with the problems and then comes back to discuss them as a class.
 I like the way he had them write something down then discuss it with a neighbor then he talked about it. It gave many levels of analyzing one problem.
Prof. tells them to write before talking to your neighbor. When students talk together it is very quietly. Prof. moves around. Prof. jokes with students bout low exergy level. Male asks question-Prof. answers. Prof. explains why he asks them to talk to each other. Male comes in late. Prof. asks question-male answers. Prof. tells students to discuss together. Prof. asks question-Male answers (jokingly)-students laugh but not really loud-more of a chuckle. Prof. asks a question-two males answer. Female leaves with phone (she is hiding phone from Prof. as she walks out) Prof. asks question-male answers. Female with phone returns.

**31-50:**
Male coughs. Prof. starts new problem on Elmo. Prof. asks Male a question-Male answers. Prof. references past class with volunteers when they acted something out in front of the class. Prof. asks question-Male answers. Prof. lectures. Male next to me yawns. Male coughs. Students are taking notes. Male asks a question-Prof. answers. Prof. asks to the back row “does this make sense?” referencing the problem on the projector. Prof. gives “pointers” for homework-information rather than answers. Prof. asks question-Male answers. Prof. refers to projector while facing the class. Prof. asks question (about if they’d done their homework) for a show of hands-majority raised their hands.

Students are very quiet in this class as Prof. lectures. They do shuffle at the end while he is still speaking-pretty common in classes unfortunately.
Prof. was very pleased.  
Prof. gives assignment for Wednesday.  
Students shuffle at the end while Prof. speaks.

**General Climate:**  
Quiet, professional climate.  
If there are social references or joking in class it is very controlled and most often something lighthearted by the Prof. that then stops. The students don’t get out of hand.

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**ME 200**  
**Professor Schwartz**  
**15 April 2005**

**Observational Notes:**
- Prof. jokes that he is wearing his jacket because of a pen splotch on his shirt—he doesn’t know which looks worse.  
- A few students clapped.  
- Prof. explains they will be reviewing for the test.  
- Prof. asks if students have specific questions.  
- Prof. corrects answer he had given for homework (on projector).  
- Male comes in late.  
- Female comes in late.  
- Male asks a question.  
- Male comes in late.  
- Prof. moves around as he speaks.  
- Male asks a question about one of the homework questions—Prof. comes over to look at paper.  
- Prof. says “no let me repeat the question”  
- Prof. shows it on projector.  
- Two males raise their hands.  
- Male comes in late.  
- Prof. refers back to previous question.  
- Male restates his question—Prof. realizes he had expanded more in depth than the simpler question the student had asked.  
- Male asks a question.

**Observer’s Comments:**
- I was really surprised that the woman next to me was taking notes because the man looked like he was getting ready to, but she ended up taking them.  
- I also noticed when the Prof. was answering that student he said “you didn’t say that” then made eye contact with me and then said “or that’s not what I heard, maybe I heard wrong.” I think he added the last part because I was there, but I can’t be sure.
Prof. tells students to pair up and find out their birthday. Male next to me that needs a partner asks me my birthday. I explain that I am just observing and not participating. Prof. tells them to record information on a half sheet of paper (write down everything they need to know from the chapter) in ten minutes. Male comes in late. Prof. says they should be talking. Students talk together—not loudly. Group next to me—two male and one female—the female is writing for the group even though a male had gotten the sheet ready his remained blank and she wrote.

20-50:
Prof. tells them to go back over and circle the parts that needed more info and expand on them. Students start speaking more loudly. Prof. walks around. Prof. says another minute or so left. Prof. says each group will give one piece of info. Group One—Male speaks. Group Two—Male speaks. Prof. says they’re picking low hanging fruit first. Male responds to Prof. jokingly. Group Three—Male speaks. Group Four—Male speaks. Prof. asks for elaboration—male elaborates. Prof. probes—male jokes—Prof. explains and says you didn’t say that or maybe I didn’t hear you correctly. Student restates. Male coughs and leaves. Group Five—Male speaks. Male and female speak quietly as Prof. talks. Group Six—Male speaks. Coughing male comes back. Group Seven—Male speaks. Prof. asks male to explain in more depth. Again, the only disrespectful thing from the students would be the shuffling at the end. And, the men are speaking much more than the women. Men are much more vocal in class. Prof. is consistently engaging as he speaks and balances the projector info. with his speech. He moves around a lot and makes really good eye contact with students.
Prof. asks question-male answers.
Prof. asks question-male answers-Prof. says no and explains.
Group Eight-Male speaks-Prof. moves around class to answer.
Prof. refers to projector but does not face it.
Group Nine-Male speaks.
Group Ten-Male speaks-Prof. elaborates in depth between questions.
Group Eleven-Male speaks.
Prof. asks question-male answers-Prof. probes-male answers.
Group Twelve-Female says they have nothing to add.
Group Thirteen-Male says they have nothing to add.
Male asks a question.
Prof. lectures a review on the next chapter saying they need to do this other chapter in depth on their own now.
Prof. records some stuff on projector about the chapter as he walks around and lectures.
Prof. references destruction with his destroyed shirt.
Students begin to shuffle as he finishes his lecture.

ME 400
Professor Michaels
16 February 2005

Observational Notes: Observer’s Comments:

Before Class:
The first two girls (out of the three in the class) immediately saw each other as they walked in and talked
I sat in a chair and one guy (later identified as MB) told me that a class would be in here I said that I knew and he then asked me if I was in the class I said no but I was observing but would be happy to move for his friend-kind of condescending
Today they work in groups for their senior project while professor circulates to answer

Girls spoke one on one much more than in larger groups
Men were more group oriented
<table>
<thead>
<tr>
<th>Questions</th>
<th>Group work</th>
<th>Group A, B, C, O</th>
<th>Group D, E</th>
<th>Group F, T, FB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very focused on computer</td>
<td>Technology huge part of class</td>
<td>Very little eye contact (focused on computers or papers)</td>
<td>All male group</td>
</tr>
<tr>
<td></td>
<td>Student referred to professor as “Michaels” behind his back</td>
<td>Interactions with Prof. seemed very relaxed</td>
<td>All groups that had dominant members had a male as dominant member</td>
<td>F was a very interesting person to observe</td>
</tr>
<tr>
<td></td>
<td>Very little eye contact (focused on computers or papers)</td>
<td>Professor seemed very approachable to students</td>
<td>About half of groups had a dominant leader</td>
<td>He seemed oblivious to how dominating he was</td>
</tr>
<tr>
<td></td>
<td>All male group</td>
<td>“HARLOTS” was written on a paper and tacked to a board where their group was B is dominant in group</td>
<td>Group crowds around his computer</td>
<td>FB seemed very shy and reserved</td>
</tr>
<tr>
<td></td>
<td>Group dynamic seems relaxed-they joked a lot</td>
<td>First to ask professor a question</td>
<td>First to ask professor question</td>
<td>T was kind of in the middle</td>
</tr>
<tr>
<td></td>
<td>Have more eye contact and gestures than most groups</td>
<td>Speaks to professor for group when professor comes around</td>
<td>Discussed hockey first with professor then moved on to a question</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“HARLOTS” was written on a paper and tacked to a board where their group was B is dominant in group</td>
<td></td>
<td>FA sat on his desk while professor was speaking with them</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First to ask professor a question</td>
<td>First to ask professor question</td>
<td>Both he and professor stared at computer while they spoke</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaks to professor for group when professor comes around</td>
<td>Speaks to professor for group when professor comes around</td>
<td>FA stared at professor when he spoke-he makes eye contact when addressing her</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All groups that had dominant members had a male as dominant member</td>
<td>About half of groups had a dominant leader</td>
<td>Group A, B, C, O, F, T, FB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group dynamic seems relaxed-they joked a lot</td>
<td>All male group</td>
<td>Group F, T, FB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Have more eye contact and gestures than most groups</td>
<td>Talked but kept eyes on their screens most of the time</td>
<td>One female and two males</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“HARLOTS” was written on a paper and tacked to a board where their group was B is dominant in group</td>
<td>Worked individually for about 45 mins. Then got together to talk, but still very limited</td>
<td>F is dominant in group</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First to ask professor a question</td>
<td>Professor knelt by their group when helping them</td>
<td>Group crowds around his computer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaks to professor for group when professor comes around</td>
<td></td>
<td>First to ask professor question</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td>Discussed hockey first with professor then moved on to a question</td>
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<td></td>
<td>FA sat on his desk while professor was speaking with them</td>
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<tr>
<td></td>
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<td></td>
<td>Both he and professor stared at computer while they spoke</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FA stared at professor when he spoke-he makes eye contact when addressing her</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Speaks for group “I don’t think any of us cares about …”</td>
<td></td>
</tr>
<tr>
<td>Explains to T that professor didn’t understand his question (puts blame on miscommunication)</td>
<td></td>
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<tr>
<td>Back to hockey with H</td>
<td></td>
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</tr>
<tr>
<td>Goes to help FA (who has been cutting herself down over her work) and teases her</td>
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<tr>
<td>Checks FB’s work</td>
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<tr>
<td>Takes over FA’s work</td>
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</tr>
<tr>
<td>Explains to partner “you know why this is” and explains walking around as if he is professor</td>
<td></td>
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<tr>
<td>T is more relaxed group member</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Floated from this group to FA</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Verbal and chatty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FB is female member</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talks a lot with FA about school and lighter topics (food, graduation, stress)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Stares at computer screen while professor is there (so does T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quiet, but good with gestures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nodding to professor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kept arms folded while listening to professor and F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talks more to T than F</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Group G,H,I,J**

- All male group
- Lots of silence at first
- Seem to have equal leadership
- Relaxed and laughing (especially later on)

**Group K,L,FC**

- Two males and one female
- FC makes little to no eye contact with other group members
  - Stays focused on computer
  - Communication is one on one
  - Brought book and loans it to a group member
  - Guy sat at her desk whole time talking with her and focused on computer

**J-answered phone in class**

**FA-felt ignored because she sat with another group as they got help from**

I was really surprised that FA wouldn’t go ask the Prof. for help

She told multiple students about how she
**professor (which took 40 minutes) so professor missed her**
First female to approach professor
Joked with professor and other students
Most verbal of females in class

**Text on board**
Two items each read “be sure to use the same XXXX” some repetition

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**ME 400**  
**Professor Michaels**  
**21 March 2005**

<table>
<thead>
<tr>
<th><strong>Observational Notes:</strong></th>
<th><strong>Observer’s Comments:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Class:</strong></td>
<td>The female could have been aware of the fact that the other female was going to have that spot and didn’t want her to have the broken chair. Could be a sign of camaraderie?</td>
</tr>
<tr>
<td>A male and a female student discuss their spring breaks and working on a group project (possibly for another class) A few guys are talking together Students are very focused on their computers Female sits down and notices she has the broken chair. She goes to switch it and then in the middle of the trade decides to trade with another empty spot. Another female later came in and took the spot she was initially going to trade with</td>
<td>Little eye contact. One female has her feet on the desk.</td>
</tr>
<tr>
<td><strong>0-10:</strong></td>
<td></td>
</tr>
<tr>
<td>Professor lectures and references computers which students are focused on.</td>
<td>MF talks to the professor quite a bit-about social stuff, sports.</td>
</tr>
<tr>
<td><strong>10-15:</strong></td>
<td></td>
</tr>
<tr>
<td>Professor introduces me and the project.</td>
<td></td>
</tr>
<tr>
<td><strong>15-30:</strong></td>
<td></td>
</tr>
<tr>
<td>Students begin group work which takes over most of the rest of the class period. A woman comes in with papers for the printer. The professor jokes with her. MF asks a female about the basketball game. Very little eye contact-focus is on computer.</td>
<td>They don’t want to drive, but they volunteer anyway.</td>
</tr>
<tr>
<td><strong>30-33:</strong></td>
<td></td>
</tr>
<tr>
<td>MF has an announcement for the class about their tour. He needs volunteers to drive. The professor and two females</td>
<td></td>
</tr>
</tbody>
</table>
Students get back to group work.
Two females talk about having to drive.
MF explains to two males next to him something about their project then wheels himself (in his computer chair) to another group to talk to a male about sports.
One wandering male crosses the room to ask another male a question.
MB takes a cell phone call in class.
MB leans over his group member’s shoulder to explain something.
MF takes a cell phone call in class.
MF talks to others as they work on their computers (mostly about social stuff—not school related).
Four males near me work together very focused on the screen—no eye contact.
MF plays the drums with his hands on his desk.
HARLOTS sign is still on the wall.
Female asks MF a question (she is in his group) then she looks over at another male’s and female’s computers that are in her group and chats with them.
She talks about her sister.
Then she and the male in her group play Jeopardy.
MF and two males discuss March Madness and the brackets for forty minutes.
Professor chats with MF about sports.
A different female asks a question to a male across from her.
M that got the broken chair almost fell.
M that was playing Jeopardy reads the newspaper.
MF and three other males leave class with 25 minutes left.
MF had come in late.
MB had left and come back (left for about 15 minutes).
M leaves with fourteen minutes left in class.

Two females seem half-joking and half-annoyed.
MF seems very dominant and overbearing.
MF seems very hyper and loud by always playing the drums on his desk or his legs and whistling and making noises with his mouth.
Professor seems more social with MF in particular talking about sports and social stuff.
Female seems to be procrastinating when she asks MF a question and talks to other male and female in her group. She is very reluctant to sit down and work by herself. She is the only female that wanders. Quite a few males wander.

<table>
<thead>
<tr>
<th>Questions for Professor:</th>
<th>Professors responses were long and seemed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Professor answers with lengthy responses for the duration of the class period. M asks question before class. MF asks 1st question of class period. M asks 2nd question. M asks 3rd question. M asks 4th question. M asks 5th question-professor sits while answering. Group of Males ask 6th question. F asks 7th question-professor sits while answering. M asks 8th question. M asks 9th question-professor sits while answering-student is nonnative speaker.

<table>
<thead>
<tr>
<th>General Climate:</th>
<th>I was so shocked at the amount of sports talk that MF engaged in. I don’t think he did any work during the two hour class period.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working with computers a lot the climate is very cut off socially. A few of the males socialized quite a bit particularly with sports. The females (except for one) were very connected to their computer and work.</td>
<td></td>
</tr>
</tbody>
</table>

**ME 400**  
**Professor Michaels**  
**11 April 2005**

**Observational Notes:**

<table>
<thead>
<tr>
<th>Before Class:</th>
<th>Observer’s Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A few students talk quietly about schoolwork.</td>
<td>The students seem laid back but work-oriented.</td>
</tr>
<tr>
<td>One male is on the phone.</td>
<td>They are not doing a lot of socializing.</td>
</tr>
<tr>
<td>Two males talk about the heavy workload.</td>
<td>They are for the most part working alone at their computers.</td>
</tr>
<tr>
<td>Two females that are not in the class are working on a computer together-figuring out their schedules.</td>
<td></td>
</tr>
<tr>
<td>HARLOTS sign is gone.</td>
<td></td>
</tr>
<tr>
<td>Professor is not in class today-he is out of the country for the week, but the students are meeting anyway.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0-30:</th>
<th>The two females that weren’t in the class talked together quietly and it seemed that the men around them were really willing to help them with their questions. The differences in the class compared to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two males are working together.</td>
<td></td>
</tr>
<tr>
<td>Students are mostly at their own computers working</td>
<td></td>
</tr>
<tr>
<td>Male leans on female’s desk looking at her</td>
<td></td>
</tr>
</tbody>
</table>

very engaged.
computer and chatting with her.
Eye contact is focused to computer screens.
Male eats a sandwich and talks to two males working.
Male walks in late with food.
Female gets up and gives male a paper.
Very little verbal communication in the computer lab.
Male comes in late-no computers are open
1st male leaves.
Male that came in late talks to another male and then leaves.
Male asks another male a question.
1st male came back.
Male gets up to work with another male.
2nd male leaves.
Male has head phones in his ears—not connected to the computer.
Male gets up to ask female a question.
2nd male comes back.
3rd male leaves.
Female (not in the class) asks male next to her a question.
4th male leaves.
4th male comes back.
Male gets up to ask another male a question.
Male and female talk together (school-related).
Male is on the phone.
Male gets up to talk to two males.
Female (not in class) asks another male a question (he moves his chair to talk to her).
5th male leaves.
Male gets up to give a paper to another male.
Male leans on female’s desk while talking to her.
Male gets up to give a paper to another male and talk to him.
3rd male comes back.
Male gets up to talk to another male.
Another male has headphones in (not in the computer).
Two males talk about the last weekend.

when the professor is there is basically so much more in and out from students. They were leaving quite a bit. And, they seemed to ask each other more question because the Prof. wasn’t there.
**30-50:**

5th male comes back.
Two females (not in class) working on class schedule.
Two males talk about jobs—neither have one lined up yet.
Male gets up to ask another male a question.
6th male leaves.
Male comes in late (MF from previous notes)—no computers are left open.
Female asks MF a question.
MF sits on a desk and chats with another male.
Male shouts question from across the room to another male.
6th male comes back.
Male gets up to ask female a question.
MF asks female a question—talks and works with her on her computer (he doesn’t have one).
7th male leaves.
7th male comes back.
Male gets up to ask another male a question.
8th male leaves.
8th male comes back.
8th male leaves for the day.
MF takes the seat of the male that left.
Female gets up to talk to MF and another female next to his computer joins in talking with them.
Male gets up to ask female a question.
Female’s (not in class) phone rings—on vibrate—she answers it.
Male gets up to ask female a question.
Male gets up to ask male a question.
9th male leaves.

I probably would have asked to use the two females’ computer had I been the student that came in late and hate to wait because they weren’t in the class.
I was a little surprised that no one said anything to them especially because my first day there a male had asked me to leave and I wasn’t even taking up a computer and there were free ones still there and class hadn’t started yet.
The girls looked young.

**50-80:**

9th male comes back and talks to the male next to him.
Two males talk together about some sort of test—they talk to a female about it to who is sitting by them.
Female (not in class) is still on the phone.

Students were talking about this test which I don’t think is a university exam (because some had already taken it and some were not going to take it) it seemed like a standardized GRE or MCAT or something like that. They also discussed the study materials for it.
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male gets up to ask another male a question.</td>
<td></td>
</tr>
<tr>
<td>Male wanders to two males talking and listens to them.</td>
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</tr>
<tr>
<td>10th male leaves.</td>
<td></td>
</tr>
<tr>
<td>2nd female leaves.</td>
<td></td>
</tr>
<tr>
<td>Male asks a question.</td>
<td></td>
</tr>
<tr>
<td>11th male comes back.</td>
<td></td>
</tr>
<tr>
<td>Male talks about how after the test he will have a beer in his hand in the car and will be drinking and driving.</td>
<td></td>
</tr>
<tr>
<td>Male leaves class for the day.</td>
<td></td>
</tr>
<tr>
<td>Male gets up to talk to two males.</td>
<td></td>
</tr>
<tr>
<td>Male leaves class for the day.</td>
<td></td>
</tr>
</tbody>
</table>

**80-100:**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11th male leaves-he has his phone with him.</td>
<td></td>
</tr>
<tr>
<td>Male asks a male for a copy of some paper.</td>
<td></td>
</tr>
<tr>
<td>Male and female talk about schoolwork.</td>
<td></td>
</tr>
<tr>
<td>Male leaves class for the day.</td>
<td></td>
</tr>
<tr>
<td>Male gets up to talk to two males.</td>
<td></td>
</tr>
<tr>
<td>Male leaves class for the day.</td>
<td></td>
</tr>
</tbody>
</table>
Two males and one female talk about their project.
Two males leave class for the day.
Male leaves class for the day.
Female asks male a question.
Two males talk about work together.

**General Climate:**
This class was really quiet-not an extensive amount of communication for the amount of time they were in the class.
They were very focused on their computers.

---

**ME 400**  
**Professor Michaels**  
22 April 2005

**Observational Notes:**

**Before Class:**
Class is quiet.
One female comes in and as soon as the other does they sit by each other and chat about tests, being hungry, tired-one is quieter and the other more outgoing, but they are obviously friends.
One needs change so the other offers her some.
Both greet me (only the three females in the class greet me).

---

**Observer’s Comments:**

The females are much friendlier towards me.
Even the one female I didn’t interview is more personable than the males that I interviewed.
The two females look like such good friends.
They really light up around each other.

---

**0-35:**
Two males come in-one attempts to sit down, but the other instructs him to take a different seat.
MF (from previous notes) says that he is going to leave early today because of a haircut.
MF then tells two females around him that a sophomore classmate keeps emailing him-he calls her a “controlling bitch”
Prof. comes in to give a questionnaire and bubble sheet (about class not Prof.)
Prof. warns students in the lab that are not in 442 that they will have to leave if his students need the computers.
MF teases female-Prof. misunderstood her

MF does great networking with the Prof.
It seemed that when the female tried to get in on it, she was not met with the same enthusiasm as MF was.
and MF said there’s a lot of her that’s misunderstood.
MF gives Prof. a cd to look at-stuff he did for the class.
Prof. sits down to talk with MF about a possible class trip (probably not he says they’re running out of time).
They had been planning earlier, but it’s now probably too late.
Then MF and Prof. discuss course materials, ME work stuff-they make a lot of eye contact.
Two females face each other as they talk and fill out evaluations.
Two females work together and chat, joke-still focused largely on project they’re working on-they are the only two (besides the Prof. and MF who make contact as they work).
Male is on the phone.
Female leaves.
Male leaves.
Female comes back.
Male comes back.
Prof. still mentors MF-female makes joke (she had been eavesdropping) and Prof. explains-female turns back around and MF and Prof. continue to network.
The two females talk much more softly than most males.
MF talks the most loudly in the class by far also using lots of gestures.
Male has headphones in.
Prof. asks MF if they did too much this semester-Prof. teases female behind them about playing solitaire on the computer during class.
Female listens to MF and Prof. talking together.

35-75:
Females look at each other’s phone-making conversation briefly.
Prof. and MF wrap up course-discussing what was good, needs changing, etc. (evaluations).

Prof. explains to me the evaluations that the department had come up with.
He says that he thinks they’re not an accurate reflection of the student’s learning.
He let me take one.
Prof. seems to really value MF’s opinion.
Male plays game on his computer while another male watches.
MF is doing a lot of networking—they talk for 50 minutes.
Prof. picks up evaluations and assessments.
Female leaves for the day.
MF asks a question—Prof. goes back to talk to him.
Male leaves for the day.
MF leaves for the day.
Prof. goes to talk to another male and female (for 15 minutes).
Male leaves for the day.
Male leaves for the day.
Other students (not in class) come in as the 442 students leave.
Male leaves for the day.
Male leaves for the day.
Male leaves for the day.

**75-100:**
Prof. talks to male and female—some course related and some about summer plans.
Prof. goes to talk to another male about a course.
Female leaves for the day.
Male describes to Prof. how he’s taking an experimental course and he is in a group with two other students, but he does all the work.
He has done five out of the six assignments, and he thinks he will end up doing the sixth.
Prof. mentors him about what to do—even though it’s a little late.
The last six students talk with Prof. conversationally about work (ME related) as students work on their projects.

Students seem very relaxed.
Their projects must be coming along really well.

---

ChE 200
Professor Richards
28 February 2005

<table>
<thead>
<tr>
<th>Observational Notes:</th>
<th>Observer’s Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Class:</strong></td>
<td>It seemed semi friendly in the class</td>
</tr>
<tr>
<td><strong>Students were talkative</strong></td>
<td><strong>The professor was friendly in a professional manner</strong></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Female in pink shoes talked a lot to two males near her</td>
<td>The girl in the pink shoes seemed to really be involved in talking to the males around her who seemed to kind of brush her off</td>
</tr>
<tr>
<td>One male answered my question as to what class this was in the hallway</td>
<td></td>
</tr>
<tr>
<td>The professor asked questions about how Friday went</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>0-5:</strong></th>
<th><strong>Professor was trying to lighten the mood by joking, but was still professional in presenting his material</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor put materials (notes) onto the projector screen about chapter five (review for them)</td>
<td>Girl in the pink shoes was obviously talking to the two males whenever the professor turned his back</td>
</tr>
<tr>
<td>Two male students wouldn’t quit talking so the professor said that they had a guest watching him and they were making him look bad (he was joking)</td>
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<tr>
<td>He refers strongly to the visual notes on the projector throughout class</td>
<td></td>
</tr>
<tr>
<td>Pink shoes girl continues to talk during class to the males around her</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>5-20:</strong></th>
<th><strong>Male in green shirt and male in blue shirt were visibly not paying attention</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor begins new chapter six</td>
<td>They talked together while he was talking and were obviously lost when asking him questions</td>
</tr>
<tr>
<td>Prof. tries to talk to them about the title (making a small joke)</td>
<td>The Prof. seemed to be getting frustrated because they were so off track and didn’t seem to be really paying attention</td>
</tr>
<tr>
<td>Prof. hands out new notes and displays them on the projector screen</td>
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<tr>
<td>Prof. asks question and two males answer</td>
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<tr>
<td>Prof. asks question and pink shoes answers</td>
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<tr>
<td>Prof. then asks them to get out their books</td>
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<tr>
<td>Prof. asks question and male answers-Prof. says “actually” and builds off student’s answer to the real one he wanted</td>
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<tr>
<td>Prof. asks question and one male and pink shoes both answer</td>
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<tr>
<td>Prof. asks question and one male answers</td>
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<tr>
<td>Prof. probes and one male answers</td>
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<tr>
<td>Male in green shirt has a question</td>
<td></td>
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<tr>
<td>Male in green shirt has a question</td>
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<tr>
<td>Prof. answers with a long and thorough explanation</td>
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<tr>
<td>Prof. has good eye contact with the class</td>
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<tr>
<td>Male in green shirt and male in blue shirt talk together when Prof. back is turned (male in green shirt was one of the two talking to pink shoes)</td>
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<tr>
<td>Pink shoes tries to talk to the male behind her</td>
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<tr>
<td>Time Range</td>
<td>Event Description</td>
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<tr>
<td>------------</td>
<td>-------------------</td>
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<tr>
<td>145</td>
<td>Male in blue shirt has a question</td>
</tr>
<tr>
<td></td>
<td>Male in green shirt has a follow up question</td>
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<tr>
<td></td>
<td>Prof. asks if there are any other questions</td>
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<tr>
<td>20-30</td>
<td>Prof. gives a handout for them to work on individually for ten minutes</td>
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<tr>
<td></td>
<td>Prof. leaves the room</td>
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<td></td>
<td>Blue shirt and green shirt give some nonverbal communication to each other that they look lost (eye rolls and shoulder shrugs)</td>
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<tr>
<td></td>
<td>Pink shoes finishes in about sixty seconds then gives them her answers (they didn’t ask for them)</td>
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<td>Some other males start talking</td>
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<td>Slowly the class starts socializing as they finish</td>
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<td></td>
<td>One girl and one boy in front of the class do not talk</td>
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<tr>
<td></td>
<td>They work on their assignment</td>
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<tr>
<td>30-50</td>
<td>Prof. comes back and explains answers</td>
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<tr>
<td></td>
<td>Prof. asks question and most of the class answers</td>
</tr>
<tr>
<td></td>
<td>Prof. asks question and pink shoes answers</td>
</tr>
<tr>
<td></td>
<td>Male has a question</td>
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<td></td>
<td>Prof. gives thorough response involving the projector visual</td>
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<td></td>
<td>Students talk as he is explaining</td>
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<td></td>
<td>Prof. lectures on chapter materials and concepts from the text (using the projector screen)</td>
</tr>
<tr>
<td></td>
<td>Pink shoes looks bored (tries to talk to males around her)</td>
</tr>
<tr>
<td></td>
<td>Students seem disconnected/bored</td>
</tr>
<tr>
<td></td>
<td>There is little eye contact or nonverbal reinforcement from students to Prof. at this point</td>
</tr>
</tbody>
</table>
Blue shirt asks pink shoes a question
She doesn’t know the answer
Prof. tells them what they will focus on for Wednesday

**After Class:**
Blue shirt asked a question and Prof. responded
Quiet girl from up front asked Prof. a question and he responded
The only time this girl spoke was after everyone left
She seemed very focused during the class period when other students were bored or rude

**ChE 200**
**Professor Richards**
**1 April 2005**

**Observational Notes:**

**Before Class:**
Two males chat and joke about so many people being gone because it’s Friday.
Female comes in and jokes about no one showing up because it’s Friday and so nice out.
Professor jokes about people paying tuition and not showing up.

**0-19:**
Professor discusses something that was missing in the notes.
Students are given a problem on the projector to do by themselves.
Male asks a question-Prof. answers.
Female asks a question-Prof. answers.
Male asks a question-Prof. explains answers.
Female asks a question-Prof. looks up the answer to her question.
Prof. gives first step to problem-how they should be and need to be starting the problem.
Male asks a question-Prof. answers.
Male asks a question-Prof. answers.
Students work mostly independently-there aren’t many of them in class.
Prof. instructs them to raise their hands when they finish.
Prof. sits on desk.
Prof. asks why Male is looking in book.

**Observer’s Comments:**
Students seem friendly but not incredibly close with one another.
For the most part they know each other’s names, but they don’t seem to really be that overly friendly.

Prof. was so shocked at how long it took the students to do this problem.
The students seemed to have a lack of focus which could have been due to the weather or the fact that it was Friday.
Prof. was very antsy as the students worked and so surprised at how long it took them.
Prof. tells him he needs to memorize what he’s looking up.
Prof. goes to Male and explains and helps (Male did not ask for help).
Prof. is professional but very polite.
Prof. walks around class.
Prof. says it’s taking them longer than he thought.
Prof. says they’ll stop when the first person gets the answer.
Prof. jokes that they’ll stop either when the first person gets the answer or 3:30 rolls around.
Male asks a question-Prof. asks and probes to help student work through question himself.
Male finishes and wins
Prof. thought it would take 5 minutes.

| 19-33: | Prof. explains problem. Male turns around and says something to the Female behind him (very quick and Prof. back is turned). Students are silent as Prof. speaks. Prof. moves around a lot, talks to project screen referencing it a lot. There is low eye contact from and with both students and Prof. Prof. asks Male what he got (that had finished). A Male leaves. | Prof. gets very focused on the screen and very into his explanation. Students seem a little lost at times. I was surprised that there weren’t more questions considering the amount of time it took them to do the problem. |
| 33-35: | Prof. goes over stats of survey focused on their understanding of course objectives and content. Prof. jokes-two females respond. Students wrote very little on comment section (Prof. tells class). Prof. goes over evaluation in detail and what can be done. Students rated communication low. Prof. encourages their feedback. | Prof. seems really intent on getting their feedback and using it. Communication was one of the lowest ranked areas, but even the low areas like communication were pretty high (in the 80’s). |
| 35-37: | Prof. tells students to brainstorm having them work in groups of three. | I thought it was an interesting way to wrap up the chapter. The students seemed to work okay in |
They are to brainstorm about the last chapter and what they learned about such as concepts, ideals they should have gotten and record as many as they can. Prof. walked around. Students talk (pretty quietly) together.

| 37-45: | Winning group had 30 pieces of info. Prof. reviews the info. and asks questions about them. Students shout out answers-mostly males. Prof. asks question-Male answers. Prof. asks question-No one answers. Prof. probes-whole class shouts out answer. |
| 45-50: | Student feedback evaluations get passed out. Prof. collects the work they did today for points. |

**General Climate:**
- Students seem friendly and fairly comfortable with each other.
- Prof. is very focused on material but seems very close to his students/approachable.

I was so impressed with his intent on getting feedback from them about the class and what they can do to make it better.

Though the class was small, the students seemed to participate fairly well.

---

**ChE 200**
**Professor Richards**
**6 April 2005**

**Observational Notes:**

| Before Class: | Male came up to me and asked me why I skip class so much. I told him that I’m not in this class I’m just observing. He said it would be too bad for a girl like me to miss class. |
| 0-6: | Prof. collected homework. New groups are assigned for project. Prof. randomly assigned students to groups. Male asks question-Prof. answers. Female comes in late. |
| 6-19: | Prof. goes over material that they need for |

**Observer’s Comments:**

- Male seemed to be hitting on me. When I blew him off, he looked uncomfortable.
- Males seem much more comfortable making jokes in class which I view as
their groups on the Elmo.
Two males talk as Prof. talks.
Female comes in late.
Male comes in late.
Prof. gives detailed instructions.
Male gives gum to two males around him and throws the female sitting by them a piece.
Prof. gives final time for semester.
Male says “alright” loudly-signifying his excitement for the end of the semester.
Prof. explains final presentations-every group member must speak.
Prof. shows grading rubric.
Two males continue to talk as Prof. talks.
Male (one that was talking) asks question-Prof. answers.
Prof. asks them to stand when he calls out group numbers so that they know who their members are.
One male raises his leg instead of standing.

<table>
<thead>
<tr>
<th>19-33:</th>
<th>negative participation. Though females have much less positive participation, they also have much less negative participation too.</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-33:</td>
<td>Prof. goes over lecture notes/materials on projector. Prof. references notes that he emails out to them frequently. Prof. looks at screen as he speaks. Female coughs-Male offers her some of his soda-she refuses-Male talks to her briefly (he sits in front of her). Prof. asks question-Male answers. Prof. lectures. Prof. asks question-Male answers. Prof. lectures. Prof. asks question-Male answers. Prof. lectures. Prof. moves down aisle. Prof. asks question-Male answers (incorrectly)-Prof. probes-Prof. then answers himself. Prof. asks question-Male answers. Prof. asks question-Three Males answer. Prof. asks question-Male answers. Prof. asks question-Four Males answer. Prof. asks question and tells students</td>
</tr>
<tr>
<td>19-33:</td>
<td>Prof. gets very into his lectures focusing on the projector screen and asking a lot of questions between lecturing material. He seems really excited when students participate. Participation is so overwhelmingly male. Males also appear to be much ruder as Prof. is lecturing. They talk together and appear to not be paying attention at all.</td>
</tr>
</tbody>
</table>
(motioning to one Male in specific) to open their books and read the problem. Prof. explains importance of carefully reading problem. Male answers-Prof. asks question-Male answers-Prof. says he’s close then explains. Male in front of me is cleaning his shoes. Prof. asks question-Two Males and One Female answer. Two males talk as Prof. talks.

<table>
<thead>
<tr>
<th>33-40:</th>
<th>I was really impressed with the way that the Prof. constantly probes rather than just giving an answer. Male participation is still so dominant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New problem is up on projector. Prof. asks question-Male answers-Prof. probes-Male answers-Prof. probes-Male answers-Prof. probes-Male answers-Prof. probes-Male answers (different males were speaking-about three). Prof. asks question-Male answers. Two males talk. Prof. asks if there are any questions. Male asks to speak with groups. Prof. says sure that he had planned on that for now anyway.</td>
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</tbody>
</table>

| 40-50: | |
| Groups meet and set up times to get together. | |

ChE 200  
Professor Richards  
18 April 2005

**Observational Notes:**

**Observer’s Comments:**

**Before Class:**  
Female complains to a male in her group about how she had to keep the flow chart for the group. She said that she would have skipped class today had she not had it. She had to get up early for work, and she was tired. She said that they told her “oh you take it.” Different male tries to ditch out on the group meeting for later. Same female tells him he needs to take the group more seriously.

Female seemed really annoyed at her group because she was responsible for the one chart for the group. The other males in her group really didn’t seem to care though. The chart was there, and they were happy.
Students talk loudly about group projects and the flow charts that were due today.

<table>
<thead>
<tr>
<th>0-15:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Prof. hands notes back to students that cover material for the class period.</td>
<td></td>
</tr>
<tr>
<td>Students hand in flow charts.</td>
<td></td>
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<tr>
<td>Students talk and joke while Prof. is passing out and collecting materials.</td>
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<tr>
<td>Prof. goes over exam (which will be in one week).</td>
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<tr>
<td>Male’s cell phone rings-Prof. looks at him and then goes on.</td>
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<tr>
<td>Prof. references text book.</td>
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<tr>
<td>Female asks a question-Prof. answers.</td>
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<tr>
<td>Prof. reviews what he will be going over.</td>
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<tr>
<td>Prof. is at front of class making good eye contact.</td>
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<tr>
<td>Prof. discusses when they will take the test-since it takes longer than an hour they will set up a different time to come in for the exam.</td>
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<tr>
<td>Prof. gives students two alternate times-a proctor will be there-not Prof.</td>
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<table>
<thead>
<tr>
<th>15-25:</th>
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</thead>
<tbody>
<tr>
<td>Projects chart on the screen (that he handed out to them).</td>
<td></td>
</tr>
<tr>
<td>Prof. references projector as he lectures.</td>
<td></td>
</tr>
<tr>
<td>Prof. looks at projector, then students (back and forth).</td>
<td></td>
</tr>
<tr>
<td>Screen is hard to read so students reference their handouts.</td>
<td></td>
</tr>
<tr>
<td>During the lecture the Prof. gives an example of a student who had come in for help and what her question was and how they figured out the answer-gives her name.</td>
<td></td>
</tr>
<tr>
<td>Two males talk quietly as Prof. speaks.</td>
<td></td>
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<tr>
<td>Prof. talks about losing his hair-says he used to have a big afro (joking with students to not make him pull what’s left of his hair out by making silly mistakes on the test).</td>
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<tr>
<td>Male leaves.</td>
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<table>
<thead>
<tr>
<th>25-45:</th>
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<tbody>
<tr>
<td>Prof. projects problem on the screen.</td>
<td></td>
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<tr>
<td>Students definitely shuffle a lot when they think they’re being let out of class.</td>
<td></td>
</tr>
<tr>
<td>Prof. definitely splits his time between the projector screen and looking and the students.</td>
<td></td>
</tr>
<tr>
<td>Female asks for a copy of the notes-Prof. gives them to her.</td>
<td>I think that happens in almost every class though. Attention spans are short. More men definitely talk. I also think Prof. probe more with men which could mean either men are farther off base or they are being encouraged more or a combination.</td>
</tr>
<tr>
<td>One male and one other female also need them-Prof. gives them.</td>
<td></td>
</tr>
<tr>
<td>Male comes back. Prof. references projector as he lectures. Two males talk together as Prof. speaks. Two other males are talking. Prof. asks question-two males and one female answer.</td>
<td></td>
</tr>
<tr>
<td>Female asks question-Prof. answers. Prof. asks question-male answers. Prof. asks question-male answers. Prof. asks question-male answers.</td>
<td></td>
</tr>
<tr>
<td>Prof. probes-three males answer. Prof. says be sure to read information. Prof. asks question-male answers. Prof. probes-male answers. Male asks question-Prof. answers.</td>
<td></td>
</tr>
<tr>
<td>Prof. asks question-male answers. Prof. asks question-male answers. Prof. probes-two males and one female answer. One male is on laptop. Prof. asks are there any questions-students begin to shuffle.</td>
<td></td>
</tr>
<tr>
<td>One male and one female talk together as Prof. is speaking. Three males talk together as Prof. is speaking.</td>
<td></td>
</tr>
<tr>
<td>Male asks question-Prof. answers. Male asks question-Prof. answers. Female asks question-Prof. answers.</td>
<td></td>
</tr>
<tr>
<td>Male asks question-Prof. answers. Prof. projects book onto screen. Male asks question-Prof. answers.</td>
<td></td>
</tr>
</tbody>
</table>

**ChE 400**  
**Professor Stokes**  
**17 February 2005**

**Observational Notes:**

**Observer’s Comments:**
**Before Class:**
Student asked me if I was new and made a joke—very friendly
Two men talked about one’s sister and how they thought she was his girlfriend
Girl and guy talked about school stuff and group work
Male said “fuck it” referring to their homework
A lot of students came in late (both male and female)

| 0-5: | Filled out group evaluations of themselves and other members |
|      | Prof. told me that this class is supposed to begin their group working experiences Odd-beginning in a capstone course? |

**5-15:**
Group exercise with five or six people in small group/had to write on board and then talk
Other groups: Chatty
Professor approaches two males who come in late. One is very rude to her and the other gets to work.

| Group One: | Three girls and one boy
Guy got on phone to call friend who is in the class but wasn’t there yet
No eye contact—looked straight ahead |
| Group Two: | Three girls and three boys
Two boys are dominant in conversation
Others talk much less
The two make eye contact with each other and the others look at them |

| 15-20: | Writing on board for group exercise 7 groups
Three females write and four males write
Guy next to me came in late and discussed drinking last night—appears to be still drunk |
|      | The one drunk guy seemed very out of place in comparison with the rest of the class
He seemed like an outsider |
Drunk guy and other male speak to me  
Sober guy inquired about why I was there  
in a polite tone  
I said I was observing the class and an  
English major  
Drunk guy said English majors are “scary,  
fruity and strange”

<table>
<thead>
<tr>
<th>20-27:</th>
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<tbody>
<tr>
<td>Talked about information on board-one spokesperson for each group</td>
<td></td>
</tr>
<tr>
<td>First group male spoke (only male from Group One)</td>
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</tr>
<tr>
<td>Second group male spoke (one of dominant ones from Group Two)</td>
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<tr>
<td>Third group male spoke</td>
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</tr>
<tr>
<td>Fourth group male spoke and joked</td>
<td></td>
</tr>
<tr>
<td>Fifth group male spoke and joked</td>
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<tr>
<td>Sixth group male spoke</td>
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<tr>
<td>Seventh group male spoke</td>
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<tr>
<td>Part of the things they learned through the project included group work and writing</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>27-40:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Go over next group project</td>
<td></td>
</tr>
<tr>
<td>Lecture using overhead, diagrams, text</td>
<td></td>
</tr>
<tr>
<td>Professor had good eye contact</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>40-47:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Went over what to do in lab</td>
<td></td>
</tr>
<tr>
<td>Professor joked (male made a follow up good natured joke)</td>
<td></td>
</tr>
<tr>
<td>Professor joked again</td>
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<tr>
<td>Professor shuffled groups for their new project</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>47-55:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Assigned new groups an information ice breaker</td>
<td></td>
</tr>
<tr>
<td>Explained project-students stared at paper</td>
<td></td>
</tr>
<tr>
<td>I wondered why they had an ice breaker since one of the students told me that they had been in classes together for five years</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Computer Lab:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Two girls discuss graduation-one is going to medical school the other to work at Anheuser-Busch</td>
<td></td>
</tr>
</tbody>
</table>
**Without the professor in lab:**  
Students are very verbal and chatty  
Not a lot of eye contact  
They looked at the computer screens mostly  
Guys stands up and calls out for a TA  
Another guy then jokes: “if you’re a TA raise your hand, hey Luke put yours down”  
TAs were late  
One was on the phone while professor was gone and the other did his homework  
Guy asked me what I was doing (I said I was observing for a project and that I was in RCPC)  
Another guy said that I picked a good class to observe that they’d all known each other for five years  
Very friendly classroom climate  
They were all very easy going even with me  

**Guy that asked me what I was doing seemed very interested-as they all did**

**With the professor in lab:**  
Still very verbal and chatty  
Guy comes and talks to me on his way out and says that they’re all dorks and he hopes my project goes well  
Girl talked to me on my way out saying it’s too bad I didn’t come on a day with more work because there would be more stuff to watch  
Males and females asking questions of professor before two TAs (both male)  
Seem very comfortable with her talking and asking questions  
Girl near me says she doesn’t mind writing and a guy in her group says he hates to write so the other guy from the group says you’re gonna make her feel bad (motioning to me) and he tells me that he didn’t mean it.

**Students seemed to request much more help from the Prof. than TAs**  
I almost didn’t want to leave because the class was so friendly

---

**ChE 400**  
**Professor Stokes**  
**22 March 2005**
<table>
<thead>
<tr>
<th>Observational Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Class:</strong></td>
</tr>
<tr>
<td>Two males talked about spring break in Vegas mentioning gambling and referencing sexually transmitted diseases. They asked me if their class was interesting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observer’s Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>So many students were coming in late and leaving. I found it really disrespectful. The students also have a habit of talking as the prof. talks. The prof. is very soft spoken and does not really address their rudeness. Maybe she doesn’t perceive it as rude.</td>
</tr>
</tbody>
</table>

| **0-15:** |
| Prof. hands back reports and explains some of her comments. The average was really high-90 percent. They talk a little bit about what they learned. A male comes in late. Prof. mentions integrating team work and report writing. A male comes in late. Prof. goes over the homework that’s due for the week. A female comes in late. A male leaves (comes back after 10 minutes). A male comes in late. Prof. does not say anything about the late students. Prof. explains a website survey they must take as seniors. She says lab is a good time for them to fill it out. |

| **0-15:** |
| So many students were coming in late and leaving. I found it really disrespectful. The students also have a habit of talking as the prof. talks. The prof. is very soft spoken and does not really address their rudeness. Maybe she doesn’t perceive it as rude. |

| **15-25:** |
| Prof. explains third major project. A male comes in late. A cell phone goes off. Prof. is very soft spoken. She mentions that they have new teams and an ice breaker sheet to fill out. Their new project includes a written report and power point presentation. Female asks a question. Male makes a funny comment in reply to the female. Two males talk loudly as the prof. lectures. Prof. gives the reading assignment for the week. |

| **15-25:** |
| The class seems really friendly with each other but also antsy to get out of class. I don’t know if it’s because they’re seniors, or it’s the end of the semester, or if it’s because the prof. is so relaxed about it, but they are very vocal to the point of interrupting her. |

| **25-33:** |
| Her lecturing seemed like it was important |

<p>| <strong>25-33:</strong> |
| Her lecturing seemed like it was important |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>157</td>
<td>Prof. lectures on economics. She uses an overhead transparency. Prof. jokes “lightly” with students. Prof. is soft spoken. Student attention is very low towards prof. Prof. points a lot towards transparency. She keeps her eye contact on transparency. Eye contact is low both from prof. to students and from students to prof.</td>
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<tr>
<td>33-45</td>
<td>Prof. gives students a problem in their textbooks to look at which is also on a transparency she displays (transparency is unreadable). Two males talk socially about a book that was stolen. A few males and one female talk together socially-blatantly not doing the problem-prof. says nothing. Other students discuss assignment. Prof. starts to walk around and asks the group talking socially if they’ve gotten an answer to the problem. They say no. Two females in front of me talk socially (quietly) about their boyfriends. Prof. goes over the problem and asks what they got. Male gives his answer (from the goof off group). Female’s cell phone goes off. TA sat in the back doing homework all hour. Two males talk as prof. does. Prof. asks one of the males if he’s confused-reply is no.</td>
</tr>
<tr>
<td>45-60</td>
<td>Prof. returns to lecturing with transparency. Student attention is low. Female asks a question-prof. answers but is interrupted by two males who answer her question with an example. Female asks a question-prof. answers. Male makes a joke. Two males talk to each other as prof. lectures.</td>
</tr>
</tbody>
</table>

I was surprised at how loudly this class talks socially, but the one goof off group managed to have the right answer in the end. The females are much quieter when they talk socially as opposed to the males who tend to be very blatant about what they’re doing.

When the males interrupted the prof., I was a little surprised. They explained with an example and the prof. agreed with them.
| Male asks question.  
| Male asks question.  
| Males continue to talk as prof. lectures.  
| Very little eye contact still.  
| Lab:  
| Prof. is not present.  
| TAs are there.  
| Students get into new groups.  
| Two males discuss March madness (basketball).  
| Male goes outside to smoke.  
| Male makes fun of the prof. stating that whatever she says to him he just ends up thinking “whatever.”  
| Male rubes shoulders of a female and kisses her on top of the head (they appear to be dating).  
| Students are trying to fill out the survey she wants them to, but they can’t bring it up on the computer.  
| Male leaves telling his partner he’ll be back in five minutes (it takes ten).  
| Smoker comes back.  
| Female answers her cell phone.  
| Two males joke around one is turned completely from his computer.  
| Class is very social and talkative.  
| Male leaves.  
| Students quiet down after about 15 minutes and focus on their computers.  
| Three men jokingly fight about who the leader of their group will be.  
| Male returns.  
| After 25 minutes they really calm down.  
| They are making very little eye contact.  
| Focus is on the screen.  
| Talking livens up after about a half hour.  
| Still there is little eye contact.  
| Two males watch Ann Coulter on one’s laptop-another male joins.  
| Three males joke about politics and news.  
| Female leaves.  
| Students joke about how prof. is not even in her office.  
| Students make fun of her ice-breaker.  
| Overall, the lab jumped from work to social hour.  
| The men jokingly fighting about leadership were a little serious as they competed for the role.  
| Students seem a little impatient with the prof.  
| One TA did homework and the other was doing something on the computer.  |
One male and female discuss assignment.

<table>
<thead>
<tr>
<th>General Climate:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mostly friendly-joking around a lot-kind of seem to be growing annoyed by prof.</td>
</tr>
</tbody>
</table>

### ChE 400
**Professor Stokes**
**29 March 2005**

#### Observational Notes:

<table>
<thead>
<tr>
<th>Before Class:</th>
<th>Observer’s Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor jokes about weather and how many students are absent (it’s nice out today). Homework is due today (written on transparency). Homework that is due next Tuesday is written on the transparency. Professor smiles at students as they come to class.</td>
<td>Prof. seems to be trying to keep up the motivation of the students by being patient about their absences and lateness.</td>
</tr>
</tbody>
</table>

| 0-8: | Prof. seems to be trying to build morale. As usual, many students come in late-very disrespectful I felt. Prof. took it in stride. |
| Prof. tells them to pass their homework back to TA. Prof. talks about end of homework and lecture. Prof. discusses senior survey that students were to have taken (possibly for the department?) | |
| Female comes in late. Male comes in late. Students are getting up to turn in their homework in to the TA as Prof. speaks. Students talk together loudly as Prof. speaks. Prof. asks a question and asks students to raise their hands in participation. Male comes in late. Male comes in late. | |

<p>| 8-55: | Students seem very restless while in lecture, and Prof. seems to feel bad about it. Students seem to have the feeling that they have more authority in the classroom than in other classes I’ve observed. |
| Chart is put on transparency. Prof. lectures. Students are very fidgety-desks are constantly squeaking very loudly. Male comes in late. Prof. does not address late students. | |</p>
<table>
<thead>
<tr>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. is stationary throughout her lecture.</td>
<td>There is little eye contact both from Prof. and students.</td>
</tr>
<tr>
<td>Female comes in late.</td>
<td>New transparency is mostly text.</td>
</tr>
<tr>
<td>Male comes in late.</td>
<td>Female that came in late asked me if the class had handed in their assignments.</td>
</tr>
<tr>
<td>Prof. asks question-2 Males answer.</td>
<td>Female asks a question, and Prof. answers-Male interrupts Prof. to “help” answer.</td>
</tr>
<tr>
<td>Prof. is going to think about the question and get back to the female.</td>
<td>Prof. jokes-Male answers female’s question-2 males talk together.</td>
</tr>
<tr>
<td>Female that had come in late asks me for next week’s homework assignment.</td>
<td>Text and chart are displayed on a transparency.</td>
</tr>
<tr>
<td>Student attention is low.</td>
<td>Male leaves.</td>
</tr>
<tr>
<td>2 males talk as Prof. lectures.</td>
<td>Students reading next week’s homework as Prof. lectures.</td>
</tr>
<tr>
<td>Male comes back.</td>
<td>“We’re almost done here.” Prof. says about lecture.</td>
</tr>
<tr>
<td>Male student has had headphones in for the entire lecture.</td>
<td>Prof. makes mention to her time at NASA.</td>
</tr>
<tr>
<td>Prof. points out which is the last slide then saying “hang in there.”</td>
<td>“You are wrestles and I don’t blame you”-Prof. says.</td>
</tr>
</tbody>
</table>
APPENDIX C. SURVEY DATA SPRING 2005

Student Survey

Communication and Gender in Engineering

Name________________________

<table>
<thead>
<tr>
<th>4-almost always</th>
<th>3-sometimes</th>
<th>2-rarely</th>
<th>1-almost never</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you participate in class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do you ask questions in class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Are you comfortable participating in class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do you ask questions outside of class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Are you comfortable seeking help from your professor?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do you work in groups?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do you take on a leadership role in groups?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Are you comfortable with leadership roles in groups?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do you work with other students outside class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Is your group work dynamic supportive?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Do your group members/classmates listen to your input?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Please answer the following short response questions.
How long have you been a student at Iowa State? In the College of Engineering?

What is your current major?

Briefly describe your current level of class participation both with your professor and with classmates.
**Faculty Survey**

Communication and Gender in Engineering

Name__________________________

<table>
<thead>
<tr>
<th>4-almost always</th>
<th>3-sometimes</th>
<th>2-rarely</th>
<th>1-almost never</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do female students actively participate in class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do male students actively participate in class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do female students seek help outside class?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do male students seek help outside class?</td>
<td>4</td>
<td>3</td>
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<tr>
<td>How often do your students work in groups?</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>How often do female students seek your help in groups?</td>
<td>4</td>
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<tr>
<td>How often do male students seek your help in groups?</td>
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<tr>
<td>How often do females take on a leadership role in groups?</td>
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<tr>
<td>How often do males take on a leadership role in groups?</td>
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<tr>
<td>How active of listeners are your female students?</td>
<td>4</td>
<td>3</td>
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</tr>
<tr>
<td>How active of listeners are your male students?</td>
<td>4</td>
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</tbody>
</table>

Please answer the following short response questions.

How long have you been a faculty member in the College of Engineering at Iowa State?

What courses do you regularly teach?

What percent of your time is designated for teaching? For research? For extension?

Briefly describe the general participation from your students.
### Survey Data

<table>
<thead>
<tr>
<th>Student</th>
<th>Sex</th>
<th>Level</th>
<th>Program</th>
<th>Professor</th>
<th>Q-1</th>
<th>Q-2</th>
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APPENDIX D. INTERVIEW DATA SPRING 2005

Interview Questions for Students

What factors affected your choice of university?

What factors affected your choice of major? What would cause you to change your current major?

How do you perceive the performance status of the women and men in your classes—as individuals and as compared to the other sex?

- Class participation?
- Level of performance?
- Vocal? Participatory?

Describe any difference you see in men’s and women’s communication in groups? How often they participate? How often they take leadership positions? How others respond to them?

Describe your own classroom participation?

Describe the classroom climate (e.g., freedom to participate and speak up; general comfort level) in your engineering courses.

How does your professor respond to you in class?

Describe your classroom/lab interaction with your professor—Formal? Informal/conversational? Focused exclusively/largely on course content? Include reference to/comments about campus social/political events?

Describe any difference you see in communication from lecture to lab? How often do you communicate with the professor? With other students?

How does your professor respond to you outside of class—during office hours, in labs, in meetings?

Describe any difference you see in men’s and women’s out-of-classroom participation—e.g., Coming to help sessions? Working in groups outside of class?

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

In addition to the active Women in Engineering program, what else have you observed encouraging women’s involvement in engineering at ISU?
Describe your strengths in engineering? Describe your weaknesses in engineering?

What do you find most difficult about your program?

What expectations do you have for yourself in engineering?

**Follow-up questions for Students**

Describe your view of how the students participate in class? Are there obviously dominant students? Are there obviously timid students?

Give an example of a time when you felt really comfortable in a class? Really uncomfortable in a class?

How does the way you participate in class differ from the way you wish you could participate? (e.g., Are there times when you wanted to contribute but didn’t, why?)

Describe the climates of groups you have been in? How did other group members work with you (e.g., Did they listen to you? Give you equal time to participate? Dominate the group?)

What factors do you think most strongly affect your classroom climate (e.g., freedom to participate and speak up with professor and other students; general comfort level)?

How does your professor’s response to you when you ask questions compare with the way he/she responds to other students? Does your professor encourage everyone equally?

How would you ideally want your professor to respond to you in class in comparison with how he/she does respond to you? More formal/informal? More conversational/social/professional?

How would you ideally want your professor to respond to you outside of class in comparison with how he/she does respond to you?

How do you think your class work matches up to those of the opposite sex in the class?

How are your strengths in engineering recognized (e.g., acknowledged and supported)? How are your weaknesses improved on?

Describe the most supportive part of the engineering classroom? The most unsupportive?
Interview Questions for Faculty

Do men and women students respond differently to you in class?

How do you perceive the performance status of the women and men in your classes—as individuals and as compared to the other sex?
- Class participation?
- Level of performance?
- Vocal? Participatory?

Describe any difference you see in men’s and women’s communication in groups? How often they participate? How often they take leadership positions? How others respond to them?

Describe your classroom climate.

Describe your classroom/lab interaction with students—Formal? Informal/conversational? Focused exclusively/largely on course content? Include reference to/comments about campus social/political events?

Describe any difference you see in communication from lecture to lab? How often do you communicate with the students? How often do they communicate with each other?

How do your students respond to you outside of class—during office hours, in labs, in meetings?

Describe any difference you see in men’s and women’s out-of-classroom participation—e.g., Coming to help sessions? Asking for help via email?

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

In addition to the active Women in Engineering program, what else have you observed encouraging women’s involvement in engineering at ISU?

What expectations do you have for your engineering students?
First of all, do men and women respond differently to you in class?

Well, um, sure. I mean, I think there are differences, um, I think in the way people interact and I'd have to say that certainly in terms of the way people, I guess I don't want to say behave because they all behave, but the way in which they kind of approach the class I can see differences.

How do you perceive the performance status of the women and men in your class as individuals as compared to the other sex?

Frankly I do not see much difference. I see a spectrum of both. One of the things of course in M.E. is that there are so few women that you do not always have a representative number. This semester I do and I see the same range of performance in the six or seven women that I have because there is enough, but when I have two, you know, I think it is really hard to tell so I would say over time, if I had to grade it over time, I would say yeah about the same. They have the same sorts of problems at this point. Remember these are juniors and I think that certainly there has been the same kind of selection if you will, natural selection at that point, and I do not think there is a lot of difference. I also think that the things that people encounter at this point in our curriculum are... some people just have.... They struggle with it, and it depends on how good their previous background is. It depends on a lot of factors and I guess I don't see overall a lot of difference in terms of gender at that point in the curriculum. [OK] I used to think actually though that the women were better at that point because of natural selection. [Ah] In other words I think that it used to be that more of the weaker women students would drop out earlier, but I think because of PWSE and other things, and possibly simply because there are more women, I think it is less true that the women who do make it to that level generally have to be the top performers, you know. Certainly there are some who are outstanding but I do not see that as disproportional. I see a change there actually. [Oh, interesting.]

Describe any differences you see in men's/women's communication in groups, how often they participate.

Well, one of the things that I did - I think I told you this, I consciously did this - was at least set up these initial groups that there was never more than one woman in a group, and I am not sure whether that is a good idea or a bad idea, but because I have groups of three and because of the way I structure it everybody has to participate, so I don't see again a gender difference. I do see differences among groups, and as I mentioned in the questionnaire I see individuals who respond differently, but I have to say again the way I structure it I try to avoid..... I give people different roles in a group. They have to rotate those roles. [Right.] I use groups in fact to level the playing field on that, not necessarily by gender but in many ways, but that is one of them.

What about leadership positions in groups?
The same thing. [The same?] I rotate that. [OK.] Some of the women really step up as do some of the men. Others, there are individuals who don’t do a very good job of it but I do not see a correlation again there with gender. [OK.]

Could you describe your classroom climates?
Well, what I try, you know…… I guess I’d have to say that the people in the class have to tell you what the real climate feels like. What I try to do is I try to make it interactive. I try to make it lively. I try to make them responsible for their own learning. I try to make it not intimidating to talk. I do get comments from people who sometimes believe that I intimidate them, but the vast majority would say no it’s just exactly the opposite. Now I certainly don’t try to do that, but I think my personality is strong and I think that maybe sometimes women more than men react negatively to that. It’s like maybe I’m too dominant and I think about that, but I have to say I don’t think it is a general problem. I do hear this and I do try to pay attention to that, but I think it is a classroom where you don’t just come in and be anonymous. [Right.] That is the one thing I do not want to have and I feel that particularly the bigger classes get, the easier it is for a student to just come in, be anonymous, sit in the corner, not pay attention or pay attention - it doesn’t matter - be completely passive and I don’t let that happen and I think it’s a welcoming thing. I mean, I’d have to say that the groups jump right in. They don’t….. It takes me awhile to get them doing that, but by this point in the semester it is just an expectation. They know each other so [mm-hmm] and I know them, and not personally very well because there are too many of them, but I use the name tags for a number of reasons. One reason is I think that it is important for people to know each other [mm-hmm] but I do find that in a group that big it is just hard for me to know who people are [yeah] and people appreciate it when I can call them by their first name. Now regretfully I would have to say that maybe only a third or a half of them would I be able to know their first name just seeing them on the street, because one of the problems with name tags is you also look at the name tag. [Right.] But it occurred to me one time at a conference that at conferences we always have the name tags and I say, ‘oh, yeah, you’re from Potsdale New York, great, I was there once’ you know [Right] and I feel that that’s a good thing and so I tried to just simply recreate that, but it does….. On balance I do better at getting to know people with them than I used to without them, but I feel like I always need to work harder at that [OK] and I think that is all part of the classroom climate. [Right, definitely.]

Would you describe your classroom interactions with students as formal, informal, conversational?
I think it is a little of everything. I have been really promoting active learning on this campus. I mean that is one of the main things that I have done for years, but I don’t believe that there is only one mode. In fact when you look at people’s learning styles, I think you need to mix up your teaching styles and I do. There are times when I lecture in a pretty formal way. There are other times when it is very informal. When I throw out a question and people are working on it, I am trying to assess and so it is very informal because I want them to call me over and say “Howard, I’m working on X. What do you think about this?” I don’t want it to be a formal interaction. But then when I call them back together and want attention to me and we are going to be talking as a group, I expect decorum and it’s
interesting because there has been all this talk about civility. I find that to be interesting because I have never had an issue with civility in my class and I think it is because if you utilize different teaching styles and you are engaged with the class, they are engaged with the material and civility isn’t an issue. I have never had it be an issue. I sometimes wonder because I teach juniors maybe that’s why, but you know I don’t believe it frankly. I know people say “Oh we teach freshmen and they aren’t motivated, blah-blah-blah”. I don’t buy it. I think it has to do with the respect of the professor for the student as much as the student for the professor and if you treat them. We did a midterm assessment and I had somebody say that I treat them with respect as a peer and I felt very good about that comment, because it seems to me that, you know, if we are all learners and if we are there to learn, and I learn from them and they learn from me, then that is what we are about and these other issues I don’t think are a problem. So back to, you know, how I structure it is I use a variety of things, but when I move from one to the other I make it clear that that it is what I am doing. I think they know what the expectations are and I guess I don’t see any big differences, but I mix it up because people learn differently.

Could you describe any difference you see in communication from lecture to more informal parts of class? How often do you one-on-one communicate with students and how often do they communicate with each other?

You mean in class? [Yes, I know you had broken them up when I was there and that they talked together and then came back to you.] I think the worst class is when I talk too much so I really try not to be the only talker, but often times the way I deal with that is that what I will do is I will start with a question. I don’t start with a lecture. In fact lectures I close with a lecture in a sense. Now I don’t mean I close the whole class. Sometimes it is just a 20-minute period that I’ve got planned where we move first from them connecting with the material and trying to work on a question to them interacting with me on that question - well, no, me interacting with them in groups on that question - with very informal one-on-one, sometimes several groups. If I am hearing two or three groups asking about something as they are working on it, I will stop everybody. I will say “Time out, I am hearing this from all of these groups. How many groups are having the same issue?” so I kind of move back and forth there. Then I will generally move into “OK, now, let’s come back up front here. Let’s hear from different groups. Let’s summarize or whatever.” and then I might go into “You know what that suggests to me is I want to show you something.” and then for five minutes I’ll talk and try to wrap it up before I move onto the next thing. So generally I use again a mixture of all types of communication within the class. I expect them to communicate with each other. We talk about communication. Sometimes I will just simply do a T-chart with them, you know, what does good communication look like, what does good communication sound like, and I will just have them review it, or sometimes I’ll give them something and I’ll say “One of the people in your group I want to be an observer in this conversation and their job is to observe what are the good attributes of communication going on.” And it’s funny when I do that, of course, because they communicate extremely well. They know, oh we are supposed to look at each other and all this stuff, and all of a sudden it’s all happening because now, oh well, somebody is observing that. [Right] Often times I’ll ask them to do something and I’ll listen and there is nobody talking. They are working away individually on their papers and I’ll say “Okay, time to talk.” and then, oh okay, it’s okay for me to talk now.
They don’t want to talk at first and then when I get them going of course they don’t want to stop, so that’s my goal sometimes. And then you have to make a lot of judgments as you go, as when do you move from one to the other, because sometimes you have to interrupt a very, very vibrant conversation either because it’s just going on too long and you have to move on, or because again if there is a point that you want to make that everybody is now really engaged with you have to strike while the iron is hot, but you have to make a lot of decisions and many of them are communication decisions for me or communication related decisions.

[Interesting.]

How do your students respond to you outside of class during office hours and meetings?

I have pretty good use of my office hours. There are regulars - there’s the regulars. [laughter] And then I post solutions at the end of the hall so people will often be, you know, over there looking at the solutions and they’ll knock on the door, so I encourage..... But I will have to say that e-mail is probably the most prevalent means of communication outside of class and WebCT. And then office hours, usually the people who come in are ones who are usually sometimes the best students because they are always on top of things and they want to make sure they dot every I and cross every T. I will call in students who are having trouble. I will bring them in and I will say “What’s going on?” The other day I e-mailed all the students in my one class who were not attending class and we’re having an exam this Friday, the ones who were not attending class and who I felt were really not doing the job, and I just e-mailed them and I said, “I’m concerned. We have an exam coming up.” I got several e-mails back, “Oh, I’m sorry. I know you don’t want to hear excuses but I’m going to come to class.” They thanked me for doing that. So I guess I find that outside of class I have lots of really positive interactions with students. I encourage a lot of interaction. They can drop in anytime. I make appointments of course, but any way you look at it probably only 20% of them will take advantage of that. I don’t know, maybe I am kind of glad they do because otherwise it would overwhelming but..... and I wish we had T.A.’s or some way that we could have some kind of help system because we don’t. We just don’t have the staff and so..... but then I also do stuff to get them to help. I communicate a lot through e-mail and in writing and on WebCT with postings and stuff. Like I just sent out..... Well, I had two assignments that were kind of practice assignments for the test and they were graded. They were done in groups and graded, and then this morning I sent out the solutions to those because the test is Friday and in class I told them, “You know, make sure you look at those. You’ve got your homework back now. Meet in your group and talk about this, and then Wednesday be prepared if you have any questions.” So I am always trying to anticipate communication in a timely way, thinking about what I want them to accomplish, and trying to assess whether or not they are doing it, and then trying to stimulate them to do it if they are not. Still I am a little frustrated because of the percent who don’t, but you know, you can only lead a horse to water I guess. [laughter] I put a lot of effort into that and a lot of it’s again around different kinds of communication, continual communication, but they always are hearing from me. I am their worst nightmare. [laughter]

Describe any difference you see in men’s and women’s out of class participation as far as coming for help and e-mailing.
Well, I asked the class. We did some assessment of the groups and I asked the class whether or not they wanted to continue in groups and I gave them options, so as far as the group participation piece there were a few women who said I just don’t want to do this anymore and I gave them the option and they are going to do their work on their own, but again I can’t make that a gender trend. I have to say it all seems individual to me and I think there is about the same spectrum. I don’t really see a difference.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
Well again I would have to say that it used to be more the case than it is now, because of what I was saying before. It used to be that there was sort of a level of preparation and most of the women were well prepared. They were like those, you know, those students who were always on top of things. They were always prepared. They had to be the ones that were the superstars. And now I see again the same thing. This point in our curriculum is tough because you have taken your basic science, your basic math stuff. Then you get here and the level of thinking and the level of complexity of what you are doing has gone up a notch and you are doing that in four or five courses at the same time and it is kind of devastating, but it is more devastating if you’ve had poorer preparation. And since I do see maybe more women making it to this point with poorer preparation, but again I’ll come back to it, it is not a gender difference. I see the same thing with men. I have to say, and I’ve believed this for a long time and I think I still observe it, is that men though if they do poorly sort of pass it off, either “I’ll do better next time” or “That stupid professor, what does he know?” whereas women if they struggle at this point really start to lose confidence in themselves. It’s like “Oh, I don’t know if I can really make it.” So I find myself sometimes having to really pay more attention to women who are struggling and saying “Let’s figure out how you can do better. How can we get more help? How can you get more support?” But I think that would be helpful for all students, but men maybe don’t seek it the same way. And that’s a difference that I see in the way in which there is some response, but I’ll have to come back and say that I don’t see it as a general thing anymore. I am really seeing that is true for some of the women. It is not true for others. Some who struggle react exactly the same as the men do in that situation, but I would have to say overall they do tend to maybe internalize that more and we have certainly seen that in the success of WISE. The reason why WISE is successful is because then they have other women to turn to and say “Oh no, no, no, you can make it.” and it is good for them to see other women who have made it than necessarily just see a man say to them “Well, you know, hang in there, you can do it.” That certainly wouldn’t carry the same weight as somebody who has just been through it, and so I think that those role models are extremely important. Which maybe brings me back to, I should put some of the better women students with some of the ones who are struggling into groups and let them use that as a model. [Right.] That is a tough one because it isn’t of course the responsibility of the women who are doing well to help the women who aren’t, but the way I use groups I want the people who are doing well to benefit by helping others and I want the others who are not doing well to see that role model, whether it is a man or a woman, and say “Yeah, I can do that too.” It is one of the reasons I use groups. So I don’t know. That would be interesting. Certainly as we get more women in the program that will be more of an issue.
What expectations do you have for your engineering students?
Well, I expect that they be serious students. By the time again they get through our early curriculum and they get into engineering and they are taking engineering classes, they need to be committed so I expect that. I expect them to be prepared and I expect them to be professional. I expect them to maybe think more broadly than they want to think. I try to encourage them to think about the implications of engineering and not just the technical part. I think they have a hard time with that, many of them. They want to focus on the technical, that’s why they are in engineering, and so I am always trying to…. and since I teach about energy and energy systems it is kind of easy to bring in environment and social issues and things related to that, economics. It is kind of easy to bring that into the subject, but when I bring it in too heavy they will push back and say but that’s not the course. They are going to test me on that. There is a little bit of that going on. But I also expect them to be able think and evaluate. I use Bloom’s taxonomy a lot in my thinking. I don’t know if you are familiar with that, but Bloom’s taxonomy is sort of a hierarchy of cognitive processing and its lowest levels are knowledge and its highest levels are synthesis and evaluation, and it kind of talks about the different levels of cognitive processing. And I think a lot about knowledge and application are important, and comprehension is important, but we should be able to analyze, synthesize, and evaluate. And engineers have to evaluate. They don’t just get an answer and that evaluation isn’t just, is it the right answer or the wrong answer, but is it a good idea, is it something I can sell, is it something I should sell? And I certainly expect them even at the junior year already to be able to really start to do that in a big way and ultimately I think that our graduates need to be able to do that. The other thing that I of course expect, and this is one of the reasons that I use the kind of methods I do, is I expect them to be able to communicate and to work in teams. I mean, that is an overall curriculum objective of ours, it is an accreditation objective, it is a university objective, and I feel that is part of my role. I don’t feel that is something I can just relegate to others and imagine that I just prepare them for the technical part of what they do and not pay attention to that. I feel that is my responsibility as well, so I expect them to be good communicators, to be able to present and defend an idea, so I have high expectations for my students.

END - Schwartz interview (1)

Interview with Dr. Michaels for Monday, March 7, 2005
(tape 1, interview 2)

Do men and women respond differently to you in class?
I really don’t think so. When I ask questions in class, I direct my questions to the whole class and so it is just as likely that I will get a response from a female as a male. Now because there are typically more males in the population there is often more response from the males, but do they respond differently? I don’t think they respond differently. When I ask a question basically I am asking a specific question about a specific question, problem, or a specific concept, and so the response would be really gender non-specific.

How do you perceive the performance status of the women and men in your class as individuals as compared to the other sex?
Typically the female students are the stronger students. They tend to be more academic oriented. They tend to score higher on exams. But you know it is not always that way because you have bright people in both groups, but it just seems like women mature more quickly than men do and therefore they are more studious I think.

**Describe any differences you see in men’s and women’s communication in groups, how often they participate, how often they take leadership positions, and how they respond to others.**

I think this is more of a personality issue than it is a gender issue. I see women with strong leadership skills and I see other women with more submissive skills. I'm not sure that's the way to say that, but they take more of a backseat approach to what is going on. But the same is true with the men, so in talking about my design class I really think that is more of the will than it is the gender. Strong-willed people dominate their way of thinking and a decision like any other, and if that person happens to be a man then they are the strong-willed group leader, but it can just as well be a woman. I do not think that I see, at least in engineering, women taking on any subordinate role to men in any of (the groups) or in the classroom. I think that is not an issue. Maybe 25 years ago but not now.

**Describe classroom climate.**

I try to make it very light and friendly, lots of interaction. I don’t want anybody to be embarrassed to ask a question. I never respond to a question with a negative kind of response. I could even take a wrong answer and turn it around so.....

(Dr. Michaels’s interview continued on next tape/document.)

END of tape #1-A/B

Continue Interview with Dr. Michaels - Monday, March 7, 2005
(tape 2-A, interview 1)

**Describe your classroom lab interaction with students? Is it.....**

So it’s in two parts - the classroom interactions and then the lab interactions? Classroom is sort of formal in the sense that I’ve got certain material that I want to present but it is informal in that I try to involve the students in thinking and dialoging with me as we go through the material, so that is often asking them questions like “What do you think about this?” and then waiting for a response instead of just letting them sit there and not saying anything. I sort of force the issue.

And in lab it depends on the particular day. If I am covering some new material or a new piece of software, it is much like a classroom setting where I am presenting something. I try to engage them through asking questions, understanding what it is we are doing with say a piece of software or a piece of literature that relates to some products that we are looking at. But if it is a work day in lab and they are working in their groups, then my rule is to just circulate from group to group to try to answer any particular questions that they may have.
What we talk about in reference to comments about campus, social, or political events - if there is a political or social current event that is relevant to what we are talking about in class we will bring that into the discussion, but I don’t spend my whole class time reading or talking about the editorial page of the newspaper. We are not in political science here. This is engineering.

Describe any difference you see in communication from lecture to lab, how often you communicate with the students and how they communicate with each other.

Is this my communication to the student or is this their interactions or -? [Both, how often you communicate with the students and how often they are doing group work and communicating with each other.] And the differences I see? [Right] Pretty much the differences I see in my teaching style is that there is not a lot of student-to-student interaction going on in the lecture, but there is a lot of student-to-student interaction going on within the lab. And I think I kind of answered this part up here about how do I communicate with the students. I guess it’s through a combination of visual PowerPoint stuff. If I have a model of something I can bring in like a plastic model of a component, you know, I try to do that as well.

How often do they communicate with each other? In the lab, quite a bit. In lecture I would say not that much. And then outside of class, well, who knows? I do encourage people to get together to study because I think they can help each other out when it comes to studying.

How do your students respond to you outside of class, in office hours, labs, meetings?

Let’s see. How do they respond? I am not sure I understand the question, like they treat me differently or do I treat them differently? [Is there a difference in the kind of communication? Is it more informal outside of class?] I think it is maybe a little less….. Okay, I still try to keep my class informal, but it becomes even less formal outside of class because you are not constrained to the time of the class so you can probe for more knowledge, understandings that the students have. You know like in class I may ask a question and then we get an answer and move on, but if a student is in my office and asks a question I can ask them back a question to see if they really understand, at what level do they have mastery over the material, and then we can explore that in more detail when we are not constrained for time - like the guy that is waiting in my office now. And then I think labs are much the same way because labs are two hours long, and many times I am in the lab for three hours because students will stay and work and it is just a comfortable place to do that. And meetings to a large extent are fairly informal, but typically people, when they set up a meeting they want time limits on the meeting, so they don’t want meetings to last hour and hours and hours. Nobody likes meetings like that. So I think in those situations outside of class the communications and the response, the interaction between me and the students, is a lot more relaxed than in class.

Describe any difference you see in men’s and women’s out of classroom participation. As far as coming in to help and asking for help, do you see a difference?

No, not really. Again it just depends on the individual. I think last semester I had a couple of female thermal students that were in my office all the time, always in help sessions, and
that was just them, but in another semester it could be a couple of men that are the same way. And asking for help via e-mail, I don’t encourage that. I think that the e-mail method is too narrow and time consuming especially if you are trying to discuss something that is, well, maybe technical in nature, but almost anything. I mean, how can you establish the dialogue? With e-mail I think it’s a non-productive way. If a student e-mails me a question I e-mail back and say “See me in class. Come to my office hours. Can you stop by?” and I’ll offer some times, but I am not going to spend my time trying to answer a particular problem with e-mail.

Can you identify any areas of your classroom requirements in which men and women differ significantly or noticeably in their performance?

Again typically I think females tend to be neater in their work. Handwritten information is typically neater. I think grammar, organization of sentences, and report writing skills might be better with women than with men. Both seem to be the same as far as oral presentations are concerned. I see very little difference between a presentation that a man or a woman makes in class, you know, on like a class project or something like that.

What expectations do you have for your engineering students?

Well, I expect them to master the material that I am trying to teach them. I expect them to be honest and have integrity with their work, you know, not cheating or carrying their own share of the load especially when it comes to group projects. We could get off onto a higher plane, but [laughter] you know, like if they are going to become president of some company or something like that. I don’t expect that. I don’t hold those kind of expectations. I just basically expect people to be hardworking and honest in their career, not using their knowledge for, uh, just to make money. You know sometimes students get into a curriculum because there are good paying jobs at the end of that curriculum and that is not a good reason to be working toward a degree. [Right.]
class, to put problems on the board or something like that. For performance, I’d say the men and the women are fairly equal. It’s not all the women perform outstandingly better or worse in my classes than the men. I have some good performers of each and some occasionally poorer, average. I don’t know. The distribution I think seems equal, pretty equal. I could probably verify that by looking through results, but I have not really tried to do that. [Okay.]

Describe any differences you see in men’s and women’s communication in groups, how often they participate as far as leadership and how they communicate together.

Well in the senior design class they have teams for each project, so three teams, three to four people, usually three, and I was kind of expecting that the women might tend to not want to be leaders but I found that is not true. They seem equally as willing, if not maybe a little more so willing, to be leaders and I was really encouraged by that. And it seems like all the students in my classes tend to show a lot of respect to one another and treat each other well and respond well to whoever is leading the group. I would say overall maybe the women tend to be a little bit better communicators. As far as the percentage of women that are good communicators, it is maybe a little bit higher with the women versus the men. I mean I have some very good male communicators too, but I tend to have in the groups that I have seen so far limited number, more kind of shy guys that did not want to speak up than the women. Except for maybe, I had a food science class where I had a large group of girls from the Philippines, from a different culture, who tended to be very quiet and they didn’t want to be very vocal, but you could tell that there was kind of a cultural barrier, that they seemed like they wanted to speak up but they weren’t used to speaking up so that was kind of interesting.

Could you describe your classroom climates?

Somewhat informal, but I try to get things started and ended on time. I try to solicit feedback periodically. I try to keep it an active learning type environment, which can be a challenge in engineering where there is a lot of number crunching and calculations and it is less discussion orientated, [laughter] the climate that the students seem very friendly and outgoing and interested in the subject, so I think it is a very good climate.

Could you describe your classroom lab interactions with students? Is it formal, informal? Is the content discussed basically focus on the course content or are there social or political aspects to those conversations?

I think it tends to be informal but still focused on the course content and occasionally I’ll try and.... I do try and relate past job experiences and relate what we are doing to things that, problems you know. If I talk about report writing and communication I’ll, you know, tell them stories about times when I’ve worked with people who were poor communicators and what the outcomes were of that and that type of thing, to try and keep it informal, conversational, but I don’t tend to discuss a lot of personal issues. Occasionally, you know, when my car breaks down we will talk about alternators [laughter] but you know kind of on limited things here and there, but I try not to let that get too carried away.

How do your students respond to you outside of class during office hours and meetings?

Um, how do they respond to me, um.... [Any difference from in class? Is it more..... ]
think it is about the same as during, before and after during class. I have a lot of students that come by and ask me questions about homework assignments and class projects.

Describe any difference you see in men’s and women’s out of class participation, like how often they come in for help, asking for help via e-mail.

I do find that the female students come outside of class. A much higher percentage of the females come looking for outside help, both coming to my office and e-mail. The males do come, but the females seem... I mean when I look percentage wise, it seems like somewhere between two-thirds and three-quarters of the time it is a female coming in and I know the proportions in my class are not that, so it doesn’t seem like the men have any trouble interacting with me when they come but they don’t tend to come outside of classes as often. Maybe they tend to ask me questions before or after class more so.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

I haven’t noticed a big difference in any of their performance. The types of things where I might expect to see some difference would maybe be in the leadership area and I am happy to see that it seems pretty equal, that they are equally good at leadership, communication, oral presentations. Last semester when I taught the senior design class they all did a very good job with the oral presentations and I was surprised and happy with that. Um, about equal on written exams. I don’t know, I don’t notice a big difference one way or the other.

What expectations do you have for your engineering students?

Well, I expect them to stay up on their course work, to have things done when I ask for them to be done. I expect them to seek help if they need help, before class or come to my office hours or ask questions during class if they are stuck on things. I am always happy to work with them off line or give them an extension if it seems like a lot of the class is confused. My main goal is that they learn continuously and that they make an effort, as long as they don’t drop the ball, they are trying to do their part. I do not expect them all to be A students. I expect them to each accomplish at their own level whatever they are at and to just make progress and have learned as much as they personally can. Some people catch on fast and learn a lot. Others struggle more but I still feel like if they’ve come a long way and learned the basic concepts that I am just as happy with them as I am with the students who are outstanding, so I guess that summarizes it.

END - Stile interview (3)

Interview with Dr. Richards for Thursday, March 10, 2005
(tape 2-A, interview 3)

Do men and women respond differently to you in class?

Yes, I think they do. Obviously there are exceptions but I think the men will blurt out answers at times when they are not sure, but my women students tend to be a little bit more cautious before they answer but they will participate. And that is not always true. Like I said there are exceptions. I had a student that I adore and she actually did research for me, but she
would not hesitate to ask a question if she did not understand. She really wanted to know and if something was confusing to her she would ask, so you know there are exceptions I think. Men tend to answer the more practical questions, I think, quicker sometimes than my women students, but the women students will tend to answer perhaps some of the theoretical questions more quickly.

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?

How do they compare to each other in terms of performance? [Right.] Oh my women students kill my men students. Women tend to, if they are in the major, they tend to be better on the average than, you know, my men students. I mean it is very rare to find a female student who is struggling at the lower end, but it happens.

What about in participation as far as how vocal they are?

I don’t really see a difference. I really don’t. In terms of how vocal, I think like I said they are vocal in different ways but I think that, you know, it all comes down to confidence and that sort of thing, but I think in terms of groups, you know, I really haven’t seen a difference between, you know, the women coming to my office versus the men. Actually I think women will tend to come and get help sooner than men will, you know. I will see probably a larger percentage of the women that are in class come and get help outside of class.

Describe any difference you see in men’s and women’s communication in groups, how often they participate and how often they take leadership positions.

I would say that if there is a difference it is not noticeable on my part. I, you know, in fact women, again given the fact that there are fewer women perhaps in my classes, they are on the average probably taking a greater percentage of the leadership rolls, but it probably has to do something with the fact that the GPA of the women students is higher so, you know, they are going to tend to feel like they know what they are…. They are going to tend to feel that they understand it. Their classmates are going to tend to let them take the lead because they probably do.

Could you describe your classroom climates?

I would say, you know, I try to, you know, crack jokes and keep the students….. I try to make it not just lecture but interactive. I try to mix up when we have group type things, get the women and the men together in groups. And I also try to make sure that everyone participates. If I see someone not participating, then I will bring it to their attention that they are expected to be participating if they are in group. In class, oh I don’t know how…. I tend to see men volunteer to speak probably at a higher rate than women, you know, when they are presenting the results of what they have just done. I don’t know if that is really true. I am just going by maybe perhaps this semester because it is the clearest in my mind, but there might be something there. I am not sure.

Could you describe your classroom and lab interactions with students? Is it formal, informal? Do you focus largely on course content or are there other social aspects?

It is pretty formal. [Formal?] It is a pretty formal setting.
Describe any difference you see in communication from lecture to any kind of lab as far as how often you communicate with students and how often they communicate with each other.

Well in lecture, I do most of the talking obviously but the students do have opportunities to talk with each other. In labs, we don’t have a lab for this particular course, the 210 course, but they do have homework, you know, where they work together and I see them working together. They seem to interact, lean on each other, respect each other. The same holds true for other classes I’ve had where we’ve had a laboratory experience with that course, that the students tend to work together, help each other. I don’t see a lot of problems that I contribute to biases, you know, that people have. Although I can remember one complaint that I got from my female students that felt that a male student was being sexually harassing, you know doing some things, saying some things that were very inappropriate from a sexual harassment point of view. They brought it to my attention, I brought it to the young man’s attention, and he had no clue about what he was saying was offensive, so I think it helped him and he was very apologetic. I think it helped him and he learned something from that experience, but I also wanted my students to know that I feel it is my responsibility if something like that occurs and they come to me, not to let it go but to deal with it, and I think they knew that if that happens in my class or I feel like something like that is happening, that is alienating my students, that I will deal with it without hesitation.

How do your students respond to you outside of class as far as lab hours and office hours and meetings?

Well, I think my students feel that I am very open and they come to me when they have questions, and we have recitation that is set up and it wasn’t a required kind of a thing and students come. I think they feel like, you know, they can seek me out and get help if they need it. Some of them never do. Some of them do quite a bit.

Describe any difference you see in men’s and women’s out of class participation as far as coming in for help or asking for help via e-mail.

Right, that’s what I just commented on. Like I said, the women tend to in my opinion at a greater percentage, tend to come by and get help more so than my men students do. I mean they will too but they don’t as often, but the women, you know, if they have a question they try to get an answer. And then some of them still, you know the students that are worrying, tend to not speak as much and you’d think that they would need help the most. But I think they still somewhat feel that if they come by and get help, then I got to know something and that is going to make them look bad. So you know, I think if they come by and get help, I think they realize that is not the case. I think women tend to come by when they need help more so than men do.

Can you identify any areas of the class requirements in which men and women differ significantly or noticeably? Are they different? [Mm-hmm, in their performance, is there a significant difference in any specific area?] Yeah, you know, like for example lab, I think. When it comes to hands on, getting dirty you know, getting intimate with the equipment, they back off more so than perhaps the men will, but you know they soon learn that that is a part
of being an engineer and they are not afraid. They get in there and get dirty but I think, you
know, when I was growing up men more so mechanically were more mechanically inclined
simply because they worked on, you know, a lot of things, and you know more so than
women, but these days my opinion is that most students come in with very little knowledge
of how to do things mechanically so the women are no longer…… I don’t know if it’s the fact
that the women have caught up with the guys as much as the guys have slipped back and
do’t have the mechanical skills that, you know, perhaps maybe men in my generation did.
And probably a lot of that has to do with we worked on our own cars and you know, but who
works on their own cars these days? I mean, cars are so complex that if people know how to
change a tire that is probably about the extent of it, of what they do know. [Laughter.] If
they can find the jack that’s probably about the extent of what they know, so - and we’ve lost
that. I think we have to figure out a way to, you know, where our students are getting….. I
don’t know if our students take a lot of shop courses or where would they get that? But it
would be nice to see more of them come with, you know, abilities to use a lot of tools. I’m
talking about pliers and wrenches and screwdrivers and that sort of thing and knew what they
were called, different kinds of screwdrivers and you know, but anyway, I’m rambling. Go
ahead.

**What expectations do you have for your engineering students?** I have lots. That’s a really
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**END - Richards interview (4)**

**Interview with Kelly for March 29, 2005**
(tape 2-A, interview 4)

**What questions affected your choice of university?**
Um, well I guess, um, like I think I pretty much, I chose blindly, I think. I think most people
do when they are seniors in high school. Like I really am not sure that if I could go back in
time and like be the same person I was then if I would have been able to make any different
choice, because it is just like you are in a position in your life when you don’t know really all
that much about what you are going to be doing and like, I don’t know, the reasons I like this
place aren’t necessarily the reasons that I decided to come here, um, and I don’t think it
usually is. But to answer your question I guess, um, the things that I was thinking about - I
thought that I wanted to go to a big school, like not necessarily a big public university but I
didn’t want to go to a small liberal arts school. I wanted to go to a school that had an entire
program because I started in chemical engineering. That’s what I thought I liked. It wasn’t
so much what I thought I wanted to do, but it was what I decided to major in if that makes sense. Basically when I applied to schools I had gone and visited some places. I visited the University of Nebraska. I am from Lincoln. I visited here and I visited Purdue and I visited Cornell and I applied to all of those places, and I did not get into Cornell and I just didn’t like Purdue very much when I was there. It seemed like really impersonal. I think it was just like..... I really think it was kind of chance that I didn’t end up going there, because it was at the end of a long trip and it was the last place we visited. I was tired, it was really hot outside, and the girl giving us the tour was kind of a dork and I think it was just..... I just like..... That combination of things made like an image of that place in my mind that didn’t really seem very appealing. And when I came here it was a beautiful day outside. I really liked the things I saw. There was like a scholar day that I came to here once that was really interesting. Some engineering professors gave presentations and there was just I think a lot of like the recruited scholars or whatever were coming and so that was really helpful I think. And then I also got a really good scholarship from them, so that pretty much sealed it.

*What factors affected your choice of major and what would maybe not cause you to change your current major now but what would have earlier on in your program?*

Basically when I was in high school I took chemistry, I liked chemistry, but I guess based on the experience, I don’t know. I kind of had the idea that if you study a pure science, like if you study biology or you study chemistry straight up, it is pretty difficult to do anything without an advance degree in it. I mean you can do things but you are not going to be..... It is going to be a lot more difficult because, I don’t know, there is so much more of a hierarchy it seems like in people who have studied that sort of thing. So, my mom’s a biochemist who works for Pfizer and she kind of like suggested chemical engineering for me. I liked chemistry so I just decided to do it. I thought about changing it for awhile, but then eventually I decided not to just because I didn’t have anything else that I really like had thought of, like, oh that is really what I want to do instead of chemical engineering. So I ended up sticking with it and actually I really like it now so it turned out okay.

*How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?* Like which does better in their classes, is that what you mean? *Yes, or do you see any difference at all?* I think there is a distribution in both. I really don’t. Like there are some males in our classes that are more vocal than other people. There are some females that are more vocal than other people. I think it is pretty even. I think there are probably more..... I don’t know, there might be a few, like percentage wise there might be a few more females who never say a word than males who never say a word, but there is both I think.

*Describe any difference you see in men’s and women’s communication in groups, how often they participate, take leadership positions, how others respond to them.*

I think that, well, I mean, like I guess it is hard for me to say because I think I tend to be kind of like a person who usually takes charge in situations like that, so in the groups that I am involved with I see it going both ways, you know. I am with guys who are really outgoing and want to, I don’t know, want to be the group leader and that is fine, and then I see it in myself too where I will take charge and there are other girls who do it too. So, um, I guess,
yeah, I don’t think there is a real like rift between guys that take charge and girls that take charge.  [Okay.]

Describe your own classroom participation.
Yeah, like I said, I ask questions in class if I have a question. I answer questions in class when the teacher asks a question, probably more than most people.

Describe the classroom climate in your engineering courses.
Pretty laid back. Like I can’t think of any professors that I have had that have been – well, maybe one or two professors that I have had that have been like really like more formal in their style and in those classes it is more like kind of you sit and take notes and that is kind of it. But most of them are kind of like, if it’s lecturing they will ask a question and they will say like “Which reactor would be the better choice?” and like people will say “Oh that one is” and then someone else will say “No that one is” and then sometimes they will take a vote and things like that and then they will, you know, laugh at them. It is really pretty informal and comfortable.

How does your professor respond to you in class?
Respond to me, like Dr. Stile or you mean in general?  [You can, either if you want to specifically reference, or......] Okay, I guess like, can I ask a question and answer it? Like they occasionally will see the looks of confusion on the faces and stop and say like “Hey, you guys got it? Should we go back over that again?” but I mean it is, yeah, kind of like the last question. It is a pretty informal relationship most of the time.  [Okay.]

Describe your classroom compared to your lab interaction with your professor. Is one more formal or informal, focused on course content, or are there social aspects?
I guess both of them are largely focused on course content, although in the lab it is a lot less directed. If you want to know anything about your lab, you will have to go find her. A lot of times she is not even in the lab. She will be in her office, so you will have to go either ask a TA or track her down and say “Hey look this is the problem we are having. What do you think?” whereas in a classroom situation, you know, you are being lectured at and you are asking the question based on what they just told you, so that is pretty much the only difference. Because the professor we have for the lab is the same professor we had for some other classes, so we had all had her before. We knew her. I mean, yeah, she knew all our names when we first got there and so.....

Describe any difference you see in communication from lecture to lab as far as how often you talk to other students and the professor.
Well, I mean we probably ask more questions in lab just because it is less directed and, you know, you are not being told things. You have to try to figure them out yourself. As far as with other students, like I think we communicate. If you are talking about actually in lecture, then obviously we don’t talk to each other all that much during lecture, you know. I might lean to the person next to me and ask them what ‘k’ stands for, but during lab obviously we are working with our lab partner. We will work together on the problem and a lot of times the way our labs are designed basically everybody does similar..... or usually there is
overlap in the labs that people do from week to week, so a lot of times people will talk to the people who did the lab before and say “Hey, like did you have any problems with it? What tips can you give us?” and people will always be willing to tell you that kind of thing. And then I guess with lecture, like I don’t know, that is one thing that seems kind of like, cause I talk to my other friends who are in LAS and places like that, that seems like something that is kind of cool about chemical engineering. I don’t know if it is the same in all engineering but we really, like we work together on the homework all the time. I hardly ever do a homework assignment by myself, just because it would take too long and I think we learn more too when we are doing it together just because we can bounce stuff back and forth more. And I think we do that really well, or at least the groups that I have been in have done that really well. [Okay.]

How does your professor respond to you outside of class in office hours and meetings?
Like I have generally had like really good experience with office hours. I mean this semester I have I guess only one class that I go to office hours regularly, because it is the only class that I have like difficult homework in every week. It is my biochemical engineering class and you know every time she has office hours before homework is due, there are usually 10 or 12 people who go up there and try to figure it out. That is how it has been with most of them just because we will do most of the homework assignment, get caught up on something, and then go in for a clue and then we’ll understand it so..... and it is pretty standard that that is what you do.

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help or working in groups.
I don’t think there is a difference really. I think like, I am trying to think if..... I think I usually just..... I am trying to think if I usually work with girls or if I usually work with guys in groups, but I think it is pretty mixed and I keep thinking of like some people who never show up for office hours, and there are a couple of girls who I can think of and there are a couple of guys who I can think of, so I think it is pretty - it seems pretty even to me. [Okay.]

Can you identify any areas of class requirements in which men and women differ significantly or noticeably in their performance?
I think women in general, of course not everyone, but I think they might have a little bit less confidence about what they are doing and that is probably just the function of, I don’t know, having less confidence in general in the sciences. It is just kind of standard. But, yeah, I think like you are probably more likely to find a girl who is really, really stressed out about her class and is kind of like freaking out about it than you are to find a guy who is doing that, so I guess that would be my main thing.

Describe your strengths and weaknesses in engineering.
I guess, like, I work pretty hard. I think I am a reasonably intelligent person and I can understand the things that they are teaching me and I can, whether I want to or not, I can make myself finish the project or I can make myself finish the homework if that is what it takes, so I guess that is my strength. I don’t know. Are you looking for specific categories in the things that we study or like learned styles of..... [Totally up to you.] I think I am a pretty
good, like, I think I am a good group member. Whether it is as a leader or a group member, I think I can do my part and, yeah, I do my part and I understand what it takes from everyone to get the thing done so I think that is part of strength. Weaknesses - I think I tend to micro-manage sometimes. It depends on who is in your group too. Like we are at the point now where most of the - I don’t know, this is going to sound funny - but like in our original classes like it was always kind of a crap shoot, like am I going to get someone good in my group, am I going to get someone bad in my group, like whatever. And we are at the point now where it seems like most people are maybe not at the same level, but most people have some level of competence. [laughter] Um, I don’t know, it’s true. There are some classes that just weed people out and like there are people that I prefer working with to other people, people that I have worked with before or people that I have a lot of confidence in, and when I am working with those people there is not a problem, but there are people that I have less confidence in and I have a hard time sometimes delegating responsibility to those people.

[Okay.]

What do you find most difficult about your program?
Just the way things tend to pile up sometimes. Like homework assignments can be an hour long or they can be six hours long. You just never know. And sometimes things just all happen in the same week and then it sucks and it is just like you’ve just got to keep doing it and keep doing it and keep doing it until the week is over and you can relax, so that is the hardest thing. [Okay.]

And what expectations do you have for yourself in engineering?
Like in life? [laughter] [In your engineering career in general, more in your academic than in your future plans.] Well I guess I have always expected….. I don’t know, I have been one of those students since I was in high school and middle school that I have always expected to be one of the top students in my class and I have really expected to be able to get [end tape 2-side A]
My main expectation has been that I will be successful in my classes first of all and second of all that I will find something in this field that interests me and like excites me and that I want to keep doing, and so far like the first one I’ve got down I think and the second one I think I am figuring out.

END - Kelly interview (5)

END of tape #2-A

Interview with Stephanie for March 29, 2005
(tape 2-B, interview 1)

What factors affected your choice of university?
One of the big ones was in-state tuition. I am from Iowa so obviously it is a lot cheaper to go to school here, and within the Iowa schools because Iowa State was better at engineering. I still considered out-of-state schools but ultimately decided that since I wanted to go to
graduate school it would be worth it to spend more money on graduate school and go to in-state undergraduate.

What factors affected your choice of major and what would cause you to change your current major or what would have earlier on in your program?
I chose my major because I like chemistry and I like math so I thought I would be well suited to that, and in addition during my summer after my junior year of high school I did an internship at Iowa State and I actually ended up working for a professor in the chemical engineering department and I had a good experience with that so that sort of cemented my desire to major in chemical engineering. I am not really sure what would cause me to change my current major, because there hasn’t been anything I have been really unhappy with, I guess, so I don’t have a good answer to that. Sorry.

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?
I don’t know. Let me think. Um, I think that some women are perceived as annoying to some of the men because they ask a lot of questions that kind of become annoying to some people, I guess, and I am not sure why that is but I guess they just - some women tend to ask more questions, but overall I think if like a professor asks a question, women are probably less likely to shout an answer out than men.

Describe any difference you see in men’s and women’s communication in groups, how often they participate, how often they take leadership positions, and how others respond to them.
I think that overall in a group environment if you are asked by a professor to pick a group leader, nobody tends to want to step up for that really, but overall in my experience women have stepped up a little more often into leadership positions. In terms of how others respond to them, I think it is highly dependent on the individual and how much respect the group has for them in terms of their previous track record basically, whether they have shown intelligence and good judgement in the past more so than their gender. But obviously if you do not know people very well then you don’t have that sort of thing to go off of, and in that case I guess it depends just on the person’s mannerism and overall probably men tend to have different mannerisms than women but I don’t know how to quantify that really.

Could you describe your own classroom participation?
I participate quite a bit usually. There are certain classes that I don’t, but overall especially in my engineering classes I participate quite a bit and I tend to lead groups probably more so than not.

Could you describe the classroom climate in your engineering courses?
It varies from professor to professor, but overall I don’t think the professors have any problems with people speaking up but people don’t tend to that often usually. They more tend to be in an environment where you just sort of listen, and people who have questions are more likely to bring them into the professor after the class rather than during the class unless
it is something like you are working through a problem example. But just presenting information usually isn’t terribly interactive in most of my classes.

_How does your professor respond to you in class?_
Do you mean like the specific class like 430 or...? If yes, if you want to draw from the specific class or... In this specific class the professor doesn’t always respond very well because sometimes she doesn’t know the answers to our questions, but overall I think professors respond very well to questions except for occasional incidents where the question is really, I don’t want to say stupid, but... Sometimes professors feel like they have covered something and that somebody was not paying attention, but that is not the norm. But I have seen it happen occasionally depending on the professor.

_Describe your classroom versus lab interactions with your professor. Is it formal, more informal, focused on course content, or are there references about campus events, social or political events?_
In this class our interactions with our professor is largely formal and about course material or more specifically just about the projects that we are doing, questions about the projects, but I certainly have had other classes where professors are more informal and conversant about things going on campus-wide socially and politically so I think there is a range that I have seen, but in this class it is pretty formal.

_Describe any difference you see in communication from lecture to lab as far as how often you communicate with your professor and with other students._
There is a lot more communication in lab with both the professor and other students. It is sort of difficult to communicate with other students in lecture because we are supposed to be quiet, but even if we are working on a problem in class like in groups there is more communication during the lab time than in class, and in the lab the communication with the professor is obviously a little more informal because we are calling her over to look at something as opposed to asking a question to her in the front of the room.

_How does your professor respond to you outside of class in office hours and meetings?_
Pretty much the same as in class, friendly but you know pretty much the focus is on the classroom material.

_Describe any difference you see in men’s and women’s out of classroom participation as far as how often they come in for help or working in groups outside of class._
I think that probably quite a few more women than men go to like independently seek a professor out in office hours or even, you know, out of office hours but in the office. In help sessions I don’t know that I have seen a big difference working in groups outside of class. Informally just like getting together to work on homework, I probably see more men than women like in the building, like in a study room in the building working on stuff, but I am not sure whether that is representative of the entire student population or not. It could just be that men tend to meet more in this building, but I wouldn’t say that those informal groups working on stuff together are necessarily gender specific. They frequently have mixed genders.
Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

I have noticed that women tend to be much better writers and I don’t know why that is. Men seem to have a lot, or at least the men that are in my classes, you know, which are all engineering major men, they really don’t tend to be nearly as good of writers and I am not sure why that is, but that is a big thing that I have noticed. In labs, like in chemistry labs not computer labs, I think that sometimes men tend to have more confidence. Whether or not they really have more knowledge I am not sure, but they tend to be more confident about things in that sort of lab situation and overall maybe, but I am not sure it this is a fair judgement or not. But I would say that men tend to have more knowledge about computer-related things. I don’t know many females who spend any of their free time messing around with computers just for fun, so that tends to come out sometimes in classes where you are doing computer things.

Describe your strengths and weaknesses in engineering.

I think that I have strengths in some of like the basic science type aspects, like understanding the concepts in terms of like the laws of thermodynamics and the laws of physics and I have a pretty big strength in math, but I would say my main weakness is probably in computer-related things. I don’t have anything specific but just like using MAT lab and using HYSS which is a design software that we are using in Chemical Engineering 430 and stuff like that. And I guess another strength I’d say I have is like just general problem solving type skills and writing. Sorry, I have lots of strengths. [laughter]

What do you find most difficult about your program?

I think the most difficult parts are the group work in some classes. It’s difficult just because it is sort of frustrating, not like the material is necessarily really challenging, but that is a big source of frustration and stress sometimes. And then more in terms of like the course work, the most difficult things are there are just a couple of classes especially like that I took during my sophomore year that I found really difficult and those were like thermodynamics and fluid mechanics I thought were the most difficult courses.

And what expectations do you have for yourself in engineering?

I have expectations to get mostly A’s and to understand stuff, I guess. Even if it is not necessarily required in the course I like to understand things. I have expectations with myself to pull my weight I guess in group stuff.

END - Stephanie interview (6)

Interview with Chad for March 29, 2005
(tape 2-B, interview 3)

What factors affected your choice of university?
Primarily the strong engineering program. I liked the bigger school idea. It was also scholarship-wise it was the most cost effective for me, but definitely the strong technical side of the school.

**What factors affected your choice of major and what would have caused you to change your major maybe earlier on in your program?**

I chose chemical engineering because I really enjoyed chemistry and my understanding was when I talked to visitations with different professors in the departments that chemical engineering and chemistry are very similar, only that chemical engineering kind of has broader, I guess, occupational opportunities. With chemistry you kind of have to have, you have to get an upper level degree for sure in order to do anything worthwhile, but as a chemical engineer you can go into a lot of different things. What would cause me to change my current major? I think to be honest if I had known now that chemical engineering and chemistry are not very related that I probably would have tried to do a double major or maybe just concentrated with chemistry, because chemical engineering is not quite as chemistry intensive as I would like it to have been.

**How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?**

I think the women participate more. They were usually the more academic focused people. The guys, we kind of, we got our stuff done but we usually try to goof around a little more and make it more entertaining. Not to say that women don’t, but by and large it seems how it is. Women seem to do, I think on average, women tend to do better in classes. They probably take it a little more seriously. I don’t know. I don’t think anyone is utterly vocal in class. There are a few here and there but as far as male versus female goes, I don’t think one is better at it.

**Describe any difference you see in men’s and women’s communication in groups, how often they participate, take leadership positions, and how others really respond to them.**

I have not really noticed that big of a difference. It really depends on the people, but by and large you will have strong leaders as men and women and you will have strong followers the same. A lot of it has to do with, you know, just what they feel comfortable with. A lot of times, I mean it would be an inaccurate generalization to say that women in these classes are more meek and quiet because that is not how it is. You know, they take front roles just as often as everyone else.

**Describe your own classroom participation.**

I am usually pretty vocal. I like to ask questions. I try to keep the atmosphere pretty light so, you know, cut a joke in there somewhere, but usually I am pretty involved I think related to other people.

**Describe the classroom climate in your engineering courses.**

I think the climate is fine. It is just such a dry topic that it is kind of hard to really get engaged into it but as far as that type of classroom setting goes, I think we are good. We all
know each other. We try to make it an enjoyable time. The teachers, I mean, definitely you know they promote asking questions and speaking up and I feel really comfortable there.

**How does your professor respond to you in class?**
I think it depends on the professor. Some of them I have had for a couple of semesters and they kind of are used to my mentality when it comes to, you know, class and what not, trying to keep it light hearted. Others don’t really understand that and they are kind of the older, you know, they think that chemical engineering is the here all and end all of engineering classes and I don’t know if I agree, would agree with that, but usually I am responded to pretty well. I have to for my own sake kind of keep in mind that we are in class, we are you know, since we are paying for an education so, but usually it is pretty....

**Describe the classroom versus lab interaction with your professor. Is it more formal or informal in one, focused mostly on course content, or are there social, political campus-related aspects to the conversation?**
I guess you mean classroom versus lab?
[Yes].
Well, I am not doing integrated research with any professors but my experience in the lab with professors that I have had in class, it is usually pretty informal. I really - I have had the same professor for both my labs and she is just very relaxed, you know, explains things as we need to but pretty much lets us try to figure things out on our own. I think she is received well that way. People can talk to her. I mean they will go to her office and just talk about anything they want, class-related or not. I really like the lab atmosphere.

**Describe any difference you see in communication from lecture to lab as far as how often you communicate with professors and with other students.**
Well naturally kind of in a lab setting it is a little more free reign if you have a question. A lecture is a little more structured than a lab, I think, as far as you have to get so much done in a certain period of time. With lab there is a lot of waiting around, a lot of time to talk and think, and when you have a professor like we do for our labs it’s nice to have her around, because you can, you know, have “un ChemE” related questions and have conversations. Yeah, I think in a lab setting like I said it is just a little more free reign, so you get that kind of cross communication that you do not get in a lecture.

**How does your professor respond to you outside of class in office hours and meetings?**
Oh, I think they respond well. I mean they see so many students you don’t expect them to know everyone’s name and know everything about you, but I think the people here are pretty professional. They have a good balance between, you know, your teacher and also trying to actually be, to have some sort of a relationship with you, so I’d say that it is pretty good. I get a pretty good response outside of class.

**Describe any difference you see in men’s and women’s out of classroom participation, how often they come in for help or work in groups.**
My experience has been that it seems like women are often quicker to go to help sessions or office hours and stuff like that, not meaning, and that is kind of not always a good thing depending on the person, because some people, guys or men and women, they use office hours just to pretty much get answers and so it depends on the person, but by and large I
think women seem to be more involved in that type of thing. Men are more, you know, kind of the lone wolf, don’t really need to ask for help “I’ll get it, I’m fine, don’t worry”. As far as working in groups, I think it is pretty balanced. Men are pretty accepting of taking, you know, meeting with each other outside of class to if nothing else go out or go to a movie or the bars or whatnot, but definitely with class work as well. I think it is pretty balanced in that aspect.

*Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?*

What do you mean, as far as class requirements? [Anything about how they perform as far as homework, tests, working together in lab. I mean really anything.] I think as a generalization women seem to work better. They are harder working than the majority of men plus, I mean, but with that there are a lot more men, or there is noticeably… I don’t know how I say it. There are more men to pick from it seems like, so you could see, well, boy A and B are both doing poorly and you can make a generalization that men are doing poorly when maybe it is not the case at all. I think as a generalization women do better, but I think men have a higher top-end but a bigger variance. Like you will have, I think….. The leaders of our class, I think, are men as far as GPA-wise but you will also have a lot of really low GPA men, and on average I think you will have a lot of pretty darn good GPAs out of women with less variance, so it is kind of…..

*Describe your strengths and weaknesses in engineering.*

Hmmm, my strengths? Well we’ll go with the easy one. The weaknesses, uh, I guess prioritizing for me. Like my priorities are not always class-centered. I have things going on in my life that don’t involve school and so making, you know, I am a CA so finding time with that as well as, you know, figuring out what is important and to me I find that sometimes I don’t feel that what we do is always the most important thing at the moment.

Weaknesses in engineering? Strengths, I think I am a pretty strong….. I am pretty vocal. I am pretty….. I speak my mind. I am pretty go-to. I am a hard worker when it comes to tasking. I am often the leader in the group because I kind of have a good image of the overall concept of what needs to be done. I guess in the same respect my weakness is I don’t normally like to get into the nitty-gritty details of a project. Normally I like to kind of have an overall encompassing view of what is going on.

*What do you find most difficult about your program?*

Good question. Uh, who is reading this? [laughter] Most difficult….. I would say I think one thing that could be improved upon is the math basis. Our program is very, very math intensive and what is unfortunate is our math department isn’t very strong, and so we often when we are talking about the transforms or matrices or complex variables or whatnot, we have to take a week and review that because they pretty much assume that we don’t know it which usually is a good assumption, and so I think the backing university-wide between the engineering departments and the math department, the link isn’t there. I mean the math is the foundation of these programs and if it is not strong then you know the tendency is for it to crumble.
What expectations do you have for yourself in engineering?
I do not want to work in a factory that’s for sure, and I think that goes contrary to most chemical engineering majors. My expectations of myself - I would say that in general, like I said before, my big push is kind of having an overall understanding of how things work and so in engineering I like to, you know, aside from engineering I like to know about the finances of it. I like to know about the construction of it, the other aspects that they don’t teach you. Besides how to design distillation columns, to be honest I don’t really care, but what I find interesting and what I expect for myself is to kind of have a very good view of the process as a whole instead of just the nitty-gritty details.

END - Chad interview (7)

Interview with Derek for March 30, 2005
(tape 2-B, interview 4)

What factors affected your choice of university?
Probably the biggest factor is that it’s a good engineering school. I was coming for mechanical engineering, so in Iowa that is the best choice.

What factors affected your choice of a major and what would have caused you to change your major earlier on in your program?
I chose it because I liked science and mechanical type things and I almost changed it a few times just because it was pretty tough, so.....

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex? I guess, do you mean as far as differences between the two or? [Right.] I don’t know. I guess I don’t really see a lot of differences between performances or a lot of things. I guess sometimes the girls probably tend to be quieter but that may just be because there are a lot fewer of them so, I mean, just the number of times one person would speak would be less so that may be why. I know some girls who are probably more assertive than a lot of the guys as far as asking questions too.

Describe any difference you see in men’s and women’s communication in groups, how often they participate, take leadership positions, and how others respond to them.
I don’t know, I guess I have seen it from all areas of the spectrum. I know a girl who is really involved with the ROTC, and she like takes charge of the group and she kind of ends up leading the group just because she takes a lot of initiative, and there are some girls who just are pretty laid back and just kind of go with the flow.

Describe your own classroom participation.
I would say if I have a question I am going to ask it. Usually I am probably not going to be.... I don’t ask every question I have probably. I don’t know. I would say it is moderate.

Describe the classroom climate in your engineering courses.
I would say it is pretty good. I would say that most of the instructors really encourage you to ask questions and dialogue with you. You know, they are pretty open to talking after class or things like that.

**How does your professor respond to you in class?**
Is this for the one class, for the design class? [You can make it a specific reference to that class or if you want to do more of a generalization.] Well for our design class that you are studying I guess pretty good. You know, I mean there is one guy for like all sorts of people and it’s the nature of the class he is always getting asked questions, so I would say he does pretty well. He doesn’t like sit in the front and surf the internet or something. He goes around and helps people.

**Describe your classroom versus lab interaction with professors. Is one more formal or informal, focused on course content, or are there social aspects?**
I don’t know. I guess I interact with them. I mean, I guess I don’t like hang out with my professors if that is what you mean, like informally, that kind of thing. I don’t know, I guess I don’t really get the question all that well. [laughter] [Is it, when you are in either lecture or lab, what you discuss, is it mostly course content or are there references to social things going on or campus events?] A lot of it depends on the professor, but most of them are pretty laid back. I mean they like talking about things that are going on in the real world not just course things, so I hope that is kind of what you are asking. [Yeah.]

**Describe any difference you see in communication from lecture to lab as far as how often you communicate with your professor and with other students.**
I would say in lab I communicate a lot more frequently just because there are usually a lot more questions. You know, I am not just taking notes, I am doing things, so a lot more questions come up during lab.

**How does your professor respond to you outside of class in office hours and in meetings?**
I have had some professors that are pretty good, and I mean they will give you their cell phone number and tell you to call them whenever if you need help, but I have had some professors that you have to find them when they are in their office or you are not going to find them ever because they don’t really respond. I don’t know. I just heard of this one guy a few weeks ago who like, this kid set up a meeting with him in his office and he wasn’t there, but the kid called the guy’s office and the guy answered it. He was like inside the office and the kid was in the hallway and he was like “Uh, what’s going on?” but I have never had any big problems like that, I guess.

**Describe any difference you see in men’s and women’s out of classroom participation as far as going in for help or working in groups with other students.**
I would say it is pretty equal between the men and women, you know. I think the girls might even be more apt to ask for help than the guys.

**Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?**
Not really. [They are equal?] Yeah.

**Describe your strengths and weaknesses in engineering.**
I don’t know. I think a lot of my strengths are... a lot of things are kind of intuitive. I don’t know. I am definitely not really good at, or really smart, but just given the way... I mean the equations and everything make sense because I have an intuitive feel for a lot of the things. And I would say some of my weaknesses are just, have been like, I don’t know in some of the more technical classes, where it is a lot of math without application or it is a lot of theoretical stuff.

**What do you find most difficult about your program?**
It takes quite a bit of work to keep up on everything, just paying attention in class, doing homework problems, reading through the book. There is just a lot things you have to be doing all the time so, but that is probably the same with any major, so -

**And what expectations do you have for yourself in engineering?**
I guess I would just like to do well and be successful, you know, whatever being successful means. Just having a job that I enjoy and I guess that is somewhat fulfilling. That is not, I don’t know, just doing something meaningless like flipping burgers or doing the same thing all the time.

END - Derek interview (8)

**Interview with Jared for March 30, 2005**
(tape 2-B, interview 5)

**What factors affected your choice of university?**
Well I guess the main reason was it was a good school for engineering that I heard and I liked the campus other than that. It seemed pretty nice down here so that was why I decided to come here.

**What factors affected your choice of major and what would have caused you to change your major earlier on?**
I guess I always knew I wanted to be an engineer. I guess it wasn’t no big thing. I know growing up I always liked to put stuff together or stuff like that, so that was why I chose mechanical engineering. As far as changing my major, I never really thought about that. I guess if my grades weren’t good enough or whatever, but other than that I guess I never thought about changing to something else.

**How do you perceive the performance status of the men and women in your classes as individuals and as compared to the other sex?**
I guess in my major there are not many females anyway, but I guess I don’t see any big difference, you know, as far as performance I guess that I can tell.
Describe any difference you see in men’s and women’s communication in groups, how often they participate, take leadership positions, and how others respond to them.

I would say it is about the same. You know again I haven’t had that many. I have had a couple of groups with a few women in them but, you know, I think that they have pretty much been on the same level as far as participation or leadership goes.

Describe your own class participation.

I would not say I am the best student, but you know as far as groups I always try and make sure I do my part in that. Individually I guess I could work a little bit better on participation but, yeah -

Describe the classroom climate in your engineering courses.

It is pretty, um, not exciting, I guess I could say. You know, you go there and just... It depends on the professor you have too, but it is pretty, you know, sit down and take notes and leave after an hour or so. [But it is generally comfortable?] Well, yes, comfortable usually, yeah.

How does your professor respond to you in class?

Professors in general? Well, I guess it depends. Most of them are pretty, you know, if you have a question they are willing to answer, or you know, if you have any problems they will help you out. I have had a few where, you know, they were hard to get a hold of sometimes or they don’t explain stuff sometimes too well, but I’d say in general they are pretty good.

Describe your classroom versus lab interaction with your professor. Is one more formal or informal? Is the conversation focused largely on course content, or are there social aspects?

Well in most of my classes, professors teach class and then they have a TA for lab. As far as, I guess, the format in lab I would say is more informal. It is mostly on core content, I guess. It is more, you know, essentially a lot of them are students as well as it is not quite as formal. They definitely focus on the course and make sure they get that part covered and stuff, so -

Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor or the TA and communicate with other students.

Well I would say I communicate more with students because, you know, we usually work in groups. We like to do lab write-ups together so there is a lot of communication between each other student. For me personally there is not much difference between communication between a lab TA or a professor. You know, if I have questions I will ask, but I won’t say one way or another I communicate more to either one.

How does your professor respond to you outside of class during office hours and meetings?

Mostly during office hours. I know some professors that I have had, it has been kind of hard to get to office hours and they will set up meetings, you know, outside of class or after class sometimes you can talk to them about the class, but mostly during office hours.
Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help and working in groups.
I guess I haven’t noticed any difference really myself for that.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
As far as requirements that they have to do? /Yeah, anything having to do with the course material, homework./ Uh, no, none at all.

Describe your own strengths and weaknesses in engineering.
Oh, gees. [Laughter] Well, I really like math so I am pretty decent at math. I like to think up things, design things, come up with new ideas and stuff like that. As far as weaknesses, I am not the best test taker myself. I am not the best writer. I am not good at writing papers at will. I guess that would be it for that.

What do you find most difficult about your program?
Most difficult? I would say the most difficult is, I guess, managing time to make sure you have enough time to do all your required stuff between homework, lab write-ups, studying for tests, stuff like that. That is what is most difficult for me.

And what expectations do you have for yourself in engineering?
Well hopefully graduate here next semester and then find a job and start making some money, I guess. After that I am not too worried. I am just focused on that right now so other than that, that is about it.

END - Jared interview (9)

END of tape #2-B

Interview with Anne - March 29, 2005 (tape 3-A, interview 1)

What factors affected your choice of university?
First of all I knew that I wanted to get away from where I am from - I am from Omaha - far enough that my parents couldn’t readily come visit me on weekends. I wanted someplace that had a strong engineering program and I wanted a place that wasn’t going to completely kill my budget, so I looked at schools both in the Midwest and on the east coast and Iowa State turned out to be the best choice for me.

What factors affected your choice of major and what would have caused you to change your major earlier?
I guess I came in declared as chemical engineering when I was a freshman and I sort of based that choice on the classes that I had in high school - advanced chemistry, physics, even some biology. I enjoyed those classes and I felt my understanding was pretty good, so the fact that I did well in those classes and all my teachers said “Oh you should major in engineering. You’d be good at it.” And I guess at this point I definitely wouldn’t change my major, but if
in my introductory little courses just laying the basic ground work for the chemical engineering curriculum, if I had struggled in those classes then I would have seriously considered having to change.

**How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?**

From what I have seen I wouldn’t say that there is much of a difference. I guess I have worked a lot with both women and the men in my classes, just working together on homework, working on projects, things like that, and in comparing the things that we do and the way that we solve problems or going about putting together something for one of our design projects, we overall have a pretty similar approach to doing things. And then I guess just from what we have shared with each other, we usually perform pretty comparably to each other when it comes to grades on homework or tests or as I said projects, things like that.

**What about class participation and how vocal they are?**

I guess in class most of the time I would say overall women ask more questions than men when it comes to lecture and new topics and things like that, but for the most part the men that do ask the questions are the same ones, three or four guys that I can think of in particular, whereas when women tend to ask questions it is not the same set of people asking questions every time.

**Describe any difference you see in men’s and women’s communication in groups, how often they participate and how often they are leaders and how others respond.**

Specifically in our upper level chemical engineering classes, I think that women do more of the organizational getting together and forming groups to work on projects, work on homework, things like that. When say we have a group formed already, participation within the group is pretty consistent I would say. I would say that women more often take the leadership positions or are sort of recognized as the leaders just because the men tend to be more laid back about their participation. In terms of actual input to what we are doing, pretty even.

**Could you describe your own class participation?**

I tend to ask questions when I want clarification on something, be it a new concept, a way of solving a problem that I do not understand completely. When we are asked to work on example problems in class I would say about half the time I will offer my answer if I feel confident about it.

**Could you describe your classroom climate in your engineering courses? How comfortable you feel speaking up.**

Well I feel that student participation is encouraged, so I have never felt discouraged from asking questions or asking for clarification, things like that. I think our professors have done a good job of just making it a comfortable setting for students to feel like they are actually learning information that we are trying to be taught.
How does your professor respond to you in class?
For the most part they will answer questions thoroughly. Most will check back to see, “Do you understand what I just tried to answer for you?” and for the couple of times that maybe they don’t have an answer right away they will say “Hey, come talk to me after class” or “Shoot me an e-mail and I’ll get back to you because I can’t think of something right offhand” and they are pretty good about getting back to me afterwards, too.

Describe your classroom and lab interaction with your professor. Is it more formal in one or more conversational in one, focused on course content or are there social aspects, political aspects at all?
Within class any communication is normally geared toward what we are doing. In lecture it is pretty much about what we are working on, in the lab it is about whatever project we are working on, and so I would say that it’s pretty much focused on course content in the classroom setting. [Then is lab more social at all?] Not really because our lab time is focused on the project that we are working on and so if we had a question or something we will go ask the question and then rather get back to working on that, so that is sort of how it is in that type of setting.

Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor and other students.
In lecture if you ask a question it is usually somebody raises their hand, asks a question, gets an answer, and people kind of nod their head yeah, okay, and we move on. In lab if we have a question on part of our project that we are working on, we will go talk to the professor and it is more of a discussion about what you would do to go about, you know, organizing that part or solving that part of the problem and it is more of a discussion rather than question-answer.

How does your professor respond to you outside of class in office hours, labs or meetings?
They are usually pretty helpful. Again those tend to be more discussion oriented types of conversations, the professor trying to gauge our understanding as well as simply trying to answer our questions, and most of the time it is pretty helpful.

Describe any difference you see in men’s and women’s out of class participation as far as coming to help or working in groups.
As I said before and I guess will say again, I see women working more to organize groups of students getting together to work on stuff, but when it comes to actually showing up for something like that and, you know, giving input when you are there, I would say it is sort of equal participation. In terms of coming to office hours, coming to help sessions, things like that, I might see more women participating in things like that than men, but I suppose it varies depending on class too. One class in particular it is pretty even and there are a lot of people who go, but other classes you will hardly ever see any guys there.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
In terms of performance on class requirements not really. I guess the one thing I could comment on is that in our project groups, having worked with both men and women, women tend to be more goal oriented, working on ‘let’s get this done and do it well’ and then move on whereas men tend to, I guess, dwell on some of the things that we are working on and then they are also less enthusiastic about getting things started and getting things done quickly. In terms of final performance there is not much of a difference though that I would say.

Describe your own strengths and weaknesses in engineering.
Personally I think my strengths lie in the more conceptual parts of the material that I have learned. As far as weaknesses, I haven’t taken my lab courses yet so I don’t have the hands-on kind of knowledge yet. Obviously I will get that before I graduate, but right now that is where I think my weaknesses lie.

What do you find most difficult about your program?
I think the most difficult part is just balancing everything. I try to do well in my course work as well as stay involved with organizations within the department and within the university. I have a job as well and so just being able to keep up with everything and still stay on top of my class work and feel that I am doing well in my class work is the most difficult for me.

What expectations do you have for yourself in engineering?
I am finding that my expectations are that in the classroom when we learn something I want to feel comfortable with that concept or, you know, that type of information. After having done an internship for a summer, that is the type of thing that is going to be more important than what grade I got in the class and I guess that is something that has changed since I was a freshman/sophomore student, but now I think that that is going to be the most important for when I graduate and, you know, move on and that sort of thing.

END - Alice interview (10)

Interview with Jason for March 31, 2005
(tape 3-A, interview 2)

What factors affected your choice of university?
I chose Iowa State basically because I knew I wanted to be an engineer. I am from Iowa City and it is cheap in-state tuition. I also kind of knew that if I stayed at home and went to Iowa I would probably be unsuccessful, [laughter] party a little too much. I knew Iowa State was really good and I went to a ( ) here too and they have like a really good marketing type program for, you know, for high school students.

What factors affected your choice of major and what would have caused you to change your major earlier on?
I knew I wanted to be some kind of engineer. I was undecided for a year. I chose chemical because I wanted to do environmental work and maybe like work for the EPA and do some of like the regulatory stuff with the chemical industry. Things that would have changed my
major, that would have caused me to change it, my current major - I knew the work load was
going to be tough, I mean chemical engineering is pretty tough. I probably wouldn’t have
changed it. I guess the job market right now for chemical engineering has a lot of jobs that
do the opposite of what I want to do. It is very much like industry and like try to avoid the
EPA and try to like, you know, just meet regulations to a minimum. A lot of the cool
environmental jobs that I probably would have wanted aren’t really in high demand right
now so they may have caused me to consider changing maybe.

**How do you perceive the performance status of the women and men in your class as
individuals and as compared to the other sex?**

As individuals I think our classes are very competitive and I think performance basically is
pretty much the same. Everyone is pretty good. There are a few students who kind of slack
off and don’t do quite as well, but I think if you made it through chemical engineering this
far and you are like in a senior level class, you have your shit together enough to know like
what to do to get by so performance wise there are students that will stand out, but you have
to be pretty good I think to make it this far. The class participation with men and women, in
class participation I think it is pretty equal. I think men and women participate equally.
Maybe you have seen that in your observation of the class. Level of performance, I already
touched on that. I think it is pretty equal. We have kind of a variety in all there. It is not
really gender specific. Vocal participatory, yeah, I think it is equal as well. A lot of times in
our classes we don’t ask that many questions during lecture. I am not sure if we just don’t
feel comfortable, we don’t understand what is going on or what but probably a little of both,
but during lecture there is not really that much participation I would say based on other
classes I have had.

**Describe any difference you see in men’s and women’s communication in groups, how
often they participate, how often they take leadership roles, and how others respond to
them.**

I would say in my experience in groups men have definitely taken the leadership positions,
but participation has been very equal I would say. And communication I think is probably a
little better with women in my experience for me anyway. The women tend to communicate
a little better maybe. Why that is I really don’t know. Maybe it is like they are not in a
leadership role, they just want to get things done, but somehow I think the women are more
efficient for communication in my experience.

**Describe your own class participation.**

My participation in class - I ask questions when I don’t understand things. A lot of times in
the lecture participation we just sit there and take notes as fast as we can and then if there are
some questions I will usually ask a question, but I wouldn’t say I wouldn’t participate any
more or any less than anybody else. I think it is pretty equal.

**Describe the classroom climate in your engineering courses.**

Usually the climate is about 72 degrees. [Really? Laughter] I don’t know. It is, um, I think it is pretty tense. It is a pretty competitive thing, but like you said mechanical was way more
tense than we were. I think it is pretty competitive and, you know, students won’t let you
like see their test scores, like you know, it is kind of like there is definitely a competition there. And they always want to know how you did in your homework assignment, which problems you got wrong, and try to figure out where they are going to be in the class like for the curve and the grade and that kind of thing. Yeah, I think it is very competitive just ‘cause the job market right now is real competitive too. You know, like in an interview they are always going to ask what your GPA is and why you have this GPA and what classes you had that hurt your GPA or helped your GPA and that kind of thing, and that climate is reflected very much in the classroom atmosphere so..... [Interesting.] It is competitive but probably way more laid back than it would be in the mechanical division like you were saying. [Okay.]

**How does your professor respond to you in class?**

All of my professors have liked me, I think, I guess. Um, I don’t know, how they respond to me like when I ask a question or what do you mean respond? [When you ask a question or how encouraging they are or how approachable they are.] If it’s a good question they are very approachable. I have never had a professor say it’s a dumb question or like that kind of thing. They are always pretty understanding and like questioning is very, uh, they like you to have to ask questions. It’s really a good thing to do so, um, they are very open and yeah they are helpful too.

**Describe your classroom versus lab interactions with your professor. Is one more formal or informal, focused on course content or are there social aspects?**

I would say it is pretty informal once you have lectures more. It does become more informal and conversational as you have probably seen in the lab. This is my first class where we have actually had like the two types of the course, like the first lecture part and then like the lab. Usually the lectures are more formal and then after like the lab now it is a little more informal, but out of class professors are very approachable, very informal. Focused more on course content? Yeah, I don’t know how to answer that really. Reference or comment on campus or political events - um, during the elections last semester one of our professors kind of got into some politics and some election stuff and that was pretty interesting. It was really cool. But a lot of times social and political events aren’t including in our lectures or anything like that.

**Describe any difference you see in communication from lecture to lab as far as how often you communicate with your professor and with other students.**

Well obviously in the lab there is way more communication. Lecture is very, very quiet. You are taking down notes. Maybe students will ask two questions in an hour, something like that, you know, but then in the lab it is a way more relaxed atmosphere. You can talk to your friends and talk with teachers in a very informal setting, so that is kind of nice.

**How does your professor respond to you outside of class in office hours and meetings?**

Professors in my experience have always been very, very helpful out of class when you can find them. Usually they are in their office hours when they say they are going to be, but yeah they have been always really helpful, really good.
Describe any difference you see in men’s and women’s out of classroom participation as far as coming in to help and working in groups.
I guess it is kind of hard to compare that. Coming to help sessions - we don’t really have help sessions and we do sometimes work in groups out of class. I think women like I said are maybe more eager to get things done and communicate better, um, with groups outside of class. They usually in my experience have been more willing to work outside of class, not a lot but you know that is maybe something a little bit, maybe a small trend. I don’t know. There is not much difference.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
Not really. I don’t think so. Like I said before even just between guys and girls or girls and girls, whatever, if you have made it this far in chemical engineering you are pretty much going to make it. You are pretty much the same. It is not really that much of a difference.

Describe your own strengths and weaknesses in engineering.
My strengths in engineering are definitely communication and writing skills and just being able to see like an overall picture of a problem. I am not really, really strong in like the computational engineering type things. I am glad I have this whole huge education to learn more about it, but if I see myself going on in a career I definitely wouldn’t be the engineer in the back like cracking the numbers. I would probably the one out talking to clients and getting things done like that way in a business atmosphere, so that is probably where my strengths would be. My weaknesses would be like the computational things. I can work through the problems and get it done, but compared to some of my classmates I am not like on the strong end of that so I would probably be more doing communication and maybe higher level stuff eventually.

What do you find most difficult about your program?
Just probably the length, like the length of the program, like the requirements we have to do and just like how many classes you need. Like most students it is rare to get done in four and if you do in four you are doing pretty well and you are hitting hard each semester. So I guess the length and the duration of the program, and also I think the freshman and sophomore weed-out classes are pretty tough, like you know, your first few calculus classes and your physics and your organic and p-chem, that kind of stuff. I think that is pretty tough.

And what expectations do you have for yourself in engineering?
I don’t plan to be an engineer very long. I am planning to join the Peace Corp after I graduate and then go back to medical school, and so my plan for engineering has kind of diminished. Engineering is very cool and it is very important. It is a very good base for education I think. It helps you acquire some really good problem-solving skills that are applicable in all areas of life, but I don’t foresee myself doing too much engineering.

[Interesting]

END - Jason interview (11)
Interview with Jeremy for March 31, 2005  
(tape 3-A, interview 3)

What factors affected your choice of university?  
I came here chasing a girl. I was accepted to the third best chemical engineering school in 
the nation but I turned it down and came here, chasing a girl.

What factors affected your choice of major and what would have caused you to change 
your current major earlier on in the program?  
I chose my major because I am a money whore and I really wanted to be a chemist and I love 
chemistry. I am really disappointed with this major because it is so far from chemistry and 
so much about engineering, but I figured that this was a happy medium where I could make 
the money and also at least have something to do with chemistry. And as far as changing my 
major, I wouldn’t do it. I wouldn’t do it because I know that this is the hardest undergraduate 
major and I wouldn’t like being out there and having anybody with a four-year degree say 
well I’m this and then if it’s harder than mine that is kind of like a put-down.

How do you perceive the performance status of women and men in your classes as 
individuals and as compared to the other sex?  
Well you notice as far as engineering go this has more women than men and it starts out as 
freshmen more men. But because men only have the capability to think linearly and women 
can think laterally, you will notice that as the classes progress, the men - there are less and 
less of them as they drop out and filter out into other classes and all the women are still here. 
And keep in mind those women that do come here obviously have already been trained in 
thinking logically and using their linear thinking, so they are able to excel and the men are 
just as everywhere across the board falling behind.

Do you see a difference in class participation and how vocal they are?  
Women are not as vocal in class a lot of times. At this point though they do tend to get more 
vocal but they are still, you know, not as vocal. It’s the….. I wouldn’t….. more of a 
socialization probably rather than confidence, because by now most of these girls already 
believe, you know, they can take on the world and they can’t.

Describe any difference you see in men’s and women’s communication in groups as far as 
how often they participate, take leadership roles, and how other people respond to them.  
Well generally we try to….. This is actually interesting because (in) my last group we 
basically, the girl came up with the schedule of what to do and everything, and we were like 
we have a leader but she ended up asking the other guy at one point. She’s like “Will you be 
the leader?” so, like, she was like the non-leader leader. In the group before that, of course, 
the woman was a leader and in another group we put the women as leaders. It is just CH-E’s 
are realists. It doesn’t matter. You don’t get to where you graduate in this field unless, you 
like, accept reality and look at it, you know, for what it is and the organization skills, we just 
don’t have it. They actually have planners and they actually write in them and they actually 
look at them and use them. I don’t know a single guy that does it.
Describe your own class participation.
I am very vocal. And if I can crack a joke I will.

Describe the classroom climate as far as freedom to speak up and general comfort level in your engineering courses.
In this building anyone can speak. I mean you have a couple - one professor, Dr. Riley, he is intimidating and then it is just like ‘Ok, God’s entered the room, shut up and listen’ but for the most part in this, especially by the time you are a senior, you speak freely. [Is that intimidating professor male or female?] Male. Yeah, at one time he actually said “Don’t hit me”. It was him and I in like biochemistry lab and we were the only ones and I must have, like, he wouldn’t give me any direction whatsoever. He was like “Oh, look in a journal” but that was part of the class but still it gets..... and he said girls have cried like when they took the biochemical lab. But I guess I forgot, like, to keep my head tilt going and I must have straightened out and started looking like I was...... I would never have done it, but I don’t know. Maybe it was a little bit of a joke, but he could tell that I was, that my posture was getting more aggressive.

How does your professor respond to you in class?
They generally respond pretty well. You know, I am more of the ‘why’ rather than the ‘this is how it works’ type because I am not an engineer at heart. I think it makes it a little bit more interesting.

Describe your classroom versus lab interaction with your professor. Is one more formal or informal? Is it focused largely on course content, or are there social and political aspects?
In lab? [In lab versus lecture.] Well, lab of course is less formal, because in like your general lab settings that we have. Part of it is Stephanie Loveland is the instructor and she is fantastic, but she is also very informal and talks of her dogs and stuff like that and like with Dr. Riley in lab, you know, it gets less formal when you are there until six o’clock at night and he is giving you, you know, you have his keys because you have to unlock doors and stuff, so it is just by nature it has to be less.

Describe any difference you see in communication from lecture to lab as far as how often you communicate with your professor and with other students.
Much less than lab. Sometimes it is good. Sometimes it is good, but Stephanie has her dissertation. She is going to be a doctor soon and I have had communications trouble this semester with her, and then also I am not much of an e-mail person which can make things difficult for my lab partners so I make sure that they have my phone number.

How does your professor respond to you outside of class as far as office hours, in meetings?
I have never known a professor in this building to like not make time for you unless they had a meeting. Even though they have set office hours, basically office hour is whenever you see them as long as they don’t have a class or meeting.
Describe any difference you see in men’s and women’s out of classroom participation as far as coming to help sessions or working in groups.

They are much better at it. When you go to an office, if you actually do have a question, and generally my questions are very short, if there is someone sitting down talking to the professor or lecturer it is usually a woman.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

I don’t know. I would say early on when girls first get thrown in here there is a learning curve, but performance wise you know they just tend to do better, tend to do a lot better. The less structured the class is, the woman tends to do better because of scheduling, because of organization.

Describe your own strengths and weaknesses in engineering.

How did the other people answer this? [laughter] [I can’t divulge that information.] Given enough time I can do anything. I mean this building, the egos - and if they are not answering the way that I am answering, it is because they held back - when someone of another discipline walks through that door they should get on their knees. And, uh, I can do anything and I think most of my classmates can to. They are savants. They will talk to you about history. They write very well. They think very well, logically. And a political debate in this building is so much different than others because it is more like ‘Wow that was really interesting on the internet. It was amazing how you could look at each precinct and see that this only had so many votes but it was this percentage for Bush. This had so many votes. It was this percentage for Clinton.’ I don’t even know how anybody voted. A couple of them maybe, but that’s not where the discussion goes. We are gods, or not yet. I don’t have the official tag yet, but we pay for it. We pay for it.

What do you find most difficult about your program?

Labs. These two last labs were just awful. And I am a severe alcoholic which makes it really difficult for me to keep up with time, and I end up like having to pull all-nighters and such, and then the next day it’s like wow I didn’t drink enough that day and my body is killing me for it, so as soon as I get done I can’t even go to sleep because I’d have to take the next four hours filling my alcohol requirement before I can go to sleep and it’s just, it’s tough. It’s just so much work I just can’t wait until I can go home and have my home be mine.

And what expectations do you have for yourself in engineering?

I don’t like engineering so I am going to go in and I am going to just throw myself at it completely when I start out, and during that time I am going to get an MBA because generally then like you get out of engineering and more into management. Not that I am a big fan of management, but right now I am just going to chase the dollars. You know, I’ve made my bed and now I am going to lie in it, but I am going to enjoy what goes along with it.

END - Jeremy interview (12)
Interview with Rose for April 6, 2005  
(tape 3-A, interview 4)

**What factors affected your choice of university?**
I would say the reason that I came to Iowa State is good recruiting efforts by my major professor in my other department, so since I am a graduate student I think that is different than in the undergraduate level but that is what it was. It was the recruiting.

**What factors affected your choice of major and what would have caused you to change your major earlier on in the program?**
Well, I chose my major originally because I was interested in biomedical engineering and I am an ag engineering student so that was a way to get the biology into my engineering curriculum. And what would cause me to change my major? I am pretty happy where I am but I think my work experience has been more mechanical engineering, so if I were to change it would probably be to mechanical.

**How do you perceive the performance status of women and men in your classes as individuals and as compared to the other sex, as far as participation and how vocal they are?**
I'd say in larger classes especially as an undergraduate, I noticed that... I don’t know, some women are more vocal than others just like the men, but I think in a big class where it is primarily men versus women that you would see a little more participation from the guys than the girls.

**Describe any difference you see in men’s and women’s communication in groups as far as how often they participate and take leadership positions and how others respond to them.**
I have done a lot. I have had a lot of classes with group work involved, and in my department there is actually kind of a lot of women as compared to men so it has been only in large classes that there has been a big discrepancy, but I would say that it is pretty even and from my personal experience I have been thrown into the leadership positions a lot so I don’t really feel any kind of strangeness between the sexes there.

**Describe your own class participation.**
I feel pretty comfortable participating in class. The class that I am in now that I guess that you are studying is very heavily men over women, but I am not really intimidated by them so I am pretty vocal.

**Describe the classroom climates in your engineering courses.**
Again in the larger classes people are just less likely to participate in general just because there are so many other people, but in smaller classes I think it’s as you move up in the program that it becomes a lot more interactive in general.

**How does your professor respond to you in class?**
You mean like positively or negatively, asking questions or? [Yeah, just how in general they may be, I don’t encourage you or discourage you…..] I think generally they are very encouraging, especially in this particular class very encouraging.

**Describe your classroom versus lab interaction with professors. Is one more formal or informal, based on course content, or are there social/political aspects?**

Classroom is always…… always feels more formal to me than lab work. I have a lot of very informal interaction with my major professor, so I feel that is pretty different than in a formal classroom setting.

**Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor and with other students.**

In a lab situation I think you have a lot more opportunity to be interactive with whoever you are working with and also with the professor, and it just depends on the class but a lot of lectures are pretty, you know, stagnant and you don’t really have a lot of opportunity to break it up, so I think the lab is definitely more interactive.

**How does your professor respond to you outside of class in office hours and in meetings?**

It is the same thing, encouraging I would say, like excited that you are taking the time to be excited about what you are doing, you know, outside of class.

**Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help and group work.**

I don’t guess I really see a lot of difference. I guess in engineering at an undergraduate level especially, you just have so much work to do that everybody tends to work together outside of class so I think that is probably pretty even.

**Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?**

I don’t think so. Maybe just the participation level in large classes but that is about all I can really see.

**Describe your own strengths and weaknesses in engineering.**

Oh gosh. [laughter] I guess I have always been pretty good with doing stuff on paper. You know, just working with numbers and stuff and that is why I got into engineering to start with, and until my graduate program I wasn’t very good whenever I had to present things or do speeches and things like that, but I have gotten much better at that by force [laughter] in graduate school, so that is a weakness I have improved. [laughter]

**What do you find most difficult about your program?**

Just finding time to fit everything in. It is always just a lot of deadlines and a lot of stuff, so just time management I think is probably the most challenging thing.

**And what expectations do you have for yourself in engineering?**
Well, I am looking for a job right now because I am graduating soon and the type of work I am in is consulting, and I think over the next 10 years I just want to obtain my license to practice as a professional and get in maybe a more management role, you know, as time progresses, so those are my goals right now.

END - Rose interview (13)

END of tape #3-A

Interview with Melinda - April 7, 2005
(tape 3-B, interview 1)

What factors affected your choice of university?
Scholarships were a big one and the reputation of the engineering program here. They are better than in Nebraska even though I am an out-of-state student.

What factors affected your choice of major and what would cause you to change your current major?
I was actually a computer engineering major when I got here and then I changed based on just the way my interests were. Like I figured out what exactly I wanted to do, what I was more interested in. I would change my major if I decided that I didn’t like the classes I was taking or if I didn’t think that the classes would help me get to where my career goals are.

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex as far as how they participate and their level of performance?
I’d say it’s.... you can’t really generalize based on like women and men. It is pretty much an individual basis. I do well in my classes and I know there are men in my classes who don’t do so well and I know men that do a little bit better than me sometimes, so it is completely an individual thing I would say.

What about how vocal they are in class? Do you notice any... I would say, um, it is kind of hard to say because there are generally more men in the classes so they are usually pretty vocal like as far as that goes, but if women have like a question or whatever they won’t hesitate to ask.

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate and take leadership positions and how others respond to them.
Men kind of don’t really say a whole lot in like group settings as far as..... Men will kind of stand back at first especially, and the women will kind of throw everything out there because they are like ‘well I have nothing to lose’ so they will put forth all their ideas, and then the men will kind of chime in after that. But the men will at first take leadership positions and then the women will kind of come in and..... It’s kind of weird [laughs].

Could you describe your own class participation?
If I have a question I will ask or if I, you know, it depends on the day. If I feel like being interactive and whatever, then I will, but..... I don’t know. I will ask questions and answer questions if I need to.

Describe your classroom climate in your engineering courses.
Well in some of them there isn’t really an opportunity to participate. You know, some are large lecture classes and so it is pretty much just lecture based, and they just kind of go through it and you take notes and that’s about it. Others you are, like in 231, you are asked to participate pretty sensibly and so it all depends on the class I’d say, but like if you are asked to participate in those classes especially, then you are more comfortable like talking and stuff like that. And in the smaller classes I would say it is easier to talk and to have more participation.

How does your professor respond to you in class?
The same as anybody else. I don’t know if that is kind of what you were getting at. Just like if I say anything, if I don’t understand something, they will try to help me understand it or if I answer something they will, you know, just ask me like any other person in the class.

Describe your classroom versus lab interaction with your professor. Is one more formal or informal, focused on course content, or are there social aspects?
I don’t really have like a lot of lab classes, like they have projects and things, but I would say it is pretty informal. I can just go in and say ‘Hey what’s up?”. And one of my professors, Loren Zachary, he just likes to be called Zach and so we just call him Zach all the time, so it is really an informal thing.

Describe any difference you see in communication from lecture to lab as far as how often you communicate with your professor and other students.
I would say like in a lab type of setting is when I would talk to students more often because it is more of a hands-on type thing and so your professor can’t, you know, be there to hold your hand the whole way. So if somebody has gotten something that you didn’t get or if you did that they didn’t get, then it is just really easy to talk to the other people that are in there with you and get help or answer questions.

How does your professor respond to you outside of class during office hours and in meetings?
Like with Dr. Zachary, like he has help sessions every Tuesday night and he pretty much just opens up his office for two hours like on a Tuesday night, and just lets us come in and work on our homework in a bunch of groups and just..... It is just really, I don’t know. He is really helpful especially then. He will field any questions we have and he won’t give us direct answers maybe but he will at least guide us a little bit, you know, where to go.

Describe any difference you see in men’s and women’s out of class participation as far as coming in for help and working in groups outside of class.
I’d say coming to help sessions, it depends, but I am usually the only girl that will go to my mechanics help sessions. There are only three girls in my class though so it is kind of hard to
say for that one, but usually for like class reviews most of the class will show up for those and then working in groups I’d say girls tend to show up more often than not. Like in my ME 270 class we only have three girls in our group and we have a group of 12, and the three girls have only, like, I think only one of them has missed one class and then the guys will miss kind of more frequently because it is not as easily noticeable if they are gone so……

[Yeah, I suppose.] Yeah, so three versus like nine.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

I would say like women have a harder time, well at least me. I have a harder time like visualizing things like in a 3-D sense. I need like physical representations. I can’t just look at a two dimensional picture and just get everything that’s going on whereas like some of my guy friends, you know, have a lot easier time doing that and so they have to like try to help me and explain like where everything is supposed to be on, you know, this object we are supposed to think up in our head. Um, I’m trying to think of something else. Was there anything else, like class requirement? [However you perceive basically the performance, the level of performance, as far as the different areas of the course requirements. If there is anything that’s, you know, that women are like significantly better writers for an example or you know significantly……]

Yeah, I would say that is actually true, that women are better writers. In our 270 class, that one that has three girls in a group of 12, another girl and I usually end up writing the reports, and everybody sends us, like, what they have written and we pretty much just go through and edit it all and make sure that it all flows together and stuff like that. I am actually writing another report today for that class, so it’s kind of the same story. I don’t know if we just get suckered into doing it, or if we just feel like we need to do it, or I don’t know. That’s how it ends up happening. [laughter]

Could you describe your own strengths and weaknesses in engineering.

Gosh. That is hard. Strengths, um, I would say that I am persistent and like I will ask for help if I need it. Like I am not afraid to, you know. I don’t have pride to lose by asking someone for help, like I don’t see that as being a problem for me. Weakness, um, maybe, I guess, lacking like practical knowledge. Like I don’t have, you know, like practical experience. Like I haven’t worked you know on farms, or you know with any of that type of stuff, so I don’t see how like mechanical mechanisms like work together and stuff like that, so I don’t…… If somebody is talking about something I’m like I have no idea what that is, so I guess the practical experience.

What do you find most difficult about your program?

Just all the classes. Like I’m taking four engineering classes and a math class right now and so it’s just a really heavy course load, and it is pretty heavy in regards to like all four years, and so it is only 15 credits but when you have a 3-credit class that meets seven hours a week, it just gets - it’s a lot of work. So it’s just a lot of outside work and you don’t get anything done in class I would say. You pretty much have to do it all on your own time.

What expectations do you have for yourself in engineering?
I just expect to do my best, be on the Dean’s list every semester, and get a job when I am done [laughs]. A good job that I….. Yeah, that’s about it, because I’m here to get a job so I figure, well, I’ll get one [laughs]. [Good answer.]

END - Melinda interview (14)

Interview with David - April 7, 2005
(tape 3-B, interview 2)

What factors affected your choice of university?
Well, I wanted to get away from Iowa City because I wanted to go somewhere besides the University of Iowa, but I didn’t want to go really far away in case the family needed me or something and, well, I got accepted to the North Carolina school but I don’t have any money [laughs] so a state school and close by were the two reasons.

What factors affected your choice of major and what would have caused you to change your major earlier?
Well my chemistry teacher in high school, he was really a great chemistry teacher and I just loved it, but I thought there is not much application with just a chemistry degree so I will see what I can do with the engineering, and right now engineering is fine. I like the problems, you know, the problem stuff, but I don’t know. There’s a lot of engineering in engineering [laughs] so I’m thinking about taking a biochemistry major too, you know. I’ve done two internships and they both involved some biochemical process, so it seems like the right direction to go because, well, I’m thinking about going into pharmaceuticals eventually so I guess it makes sense to maybe.

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?
There are not a lot of girls in my classes, women in my classes. I don’t know. The only thing we are graded on are….. We don’t talk about it in class do we? It is hard to judge how other people are doing in the class because, you know, we don’t interact a lot.

How about how vocal they are? Do you notice, is one sex more vocal than the other?
I can’t say that for certain just because there are so many more guys in the class. If there were an equal number of guys and girls it might be equal, but it is disproportioned so I couldn’t make that assumption.

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, and how others respond to them. In my class? [Mm-hmm.] You know I think we do pretty well. We are pretty equal in the sense of how we push each other to do stuff and how we get things done relative to each other based on sex because we have done a few in-class projects and assignments.

Describe your own classroom participation.
It is not that great. I sit in the back. I write down notes to stay awake instead of just looking at the notes he gives us. It is not a boring class. It is just close to after lunch and I get tired, but you know every once in awhile if most of the people are being quiet and he asks a simple question I’ll shout from the back the answer.

*Describe your classroom climate in your engineering courses as far as how comfortable you feel participating and speaking out.*

I have been in two engineering courses and the first one was basically computer programming. I hated that class, but this one is better. The question - the climate - you know I do feel comfortable in class and if I wanted to talk in class that would be all right, but I don’t know. Maybe I’m just a shy and quiet guy. I don’t really like to take the spotlight from somebody else when they have the right answer too.

*How does your professor respond to you in class?* To me individually? [Mm-hmm.]

When we answer a question that is incorrect, he doesn’t say “This is wrong”. He says “Part of it’s right, but you’re not all the way there,” which I think is more effective because you have to think about the exact phrasing of how you want to say what you want to say.

*Describe your classroom versus lab interaction with your professor. Is one more formal or informal, focused on course content, or are there social aspects to class?*

Well, at the beginning there were some social things. You know, he would talk about himself. He’d let us get to know him. But we are not in the lab, so I’ll just reference the recitation that we have on Tuesdays. [Okay] It is more informal mostly because there’s less people, but.... You know, we’re in a small room and we’re just talking about some of the homework, and, you know, it’s easier to..... It’s always easier to talk in a small group of people than it is in a large group of people, so I guess you could call it more informal in that sense.

*Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor or your recitation instructor and with other students.*

Actually I don’t see...... Like in our recitation that we have, I talk more with the professor, but in class I talk more with the students even though there is less.

*How does your professor respond to you outside of class as far as office hours and meetings?*

If I needed to go talk to him sometime I’m sure I could get into his office and he would be, you know, more than willing to help me find the answer to my problems and stuff. [Have you gone in for help this semester?] Well, I haven’t really needed to but it’s always nice to have that option, if I get really hung up on a problem that I can go talk to him.

*Describe any difference you see in men’s and women’s out of class participation as far as coming in for help sessions and working in groups.*

Well this recitation I go to on Tuesdays, there are two classes of it. There is one at 11:00 and one at 2:00. I go to the one at 11:00 and there is always two or three guys and then the same girl every time, so I don’t know what happens at the two o’clock one, but I guess if you talk
Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
No. I can’t. [Okay.]

Describe your own strengths and weaknesses in engineering.
I like problem-solving, the engineering problem-solving, but I don’t know. Some of the stuff is just really basic, really remedial, and I understand why we do it, to build up more complex ideas but I don’t know it just seems directional-less now, you know, because I have been “PV=nRT’s” since the Stone Age. Maybe not that long, but awhile, so strengths would be I already have a lot of the basic knowledge of what is going on, but the weaknesses are now I’m not paying attention to the applications, to the knowledge that I already have, as well as I should be. I really don’t like programming computers.

What do you find most difficult about your program?
Most difficult about the program would be the chemical engineering program has a lot of chemical engineering requirements. Like if you compare it to other degrees there is, you know, 12 more credits that you have to take compared to other ones. [Is that just chemical?] I’m not sure about the other engineering, but like the LAS schools and the other schools [laughs] - I know there’s other ones. [Laughter.] [LAS is big though.] Yeah, but they require more broad requirements whereas chemical engineering has more core ones for your major. [Interesting.]

What expectations do you have for yourself in engineering?
What do I expect to get out of engineering? [What do you have - what expectations do you have for yourself?] What expectations - what do I want to do with engineering? [However you want to, you can answer that way. Like what you hope to achieve or .....] Well, basically I won’t lie to you. Eventually I do plan on going into some biochemical field and the main expectation I have from engineering is that I’ll learn enough basic chemical transports, energy transports, that I’ll be able to apply the physical systems like the heart and the lungs and stuff like that. [Okay. Good answer.] That’s what I expect from my engineering.

END - David interview (15)

Interview with Betsy - April 7, 2005
(tape 3-B, interview 3)

What factors affected your choice of university?
The factors - it’s just the programs offered here at Iowa State was a big part. Plus it was a few hours from my hometown so if I want to go home a day I could easily, and plus Iowa State has got a great engineering program, so - [Right]
What factors affected your choice of major and what would have caused you to change your current major maybe earlier on in the program?

What factors affected my choice of majors - in high school I did very well in my math and science classes. I had a lot of people say “Oh, you’d make a great engineer,” so I was looking at engineering. What made me specifically choose mechanical engineering was the fact that it was a very broad major and I didn’t know exactly what I wanted to do my freshman year. They said ‘hey, mechanical engineering is great’ so I went for it and stayed with it, so - [What would have caused you to change maybe earlier on?] Well I guess if I don’t like my math or science classes too much I would change my major.

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?

I don’t know. I think sometimes the women are more, they perform better sometimes than men, but I don’t know. It goes both ways. [Okay.]

Do you notice is one more vocal than the other?

The guys tend to be more vocal in class and [laughs] that’s for sure. [laughs] But there are a couple of women too that are very outgoing and like to speak up more often, so - [Okay.]

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, and how others respond to them.

I have never had any problem with communications, so… Like I said the men do tend to be a little bit more vocal than women. [Okay.]

Could you describe your own class participation?

Well I do ask questions when I do need to ask questions or I need to point out something so..... But otherwise, yeah, I don’t. I’m more observatory than I am anything else so.....

Describe the classroom climate in your engineering courses.

Well they do encourage us speaking up and our professors hate quiet classrooms [laughter] so any kind of input from us, they are very appreciative and they are very conversational.

How does your professor respond to you in class?

I don’t know. He’s pretty happy to answer our questions. [laughter] [Okay.]

Describe your classroom versus lab interaction with your professor. Is one more formal or informal, based on course content, or are there social aspects?

Well the ones I’ve had lately are more informal. I mean they like to tell stories in class, you know. It keeps things interesting. [Definitely.]

Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor and with other students.

Probably I do communicate quite a bit more in lab settings than I do in lecture, and I think a lot has to do with that is because lab is a lot smaller groups and lecture you have 50 people in
class. Sometimes we don’t want to speak up, you know, don’t want to look stupid. [Yeah, yeah.]

How does your professor respond to you outside of class in office hours, labs or meetings? They are very reasonable. They usually try to set up a time so you both can meet and usually I don’t go be myself. I go with some other students that I am doing homework assignments with.

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help and working in groups. I do see… I do meet with like two or three other girls in my classes. They will help each other on homework assignments, so I do see the women doing that more often than the guys. The guys so “Oh, I can do this myself.” [laughter]

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance? I think in general women do tend to write papers better. I don’t know why that is. I think we tend to focus more on communication in general where guys will do more of the math and logic, but in the engineering sector you don’t really see that as much.

Describe your own strengths and weaknesses in engineering. Sometimes especially with the open-end problems in some of the later engineering classes, it’s kind of hard to find a spot where to start on the problem. That’s why you meet with other people, see what they think, and get some other input. Strengths - I get along with people fairly well, so I guess communication in general I think I am pretty good at. [Okay]

What do you find most difficult about your program? The most difficult part is probably getting through all the basic programs like calculus and all the physics and chemistry and everything in the beginning. After all that is all done, everything gets a little better.

What expectations do you have for yourself in engineering? Well I just apply myself and do my best in whatever I do, and hopefully it will make this world a better place. That’s all I’ve got to say. [Good answer.]

END - Betsy interview (16)

Interview with Steve - April 7, 2005 (tape 3-B, interview 4)

What factors affected your choice of university? Iowa State University is a pretty conservative university for the fact it wasn’t like University of Iowa, which is a little too radical for me. I don’t know. I liked the agricultural idea.
What factors affected your choice of major and what would cause you to change your current major?
Well, I really liked chemistry so I figured chemical engineering would be a good idea, and I hated English so I wanted to take a course with the least amount of English. Something that would make me want to change my major is if there is too much thermodynamics just to overwhelm me to where I would probably just switch to chemistry.

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex? What about class participation and how vocal they are?
Well, on class participation here at..... Well, it seems like the girls are always there as compared to the guys which seem to skip out a lot. It’s probably because they are drunk usually near the weekends. Performance wise, I don’t know. It is pretty close to each other, because the guys who don’t participate usually drop out halfway through the semester and so it evens out pretty well. Vocal - usually the guys are a little louder and participatory. I’d say the girls are more..... They think of a lot of ideas. The guys always kind of want to lead. It is kind of just our nature I guess. /Okay./

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, and how others respond to them.
It has been my experience that girls usually just..... It seems like they make a lot of suggestions like they don’t want to take the leadership roles as often as a guy will.

Describe your own class participation.
Mine, not all? /Yeah./ I don’t know. I try to keep involved. I don’t want to do bad on the participation grade on a project so I try to participate as much as I can. I’m always making suggestions and trying to get things done.

Describe the classroom climate in your engineering courses.
It is small. It’s usually just, uh, it’s under 50 kids usually in each class. It makes it a lot more personal, a lot easier to talk and ask questions in classrooms.

How does your professor respond to you in class?
He is open to answer individual questions. He is just a nice guy, one of my best professors. [I’ve heard really good things about him, yeah.] Yeah.

Describe your classroom versus lab interaction with professors. Is one more formal or informal, focused on course content or are there social aspects?
What is it you want to know here, just how we interact with our professor? /Yeah, in lab and lecture - are you comfortable more in one? Is one more social than the other?/ Lab is definitely more social. It is just you are doing things at your own pace. You can have fun and talk with the TA. It is a good time.

Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor and with other students.
I don't know. I feel like I communicate with the professor a little more when I am in a lab, but with students I don't know. I don't really communicate a whole lot in class, because after classes we meet a lot. We might work on a homework assignment together, like we are working on projects now because it's nearing finals.

How does your professor respond to you outside of class in office hours, labs or meetings? He always seems to find time to step out of his way to help a student, which is really good. I guess that is what a teacher usually does. They like to teach and help a student, help someone learn. [Okay.]

Describe any difference you see in men's and women's out of class participation as far as coming into help sessions and working in groups outside of class. I'd say women definitely like to work in groups more. I could learn something from that. When I go to help sessions, it is usually dominated by women. [laughter] [Okay.]

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance? Um, just mainly when it comes to giving speeches. It seems like that is where once again, I don't know, if the guys are just blowing their way into leadership or whether they don't, uh.... [Okay.]

Describe your own strengths and weaknesses in engineering. My strengths, well I am really creative. That is probably because I like to tinker a lot. I like to think outside the box. My weaknesses are definitely my vocal skills. My English vocabulary isn't that great.

What do you find most difficult about your program? The thermodynamics - it is just the sheer math of it, when it gets more towards quantitative instead of qualitative.

What expectations do you have for yourself in engineering? Well, I hope to graduate and go find a job in a factory somewhere, work in a research group maybe. I am thinking of maybe just going to teach.

END - Steve interview (17)

END of tape #3-B

Interview with Alison - April 8, 2005 (tape 4-A, interview 1)

What factors affected your choice of university? I wanted to go to school in Iowa. I didn’t want to be too far away from my parents but I did want to be away from home so that kind of put me in Iowa, and then I decided to do engineering and Iowa State had a better engineering I felt than the University of Iowa. Also I
like the campus better so I could park rather than all spread out across the city, and both of
my parents came here too. Also I had scholarships. I got more scholarships from here than
at the University of Iowa so that’s the factors. [Good reasons.]

What factors affected your choice of major and what would cause you to change your
current major?
I always wanted to be a doctor when I was growing up, but then when I was in high school I
took biology and I really didn’t like it. I have always been good at math and science and my
dad suggested chemical engineering. Also because with chemical engineering it is easy if
you do decide you want to go to medical school you can, instead of just getting biology or
something. So that is pretty much why I chose the major and I really like it, so I am really
glad I chose it.

How do you perceive the performance status of the women and men in your classes as
individuals and as compared to the other sex?
Well, it is definitely obvious that there aren’t as many women [laughter] in the classes. That
can be good and bad in some ways but probably..... What do you mean by performance
status? [Um, as far as like how vocal they are. Is one do you notice, either men or women,
more vocal than the other? Um, maybe as far as doing well on homework or group work or
just any aspect.] I really haven’t seen a big difference. You always can tell, well, um..... I
have only taken really like two engineering - Engineering 160 and then the Chemical
Engineering class - and a lot of the guys will already know each other, so you have to kind of
like get to know someone so that you can do homework with them, but, um, like I don’t feel
like I do any worse than the guys or that I am intimidated to do anything different just because
there are more guys in that class, but..... So I don’t think it’s a huge difference so far, so.... I
think a lot of people..... Maybe that’s just me though because I am not..... I don’t know. It
just doesn’t intimidate me as much, so I don’t really know how a lot of the other girls in the
classes have done but my performance is just as well or better than the guys so - that’s what I
think. [laughter]

Describe any difference you see in men’s and women’s communication in groups as far as
how often they participate, take leadership positions and how others respond to them.
Let’s see, hm - I like having the leadership position. Like I just started working on a group
project, and it’s two girls and two boys in our group so it’s pretty equal, but usually like
when you work in a group a lot of times the guys can be kind of jerky and make fun of you
for..... I know I worked in a group for my homework and stuff, and some of the guys would
be like “Oh, like totally, like totally” like you know, making fun of..... I wouldn’t say that. I
might say ‘like’ sometimes but I’m not a Valley girl or anything. It just kind of can get kind
of annoying, just because they’re like oh, you’re a girl and you know, you have to kind of
prove yourself more, but then once you do it’s just..... I don’t know, I think maybe the guys
think.....

Describe your own classroom participation.
Let’s see. I really don’t ask that many questions because..... I mean I pretty much - I’ll ask
questions if I am confused, but I usually don’t ask that many questions, so I guess I don’t.....
I’d rather just listen, and then if I have something maybe I can work it out myself, and then if I can’t get it, ask. I don’t know. I don’t think my class participation is any less than other people. I think like sometimes class participation can be good and bad, because like in my Differential Equations class there are not very many of us. We’ve got like 10 of us in the class and then there are like three guys who always….. They talk, they ask a lot of questions, but there are a lot of disruptive questions. They like will ask the same questions, they won’t listen to the answer, and then they will kind of like….. Our teacher doesn’t speak very good English, so then they kind of like mock him, but so I don’t always see like a lot of participation as even being good, you know, in some classes. [Right.] But obviously, you know, if you need to work on a problem, I mean, you’d do that….. But, so, yeah…..

[laughs]. [Good answer.]

Describe the classroom climate in your engineering courses?
I think a big reason why I stay in engineering, because like my two different classes this year - my first semester was Engineering 160 and this semester is 210 - I really liked my teachers. Like Dr. Richards is really great. He really gets….. He’s really willing to get to know you like as a person, not just as like a student. My Engineering 160 I had a TA and he was really great. I think like the more personal the teachers are with you, the more you feel comfortable with asking them questions and knowing that they care about kind of, I don’t know, your grade and stuff and like so I’ve in this year, when I’ve had to have recommendations, you know, the two teachers I have gone to are both my engineering teachers. I just think that they from what I’ve seen, that they are - I don’t know - I think more caring or maybe they can relate to you better. I don’t know. [Yeah, I’ve heard great things about Dr. Richards from everybody.] Yeah, he’s a great teacher. [Yeah.] Because you know 210 is a big reason….. You know, I was like if I don’t like 210, I mean, it’s early enough on I could switch my major, but I really like it a lot. He makes it….. He’s really good at showing you how to do things and giving you practice exams and stuff like that. [Yeah.]

How does your professor respond to you in class? You kind of started that, but…..
Yeah. Um, they have, um, like you came and watched. We don't have like a lot of….. He’s just really thorough and you don’t really have a lot of questions, but if you have a question he’ll like answer it really well. But compared to other classes today, and here I go back to my Differential Equations class, someone asked a question and he’s like “That’s a question you can ask me later” like in private or something like that, because it wasn’t to do with the exact problem that we were doing. It was kind of like a general question. I really didn’t like that because, you know, other people might have had the same question and he’s like “Well I’ll answer you that later, and you have to come by at a later time. I can’t answer that now,” and we had plenty of time in class, you know. [Right.] Yeah, so but I love my Engineering professors. I think they are great so far.

Describe your classroom versus lab interaction with professors. Is one more formal or informal, focused mostly on course contents or are there social aspects?
I haven’t really taken a lab really. [Okay.] But with Dr. Richards especially, he got me involved in Novashay and he also wanted me to do research for him, so I see him a lot. During the middle of this semester I probably spent probably three hours with him a day, just
doing research and then with the Novashay stuff, and we - a group of us girls and a male graduate student - went to Florida for three or four days for a chemical engineering conference. [Awesome.] I don’t know. I feel like he has kind of taken me under his wing but, so, which is really nice. I don’t know if a lot of other teachers would do that. [Right.]

Describe any difference you see in communication from lecture to lab as far as how often you communicate with professors and with other students. You can just do lecture if you haven’t had a lab.

I think I’ve, um….. Probably going to the office hours is way more effective than e-mailing or doing anything else I know, because you don’t always get back or you don’t always check your e-mail or you accidentally delete it out. [laughter] I think I have had good responses if I need something, and very flexible it seems. [Right.] I know I don’t have a lot of other teachers to compare, but like Dr. Richards is only teaching our class. It’s the only class he teaches this semester so he is pretty free anytime, and I’ve been in there talking to him and students will come in that are in Statistics and he’s not even teaching the class and he’ll help them out, you know, so I think that is above and beyond anything that he or some people need to do. [Yeah, definitely.]

How does your professor respond to you outside of class in office hours and in meetings?
Like he acts like he knows me obviously, because he knows who I am. [laughter] That really annoys me about some teachers. Oh, today I was in the undeclared Engineering 101 class because I couldn’t get into Chemical Engineering class so Andy Shatingo is my advisor, not my acting advisor but he was like our teacher, and I saw him with his new baby on campus today. He was bringing it to the office and he even recognized me and we really had class together maybe half a semester and he still recognized me and you know said hi and I got to talk to him about his kid and I thought it was really nice, you know. A lot of teachers don’t, you know. I know my first semester I took a class in - it was Calculus II - and the teacher I wasn’t really impressed with. Like he would come to class right at the time it started, but before class he would sit out like around the corner by himself like he didn’t want to talk to any of the students or really have anything to do with any of the students, and that really bothers me. I think it is really important that the teachers want to get to know their students because I know all the classes that I have gotten, you know, you’re comfortable with your teacher, you get to know them, you do better in it and it’s more enjoyable to go to class. You pay attention more because you feel like you are kind of a friend and you wouldn’t want to sleep in class when your friend’s talking to you kind of a thing. [Yeah, good point.] Or skip class because then you know they wouldn’t be, they care, they’d be like “Why didn’t you come to class? Were you sick?” You know, you can’t just skip. If you have a teacher that doesn’t ever talk to you or doesn’t even really know your name, then you don’t care if you don’t come to class. You don’t care if you do well. [Right.] Or I don’t know. [No, it’s a really good point.]

Describe any difference you see in men’s and women’s out of classroom participation as far as like working in groups together, coming in for help sessions.
I think, yeah, I think guys like working in groups more than girls do and I’ve always had to really kind of ask to be in a group more so. If I didn’t know anyone in the class I’d be like
'well, can I be in your group?' if I was like doing homework. I mean like in class it would be like 'oh be in our group' but, you know, out of class I’d be like “Well, can I meet up with you and do homework together?” because I like doing homework in groups. But since there’s not a lot of girls it seems like, you know, guys are in groups together and girls are in groups together so kind of like that, but then there’s not enough girls to work with. Help sessions, I think about equal amount I’ve noticed. Maybe more of the girls come to help sessions. I don’t know, like with the ratio it seems like almost all the girls would come to help session and just like a couple of guys would come to the help session. It would be like an equal amount of girls and guys then in the help session, but I guess compared to how many people are in the class. I think girls might be, you know, guys don’t like to ask for help. I think girls might be more comfortable asking for help. [Right, right.]

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
I’m sure there are. [laughs] I have to think about that one. Well, in Engineering 160 it seemed like a lot of the guys already knew how to program and I think that’s because when I was in high school - I guess it kind of goes back to high school - but like the programming classes were all guys and girls like didn’t take those classes. They’d take like Home Ec or Foods or something. Not because they were like oh, I want to be….. Just like those were the easy, like the easy classes, and that’s just all the girls take those classes, and it’s not like you had to take them or you couldn’t take other classes, just like that’s what it was, so then when you came to college they kind of had an advantage. They kind of already knew what was going on and I know I had trouble. I felt like I was kind of behind during that and so….. I know there are lot a things. I’m just trying to think of them. I do feel like the guys do have an advantage. It seems like they pick up kind of a little bit quicker. Like sometimes I think I need to, I don’t know, read more or something. I don’t know. [laughter] Maybe just learning styles or something, I don’t know. [Yeah.] A lot of the guys I have met seem like they have had a lot more experience in taking more like the physics classes and the math classes and that is kind of, you know, college prep more than actually being here, but I think that does make a big difference, you know, because then girls are kind of already behind. I think it is more important in high school to be with your girlfriends, you know, what you take, rather than when you get in college because obviously I’m not going to go take design class with my girlfriends because I have no desire to be in Design but [laughter]. So I think that is a big, so….. And then the requirements are the same for both. They are not going to, you know, say “oh well okay you didn’t do this so you get another day”. That doesn’t happen. Back to the help sessions, a lot of girls I think need more help. I don’t know [laughter]. It that a sufficient answer? [laughter] [Definitely.]

Describe your own strengths and weaknesses in engineering.
I think my strengths would be I really like the outcome of the problems that I do and if I do them right, you know, I feel really smart and that just makes me feel good. [laughter] And I like the fact that, you know, I am a woman and I like to kind of prove like yeah I can do this. I can be, you know, I cannot be a nerd and still, you know [laughter], and I don’t really think engineers are nerdy. I don’t know where that stereotype came from, but, um, so I really like hard working. I like working hard and stuff, but like weaknesses, I think it takes me longer
to catch something. Especially like I am taking Physics 221 right now and it’s so hard and I just feel like some of my guy friends are like..... How do you (guys) remember all that, you know, you can just retain all that like it’s nothing and I have to study and it might be just like person-to-person. But like catching on, I think it takes me longer than a lot of the guys that I know to remember some of the things I need to remember. Is that a good answer? [laughter] {Yeah, you do really good.} Okay.

What do you find most difficult about your program?
Maybe the classes are really hard [laughs] and there is not a whole lot that, um, you know you can’t really like equal out the semesters like ‘Oh well I’ll take these two or three hard classes and like one easy class’. It is more like all the classes are really hard, like all the time, and you just study a lot and I get really frustrated a lot because I kind of wish I would have done a learning community, because I live with a lot of, um, women that are in Design and Business and they..... Especially my roommate, I love her to death but she does not have to study at all because, you know, she can just draw stuff and that’s hard, but you have to study a lot when you have, you know, physics and differential equations, and then when they want to..... I don’t know, it’s hard when they go out, you know, you don’t get to go out as much. You know, you can go out Fridays and Saturdays but you can’t be going out, you know, every day of the week and you can’t just sit. I don’t think I just sat and watched TV once, you know. I can’t just sit there and watch TV or, you know, you have to work. You have to be really driven, I think. I think that is difficult for women, especially since most of your friends aren’t going to be, you know most of your women friends aren’t going to be women in engineering and then, you know, you have that outside pressure to be like ‘oh you can do it later’ and you’re like ‘No, you don’t understand, I can’t. I can’t stay out until two o’clock in the morning tonight. I’ve got to go to bed. I have a test tomorrow.” I think that is difficult like especially for women and, you know, more of the guys will understand that they can’t do that, but..... Yeah. [That’s a good answer.]

What expectations do you have for yourself in engineering?
What do you mean my expectations, like grades or? [Yeah, like what do you hope to do or get or you know like, it can be in school or after you get out.] I really want to get good grades and, you know, kind of be like ‘yeah I’m a woman and I am going to get good grades. I am going to graduate with honors.’ I don’t know. I want to be able to get a job right after college. I don’t want to have to..... And I want it to be a job in chemical engineering, but I guess if I don’t get a job I’ll probably go to graduate school or I’ll probably go to..... I know it sounds really stupid, but I’ll be like ‘oh I’ll try for veterinary school or med school.’ Both of my parents are veterinarians and, um, so I’d be like, not that veterinary school is easy by any means, but it would be kind of like the easy way out. I could just go work for them if I had to. [laughs] I don’t know. But my expectations are, you know, I want to stick to - I want to graduate with a degree in engineering because I have always been kind of the one who wanted approval, to be like I can do this, you know, so..... [Well I’m sure you will. I hope so.] [laughs]

END - Alison interview (18)
Interview with Dan - April 12, 2005
(tape 4-A, interview 2)

BLANK – interview did not record.

END - Dan interview (19)

Follow-Up Interview with Jason - April 14, 2005
(tape 4-A, interview 3)

Are you doing follow-up interviews for everyone or just certain people? *Mm-mm, just one man and one woman from each class.* Okay. So.... Okay.

Describe your view of how the students participate in class. Are there obviously dominant students when it comes to participation? Are there obviously timid students?
Yeah, obviously I think in most classes there is going to be that. In any curriculum in any department I think you are going to have students who are more outgoing. It is just a personality trait that’s obvious, I think, in all classes.

Do you have any like specific examples?
Of actual students? *[Yeah.]* Um, I’m not going to name names but, yeah, there are specific examples. *[Nothing would be used.]* There are definitely specific examples of students who are more outgoing than others.

Do you notice any gender traits at all with that?
No. I think it is both. It is very equal. *[Okay.]*

Could you give an example of a time when you felt really comfortable participating in class?
I think it’s all about the professor’s ability to make the classroom atmosphere comfortable. I think if that atmosphere is comfortable then students are comfortable to participate and you can see that. In a very formal lecture style you are not going to have professors that accept comments or questions as regularly, and so I think it is all up to the professor how comfortable the class atmosphere is.

Anything different for feeling really uncomfortable in a class, any other factors?
Not really. I think it is all the professor and I think physically like the structure of the classroom, like the chairs, the temperature, the environment you are in might have something to do with that, but that’s probably a whole different research topic on itself. *[laughs]* Anyway, yeah, it’s all the professor, it’s what they bring is what usually happens.

How does the way you participate in class differ from the way you wish you participated?
It doesn’t differ. *[Doesn’t differ at all?] No.

Are there times when you wanted to contribute to class but didn’t?
Not usually. If I do want to contribute I usually do, but that probably differs for everyone, so…..

*Can you give any specific examples of the climates of groups that you have been in as far as how comfortable they were?*
Yeah, each group you’re in is obviously a different dynamic. Um, it depends on what kind of people you have in the group that dictates what the group dynamic will be. Um, I’ve had groups that are very comfortable, very open, very informal. I’ve had groups who are very, like you dictate out jobs. Each person is very structured, very formal, very like less communication, um, it just depends on who you have in your group, but yeah I think having a lot of different types of groups is helpful to understand the dynamics. I think that is good.

*What factors do you think most strongly affects your classroom climate as far as the freedom to speak up with the professor and other students and general comfort level?*
It is always the professor itself because I’ve been with these same students of the chemical engineering department for, you know, for three years mostly and they really haven’t change that much, but each class dynamic is very much changed. So I think it is all about the environment the professor brings to the class and how open they are to suggestions, comments, concerns, and, you know, talking definitely.

*How does your professor’s response to you when you ask questions compare with the way he or she responds to other students?* To my response or to other students? *Yeah, how do they respond to you versus other students do you perceive?*
Pretty equally I think, all the same.

*Does your professor encourage everyone equally?*
Yeah. *[Yeah? Okay.]*

*How would you ideally want your professor to respond to you in class participation in comparison with how he or she actually does?*
How would I want them to change basically? *[Yeah, how would you want them to respond to you differently?] I think there is no real response. I think informality is a good thing. Oh I think formality is really good too, but I think when you are learning education wise I think creating an informal environment is very important for education for me personally. Um, the less uptight the environment is, the more I think I learn and take out of it. If it’s very structured and very, like, rigid I think that’s hard to maybe stay as focused and stay as connected and stay as interactive. *[Okay.]*

*How would you ideally want your professor to respond to you outside of class in comparison with how they do?*
I think they do fine. I mean I think professors say hi to you in the hallway who are very formal, say ‘Hi, how ya doing?’ like, you know, very cool about it. You know “How’s your day?” whatever, you know. I think they do a really good job with that. *[Okay.]*

*How do you think your class work matches up to those of the opposite sex in the class?*
I think it is pretty equal. I think... I don't know, I think girls probably do maybe better than guys do in this class, in our course. Chemical Engineering has the most women from what I've heard out of all the majors and I think that, um, you can see that. I think girls - I think it's equal pretty much. Maybe there is less - this is kind of, whatever, wrong, but - there is probably less girl slackers in classes than there are less guy slackers in the class. There's more, you know what I'm saying? If you're a girl in chemical engineering you are pretty darn good and you are probably going to be at the upper end of the class I would say more often, but not like a huge trend. I mean there is whatever but, yeah, I think maybe I can see that.

**How were your strengths in engineering recognized as far as supported and acknowledged?**

Um, how were they recognized within my department with my teachers or like in the real world or where? *Within your class, your......* I guess problem-solving skills. I mean all engineers are problem solvers and I think those skills were recognized very easily on exams that you take, where it's like I have an open-ended problem and you need to find a solution for it. Um, I think that's probably the best way in our classes that your skills are recognized. *Okay.*

**How are your weaknesses improved upon?**

Technically it's probably technology, and like your technical skills are always improved upon as an engineer. As you further your curriculum you are also going to get more difficult courses that will improve your, like, math and problem-solving skills. I think that is always improved upon, but I think with our senior level of classes like your writing skills also improve. Like with your projects there are, like, documents so I think that really helps improve your writing skills and presenting I think helps too, like presenting these projects the end of our semester in front of our class will help.

**Describe the most supportive part of your engineering class.** Supportive? *Yeah.*

The most supportive part...... The professors are very supportive I think, um, but I think more so it is probably the friends you make that deal with the same problems you deal with. Like if you are working on a homework problem and it sucks and you like struggle on it, you know, and like if they are going through the same problems and they have the same challenges you do I think that, you know, like a close knit group of friends going through the same, that really helps be supportive.

**And lastly, what is the most unsupportive part of the engineering classroom?**

Unsupportive...... Probably difficulty of the curriculum. Um, that is not very supportive because [laughter] it's very difficult, so I mean if you are easily kind of blown away by it, you don't really like it, it can be very difficult. It can be very challenging, so you need to have like, you know, a little bit of tenacity to keep coming back and getting beaten back down again. You need to have like, you know, you need to have a little stick-to-it-tive-ness if that's a word, whatever. You know what I mean? Yeah.

END - Jason follow-up interview (20)
Describe your view of how the students participate in class.
Um, I think people are generally a little bit hesitant to, you know, shout out an answer, I guess, if professors ask a question unless it is sort of something easy and non-technical, but when it is technical I guess maybe people are embarrassed that they will be wrong, and maybe they think the professor will think that they are stupid because they should know that or something like that, which I don’t think professors necessarily really feel that way but I guess I see that as being the reason. And I think certain students either don’t have that fear or just know everything so they don’t mind saying things, and certain other students know those things but still don't really participate. I don't know if it’s gender specific or not, really. I’m not sure.

Are there obviously like dominant and timid students in class?
Yes, definitely, and it varies from class to class, too. Like one student might be dominant in one class and timid in another. I don’t know why that is. Maybe it is just comfort with the material or with the professor, but there are overall students that are more dominant.

And do you notice gender?
Yeah, probably there are more males who are dominant in a just sort of being friendly and shouting things out kind of way, but I think the speaking up in class about having the right answer without being specifically dominant is probably pretty even gender-wise. I don’t think there is somebody who gives the right answers more or less gender specific.

Can you give an example of a time when you felt really comfortable participating in class?
Sure. Um, let me think. I guess in, like I personally feel comfortable participating in class when I know the answer or when I feel comfortable with the material even if I don’t know the exact answer, and I think there are certain professors that facilitate that a little bit more. A lot of the chemical engineering professors are pretty good at that, I think, um, although there are a few who aren’t. So I think that certain professors can ask questions in ways that make you think ‘if I know what’s generally going on then I can give this a shot’ as opposed to ‘here answer this question that seems like it is coming out of the middle of nowhere and there’s just this one answer and if you don’t have this answer then it’s wrong’ kind of thing, which I have..... I’m taking a chemical engineering class that’s taught by a material science professor and he always asks these random questions. He’s like “We talked about this in lecture 3,” and it’s like I don’t know, and this is like, you know, there’s one answer and there’s no ‘well it seems like maybe it could be dealing with this’ kind of situation where you could kind of get close if you have a general understanding.
Can you give an example of a time when you felt really uncomfortable participating in class?
That professor from material science makes you feel uncomfortable. He makes me feel uncomfortable anyway because of the way he asks questions, I guess, and because he kind of puts people on the spot if nobody volunteers. Like if nobody volunteers he’s like “You, what do you think the answer is?” and I don’t know. Some people just say I don’t know but I always feel really uncomfortable when he does that, but on the other hand nobody ever volunteers so I guess he is just trying to get people to participate. [Yeah.] But I don’t think he is doing it effectively.

How does the way you participate in class differ from the way you wish you did?
Um, in general I wish I spoke up more when I knew the answer, but sometimes I just don’t feel like it I guess or feel like if I am not 100% sure, then I’m not going to bother answering.

Describe the climates of the groups you have been in as far as how comfortable they have been. How did other group members work with you? Did they listen to you, give you equal time?
Yes, they give me equal time, they listen, etc. I think in general the climate of groups, different groups I’ve been in, has all been pretty positive and at least if it is like a three- or four-person group, at least most of the people in the group, you know, are interacting that way. Sometimes there is sort of that one person that everybody is irritated with or doesn’t listen to anybody or, you know, that kind of thing, but I have never been in a group where like every single person in the group didn’t get along with every other person in the group. It is usually more of like there is this one person that everyone is like this person’s crazy or this person’s really annoying or whatever, or this person never shows up on time, so even when you are dealing with one person like that I think the climate of the group can stay pretty positive if the rest of the group is able to sort of work around that individual.

What factors do you think most strongly affects your classroom climate as far as how comfortable you feel speaking up and participating?
Oh, I would say a big one is how the professor deals with people who answer. Like ones who have given an answer, whether the professor’s like “No, that’s not it,” or whether they sort of constructively criticize the answer with less criticism really, more just being like ‘That’s a good try,’ or something or I don’t know. And the other thing is just like the general environment in class, like when a professor’s classroom style is just to stand in front of the room and talk to you, then it is never really a positive environment to participate in so I think that some professors are just really bad at that and I don’t know how to change it, but some of them just……. They’re bad at it and it makes it uncomfortable for everybody to ask questions. [Okay.]

How does your professor’s response to you when you ask questions compare with how you wish they responded to you?
Well, I have one professor in particular who is always really irritating in that regard. Because if you ask a specific question, for example, on a homework assignment sometimes you need like one little thing answered and then other than that you are cool, he has to give
you the 20 minute ‘this is the history of the subject that we are studying and this is everything that goes into it’ and maybe you already understand all that stuff but what you want is your specific question answered. So that professor in particular, like, the result is that you just don’t even bother asking questions, for me anyway. It’s like it’s not worth your time because you still don’t end up with the question you needed to get answered anyway, so that’s the point of bothering to try other than, you know, because he likes it when people ask questions because he likes to talk. But overall when professors are knowledgable about the subject they are usually good at answering questions, but when they are not then they are obviously not going to answer any questions. I have had a professor who just really probably shouldn’t have been teaching the class because she really didn’t know what was going on and she sort of delivered lectures but she didn’t understand the subject well enough to, you know, answer questions that didn’t deal specifically with what she had talked about, and the result was that questions were frequently answered wrongly or poorly or not at all, so that becomes obvious to everyone in the class when the professor doesn’t know what’s going on and the result is that everybody learns less, so.....

**Do you think your professors encourage everyone equally to participate?**

Um, I guess I think professors ask questions but in general don’t specifically encourage anyone to participate. I have had one professor who did a good job of encouraging. I guess I would say he encouraged everybody to participate because sometimes when he asked questions he’d have like everybody vote and he’d insist that everybody vote and that kind of thing which sort of makes everybody participate, but that is really the only example I can say that I have seen. Well, and the other thing about that was he would sort of interact with the class maybe for a few minutes at the beginning by asking non-chemical engineering related stuff. Like when the elections were going on, he’d bring up stuff like that, that maybe people who weren’t ever going to be comfortable answering a chemical engineering question during class maybe would be able to participate a little bit that way for a minute or so at the beginning of class, so I thought that was helpful for the class as a whole.

**How would you ideally want your professor to respond to you in class in comparison with how they do? More formal or informal?**

I guess more informal. [Okay.] I don’t know. I mean it’s hard when you are up in front of a group of people to like know when to push someone to answer more or to know when they are just going to be embarrassed because they don’t have a clue what’s going on, so I don’t know what a professor exactly could do better but I think that sometimes not everybody feels active in the learning process exactly. There are definitely a lot of people that are more passive and part of that probably..... Well, one thing that I think, that a way that a lot of people interact with the professor is like nobody ever wants to ask the questions during class but if a professor is around for the five minutes after the class for people to ask individual questions, then a lot of times it turns into a group of three or four people who ask the same question and people are more comfortable with that than discussing it in front of the whole class. And some of that is just because you feel like you don’t want to waste everybody’s time if your question isn’t relevant to everybody, but I think professors who get to class a little early so that they can answer questions people have or a little later so they can answer questions, I think that kind of thing is helpful.
How do you think your class work matches up to those of the opposite sex in the class?
I think that one thing I see is that a lot of the smart guys - I mean like the really smart ones, the ones who like know everything. A lot of them, I don’t know if they’re lazy or they just have other things going on or they just don’t care or they are just like ‘I know it so I’m not going to do the homework’, and I’ve noticed this more honestly as a grader for classes. The really smart guys don’t turn in homework half the time or at all and they will get like 100% on all the tests, but they will get a B in the class because they didn’t do any of the homework and I don’t see that from the really smart girls. I see the really smart girls putting a lot of effort into their homework assignments and then doing well on the tests and then getting A’s in the class. [Mm-hmm.] I don’t know how professors interpret that because I’m not a professor, but to me it’s a question of, well, do you reward the person who is more intelligent or the person who works really hard and really demonstrates that they learn everything but maybe isn’t as intelligent and maybe couldn’t go up and drive everything we did in the class, like the really smart guy who just knows everything could. I don’t know what grades everybody ends up getting in classes because I just grade the homework but that is definitely a difference I see when I am grading between genders, and as a member of a class I don’t think it’s as visible to members of classes how much difference there is. At least there never has been too much of a gender difference visible to me as a member of a class in terms of homework assignments. [Okay.]

How were your strengths in engineering recognized and acknowledged and supported?
I think most of that that happens for me is through the fact that I do research with a professor and in through doing research for the professor I have gotten to know several different professors probably pretty well, more than the average undergraduate. Professors who like aren’t my advisor or aren’t professors that I have had for three classes, but that I know like anyway even though I don’t have those interactions with them, and because of things like that they just know me better and I don’t know if there’s a professor grapevine or something but, you know, like they acknowledge me in an informal way in “I heard you got this award, congratulations’ kind of thing because I know them pretty well, but I don’t know that the average student who doesn’t know professors pretty well through research or whatever would necessarily experience that or not. I’m not sure because I don’t think there are too many formal things like that. There is a banquet in the spring - it’s actually today - that like the engineering scholarship winners get recognized at but nobody else does. Like unless you get an engineering scholarship, which I know there are people who have other awards and other, you know, things that they could get acknowledged for, that maybe they get acknowledged for those things anyways, but the Chemical Engineering department doesn’t acknowledge them in that way.

How are your weaknesses improved upon?
I don’t feel like there has ever been a professor who has been like ‘Susan I have noticed one of your weaknesses is this or that, you know, let’s work on it.’ I don’t feel like that has really been addressed exactly. I guess informally it’s addressed because the weaknesses of the class as a whole are addressed, but I don’t think they really have been on an individual basis.
Describe the most supportive part of your engineering classroom.
Probably, well, other people in the class can definitely be supportive if the class environment
is such that everybody is commiserating about how awful it is or how hard it is or whatever,
so that can be a support and I’ve had engineering classes where a TA was a big support.
Actually the one I’m thinking about isn’t an engineering class. It was a math class. It was
Calculus III, and the TA was like really the support structure in that whole thing because the
professor like just gave the lecture to the big group and English wasn’t his first language
and so it was definitely the TA who was the support source for that class, so then in more, like, in
chemical engineering classes it’s the student (who) is a little bit, depending, but a lot of times
it is just the professor. Like the professor is the support basically I’d say largely.

What is the most unsupportive part of the engineering classroom?
This is going to sound completely contradictory, but in other engineering classes I have had
professors that were very unsupportive and those are the ones where you are more relying on
either yourself or your classmates, or even I have had experiences where I have relied on like
a grad student or an older student or something, someone that I know from something else
who I know can probably help me with something, if that makes sense, or just sort of the
connections you have through other stuff. So it totally is variable between whether any of
the professors are that support or like because the professor is totally unsupportive you have
to go somewhere else for your support, I guess. [That makes a lot of sense.]

END - Stephanie follow-up interview (21)

Interview with Teresa - April 14, 2005
(tape 4-B, interview 2)

What factors affected your choice of university?
Well, when I was looking for a university I wasn’t really exactly…. I went on-line to one of
those college searches and I wasn’t exactly sure what major I wanted to go in at first. I was
more so making sure I had a four-year college that offered like masters and bachelors. I
didn’t want to go to a two-year college. At the moment I was looking a lot into biology and
everything and I wanted to make sure it had a lot of intramurals at the time and had good
standings and rankings, you know, as far as across the board and stuff overall for a
university. I was kind of….. I wasn’t really looking for anything major. I just wanted to
make sure it had pretty good rankings. I was comparing it with a lot of other colleges and
with the college search, you know, you can compare and contrast as far as, like you know,
money cost to make sure it was within the range but also was, you know, not too low because
then it probably wasn’t high enough quality as well to get within the rankings either, too, so I
had to look into that, as far as also GPA too. And I was pretty average too. I came from a
more like the Chicago area and our school, like high schools, are pretty tough and so I was in
like the top third of our class and so that was like pretty decent and pretty good for like the
type of school. So we were in pretty hard schools so I can say that it was like pretty good for
wherever I was looking, even though it wasn’t one of the top or considered (on of the top) it
was pretty tough schooling anyways.
*What factors affected your choice of major and what would cause you to change your current major?*

Okay, like I am still debating. Like every semester I am always thinking am I in the right major still? Like freshman year I was undecided. I was taking some biology, psychology classes. I took some meteorology because I like weather and stuff like that. Totally not what I want to do I figured out. I researched into a lot of the majors and I ended up with engineering. I went through each engineering major and specifically mechanical engineering I found out was specifically the one that I liked the best because I like to work with little gizmos and inside of things, you know. I don’t want to be a construction engineer. I don’t want to work outside. As far as like what I want to do like for the rest of my life, nothing ever really appeals as far as for my particular taste, like what I like working with. Bridges were always fascinating but it’s not exactly what I want to do. [Right.] My dad is like an aerospace engineer/pilot, so you know of course my dad has definitely some effect on me. My mom didn’t like do college either, but all my uncles and the majority of my family is like pure engineering so I guess all of us, whenever we’re together, we’re always like working on stuff. My dad and I always work on my….. Well, we used to work on my old beat up car together so I was really into cars and still am into old, like, mustang cars and stuff, but that is not exactly what I wanted to do, but I always have that feel for fixing things and working on problems and so I think that is kind of why engineering really fascinated me a lot. But specifically now, um, I am really getting into that biology aspect like from freshman year and like medical stuff has always been in my head, and so prosthetics has really started pinpointing out in my head and so like biomedical-like engineering is really starting to become a top interest in my head. They don’t offer it here and so I am coming to decide, like, finish up my mechanical engineering degree and then go to grad school for biomedical like engineering, like prosthetics is actually what I’m coming to do, but every semester I’m like ’what am I doing in this major’ because like, you know, classes are kicking your butt all the time.

*How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex as far as how much they participate and at what level they perform?*

Well clearly, obviously there are way more guys than girls in classes by far. I actually started noticing that a lot more girls started coming to my classes later on, as far as like before for some reason. Like I just started noticing more girls in my classes than I did before. I don’t know if some more girls are just starting to come into the classes or maybe they are just trying them out and maybe not going to stick with it. Class participation - Like obviously since there are more guys I always hear more guys participate in classes. [Mm-hmm.] Some classes, um, I hear girls like ask questions and stuff, but usually they are more like intellectual questions [Oh really?] to be honest. Yeah. I have girls in classes who usually….. When they ask questions like outside of class, I’ve got some friends who have like a more fun aspect to them, but as far as when they are in class they are usually a little more on the ball and on top of things I’ve noticed. I don’t have that many like girl engineering friends so I’m not exactly sure what their personalities are, but as far as like noticing in class they are usually more intellectual questions when I hear them talk. [Okay.] Level of performance - For me engineering is just hard and so I am just always having a hard
time with it. Keeping up and being a girl has that extra enhanced, you know, pressure on you to like feel like you have to keep up with everyone and so it is just a little hard. Especially in one of my group projects, the guys had this idea of improving these valves in the air ducts and I had no idea what the heck they were talking about, and so I sat there just completely over my head. I had no idea what they were talking about and I felt like I was just a complete idiot and so stuff like that like I just, you know. It was completely over my head and I really don’t have, you know, some of the knowledge they do on certain things, because they have always been into it and stuff and so some of the stuff is a little different. [Right.] But, um, I don’t know.

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions and how others respond to them. Okay, this is really good that I just had my one 270 class actually. Peer class was just a project and I noticed that I had one other girl in my group and I noticed that for this particular group the way the dynamic worked out was the girls, the two of us, we ended up taking more writing tasks and more, you know, just taking down like notes and like keeping down all the tasks for recording and copying and keeping things together, more organized tasks for the group because the guys were more focused on what, you know. We did have like things of what we needed to get done, but they were more focused on like how things were going to work and stuff like that, too, and they were too focused on that to worry about small details and stuff and that was just how it ended up working out. So we just kind of took to the extra little tasks to just make sure that those things were taken care of, and not because like they just didn’t want to, they just….. It just fell into our hands. Like if we weren’t there they would, of course, have taken them on. That’s just how it ended up working out. [Right.] And, um, also because they kind of were like “Oh you guys might want to take notes because I can’t read my handwriting,” stuff like that too because we just have better penmanship too. [Right.] Stuff like that, as well as just making sure things were getting done as well. We also were more of the ones who kept them getting things done. Like I was in charge of telling people when they had to get their task done, like as far as fabrication process and stuff. I was the person who sent out everything for when people had to get stuff done, when it changed, that was like my task and stuff, and the guys, um….. But the guys as far as when we had to meet with the teacher, they were usually the ones that were the, um, the leader as far as the person presenting the material and stuff like that. [Okay.] But we took more side tasks when we had to present it in the group. [That’s really interesting.]

Could you describe your own classroom participation? I personally am a mute when it comes to class participation, like I am just a quiet person and I don’t really participate. When it comes to groups and talking like one-on-one in my own little group I will talk and participate and get involved, but when it comes to classroom stuff like I usually just don’t say anything. I just listen. [Okay.] [Laughs] And if I usually have a question to ask the teacher I just go into his office and ask.

Describe the classroom climate in your engineering courses. I actually feel, as far as like comfort level, I feel pretty comfortable and fine, like I am used to, um, sitting in the classes and I feel perfectly fine actually. As far as compared to some of
my other classes, like I almost feel more comfortable than in some of my previous like freshman classes when I had some more girls in my classes, probably because people are more focused on like the actual work as opposed to being distracted by other people because it is more intermixed. But I also notice that, like coming into a class sometimes, like in the beginning of the semester when you walk in the class and you are the only girl that walks in, like the first couple of days you just have eyes like ‘oh, there’s a girl in the class’ and one of the first girls. It is kind of a little annoying the first couple of times, and after awhile like they don’t do it anymore and then it’s okay. But once you get to meet all your classmates and stuff like I feel pretty good, and if you get to know them and they know where you’re at and don’t make you feel like a little belittled because, you know, you’re just like them and you just have as many problems with the class as they do. Just as long as I don’t have problems with them making me feel like I just don’t know as much because I’m a girl, then I won’t have any problems which I haven’t, which is a kid so… [Laughs]

How does your professor respond to you in class?
Actually just fine. Like one day Schwartz handed back tests, like I got back a test and I didn’t do so hot on it and I think he noticed that I was kind of upset about it. He even asked me a question in class and I was just like ‘oh Schwartz not today,’ like he was trying to be nice but it was just not the day to do it. So like he is, actually he is an awesome teacher. He is probably one of the best teachers I’ve got and like, you know, he is really good and he’s like….. They are really good about it. All the teachers are really good.

Describe your classroom versus lab interaction with professors. Is one more formal or informal, focused on course content or are there social aspects to classes? Compared to lab? I am not taking any labs right now.

What about just your classroom as a whole, are they usually more formal or do they have social aspects?
I would have to say that the lectures are formal, more formal and the smaller classrooms are much more informal like Schwartz’s class but they’re still more….. They are not so informal that people get out of hand, unless he is not there, because they have a lot of respect for him. And the same with some of my other classes. Like the smaller classes are a lot more informal but they still really, like, end up and get to the point and, um, get a lot more focused and end up. Of course you know it all depends on the particular class and who you are with like as far as like who’s in your class too.

How does your professor respond to you outside of class in office hours and in meetings?
The same. Yeah. I mean they are much more personal, you know, outside of class. I mean they are a lot nicer. They are concerned. You know, they want to know exactly where you are at. When I have gone to teachers outside class they are always like, you know, um, “What exactly is going on?” like “Where do you think you want to go from here to improve this problem. Do you want me to give you some names of people that can like help with this problem?” Stuff like that, like they are always very helpful and very
informative and like…..  [Okay.] And they always give office hours and stuff of where to find them. At least I’ve never had a problem with it, and if I can’t find it I can usually look them up to find it, so I’ve never had a problem.

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help and working in groups outside of class.
[Laughs] It depends on the day. It depends on when they are serious about it or not, and if the test is coming up [Laughs] to be honest.  [Okay.] Because some days usually in class, people aren’t as concerned about the material. They are more like ‘ok, let’s just get this over with and get through the day.’ And they don’t really care about what’s going on. But once they’re outside of class and working on stuff and it is using up their personal time, they are more concerned about what is going on and they want to get it done. But then they like, you know, if they’ve got a lot of free time and know there is not a test for awhile, they are more likely to screw around and just joke off and like have, you know, some jokes.  [Do you notice any difference between men and women as far as do you think one gender takes it more seriously?] Um, I would probably say I would take it more seriously than the guys do, because I feel I struggle with engineering more so than some of them.  [Okay.] It is harder for me to get some of the stuff than they do sometimes.  [Okay.] And, um, but usually it is just me, not with like another group. I am usually just the only girl so it is kind of hard to say or that’s why I don’t…..  [Laughs]

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
Meaning exactly what?  [Do you notice maybe either men or women tend to do better on homework, on tests? You mentioned you tended to write more or maybe the women did in groups. Maybe women tend to do better writing-wise, or …] Yeah, probably as far as, like I mean if I was in a lab I would assume like lab write-ups and stuff, and like we probably get higher points, you know, I would assume for stuff like that and as far as like accuracy. But as far as tests go, I think it is pretty even.  [Pretty even?] Yeah, because it’s the same amount of time and they don’t really…… They’re not as concerned with, um, you know, penmanship as far as that goes. It is more so the material you have down and everyone knows exactly what you need to have done for that. If you don’t have the equation then it’s more so. There’s a whole different field there as opposed to like a project write-up  [Right.] when it comes to that kind of stuff.  [Okay.]

Describe your own strengths and weaknesses in engineering.
My specific strengths? [Laughter] Well, my specific weaknesses in engineering right now would be using the calculator  [Laughter] because I can’t punch in the numbers correctly. At least I couldn’t a couple of days ago. Um, my strengths? I don’t know. I just really like the field a lot, but I can’t say that I always understand the full picture of the problems. I have a hard time picturing the entire problem as a whole sometimes, which is upsetting a lot of the time  [mm] especially when you are pressured for time on the test and you could use ten more minutes [Laughs].

What do you find most difficult about your program?
I would have to say that probably the most difficult thing about the program is that [Laughs] the classes, you could take just as many credits but it requires like triple the amount of time to do it. So you could spend just, you know, countless amount of hours here, and so right now I am going to spend like another year here just trying to get the same GPA. Other people would finish their major sooner with, like you know, free time to spare doing extra activities which hurts a lot because that sucks [Laughs] /Yeah, yeah./ but that’s okay if it’s an extra paycheck, so….. [That is true.] [Laughs]

What expectations do you have for yourself in engineering?
I would have to say the expectations I have for myself in engineering would be that I would just really enjoy exactly where I am going to end up in it, honestly. Like for all the work that I’m putting into it, I hope I really enjoy exactly what I’m going to be doing because it is a lot of hard work right now. Hopefully I picked the right major. /Laughter/ Right now I hope I did. Go prosthetics. /Laughter/ [Okay, great answer.]

END - Teresa interview (22)

END of tape #4-B

Interview with Scott - April 15, 2005
(tape 5-A, interview 1)

What factors affected your choice of university?
A lot of it was the reputation that Iowa State has as an engineering university. I knew I didn’t want to go terribly far away from home. I am from Newton, Iowa and I didn’t want to go to the coasts, which you almost have to do to get to other universities. I looked at the University of Minnesota, the Twin Cities campus, which is a small city in and of itself. It just felt too big. I felt I could never get to know the whole campus. I went and looked at Bradley University in Peoria, Illinois, which was the other side of the spectrum. It’s a private university, a very good engineering school but very small, and it just didn’t have the facilities that Iowa State has since it doesn’t have the same budget. And there’s a small legacy here at Iowa State. /Oh okay./ My grandfather went here, my great uncle went here, and I had a cousin who was here when I was a freshman, so… /Oh, interesting.]

What factors affected your choice of major and what would maybe not cause you to change your current major now but what would have earlier on in your program?
The main thing that caused me to choose engineering was the fact that I’d said I was going to be an engineer since I was in sixth grade, so I really got set in the rut and it was hard to bump out of it. I am a very problem-oriented person. I’m a mechanically inclined person. Mechanical engineering just seemed to fit who I was very, very well. All the tests I took said that I should do something with engineering. It always seemed interesting in the things that I read. I am always tinkering. I love taking things apart. Lego’s were my favorite toy as a kid, so I always viewed myself as an engineer. Causing me to change my major, I actually fought with that last year. Um, I’m a very mid-brained person. /Okay./ I don’t live just in the logical numbers side of my brain like a lot of engineers do. I have a very creative side, a
very expressive side. I was really big into theater in high school. I actually wanted to do a mechanical engineering and theater technology kind of a double major hybrid thing as a major. That would have taken about seven years to do so I didn’t elect to do that at this point in the game, but it’s… My biggest fear is I am going to end up sitting behind a desk for eight hours a day, five days a week, designing widgets. Routine, I can’t do routine. [Okay.] I need variety, so I’m a little bit worried about how routine a mechanical engineering job is going to get, but I’m hoping to end up in a research and development type position or something similar so I’ve got something new coming up on a regular basis. [Right. That’s interesting.]

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?
A lot of it depends on the individual as far as class participation, level of performance, various things like that. Girls and guys both, you’ll have the people who are pretty outspoken, you’ll have the people who are very quiet. For engineering a lot of the classes are lecture type settings. If they’re not 200-300 person lectures they are still a 40-person class with one instructor, so that is pretty intimidating to a lot of people, and just given the relative ratios of guys to girls you are going to have more guys that speak out than girls just because there are more that feel comfortable, men versus women. But I know some very outspoken females in engineering who have no problem standing up in class and asking a question. I know some guys who are just as timid as anybody else and won’t say a word in class. [Okay.]

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, and how others respond to them.
I’ve really only done… Again given the ratios I’ve really only had one group where there’s been a female so I can’t speak to it too much, but in that group we all just seemed to click. It was a group of four of us and we were all good friends as well as just being - well, got to be good friends - as well as just being a group, so communication was very open. It was like being good friends. We would sit around and bullshit instead of doing our work at times. We would, uh… It was a group of friends who happened to be working on a class, so she would pipe up just as much as any of the rest of us. [Okay.] I guess I’m not sure exactly what you’re looking for, but there are no outstanding… It doesn’t seem like the guys in the groups intimidate the girls especially. Um, it might have been that way in previous years, like five-ten years ago, but anymore it seems like they are engineers. They are just like us. They happen to be female. [Right.] So they have an idea - okay, let’s see what they have to say, analyze it in a technical sense, okay, it works, do it. [Okay.]

Describe your own classroom participation.
If I don’t understand something I ask a question. I really don’t feel any qualms about asking professors things in class, going up and talking to them afterwards, but I have never really had a problem talking with adults, talking with authority figures. I’m an only child so when I was growing up there weren’t other kids around so I did a lot of talking with adults, so that’s probably a big portion of why I don’t have any problems with it.
Describe the classroom climate in your engineering courses, general comfort level.
It depends on the professor. [Okay.] The professors I’ve got this semester are all pretty open. They don’t seem to mind if you ask questions. I have had some courses where the professor didn’t so much discourage questions but they barely acknowledge the presence of a classroom, so it’s difficult to ask questions just because it was difficult to get their attention to let them know that you have a question. [Mm-hmm.] One professor in particular would teach off of overhead slides. He would come at the beginning of the class, put down his first slide, and wouldn’t look up until the class was done. He would just be over the overhead switching slides and so if you had a question you really did have to stand up, wave your arms, and yell to get him to look up. You couldn’t just raise your hand and say “Hey, go back over that.” [Right. Okay.]

How does your professor respond to you in class?
If I’m asking an intelligent question they usually respond fairly well. If I ask something that somebody just asked, because I wasn’t paying attention of course, they get a little bit exasperated and again it depends on the professor. Some professors are very open to it. They actively encourage people to ask questions. It’s not like being back in high school where teachers would force questions [mm-hmm.] but they’d give ample opportunity for people to ask questions. [Okay.] Other teachers almost seem to take an affront at the audacity of disturbing their lecture with a question, but that is more the exception than the rule at least in my experience. [Okay.]

Describe your classroom versus lab interaction with professors. Is one more formal or informal? Are they focused largely on course content, or are there social aspects?
If I have an actual professor for lab, it has usually been a more informal interaction. Usually the labs are done by TAs or graduate students, so you see the one person in lab and the other person in lecture and never the twain shall meet. [Mm-hmm.] I don’t think I have ever actually had the same professor for lab and lecture, but in my Physics 2 course I had another professor as my lab moderator and I would assume that was a much more informal reaction. I can’t see how you would keep track and keep control of a two- or three-hundred person lecture with the style with which he taught lab, and it really was a very ‘you have your instructions - you know what you need to do from your lab book - I’m going to be up here - if you have questions come ask me.’ It was a more self-directed thing and that’s been the case in a lot of my labs. [Okay.] They tend to just let us do what we need to do and come to them if we have questions.

Describe any difference you see in the communication that you see from lecture to lab as far as how often you communicate with other students and professors.
Well, obviously a lab is a more one-on-one or one-on-two setting with other students. You have to talk to figure out what the heck is going on most of the time. [Mm-hmm.] I usually in a lot of my lectures, I try to sit next to somebody I know or at least get to know, so that I can try and….. So that we can talk back and forth quietly during lecture if one of us doesn’t understand something and one of us wants clarification on something. As far as talking with the instructor, it is obviously a much more open environment in the lab. They expect
questions. They are waiting for the questions, but they are not up there trying to lecture at the same time. [Right.]

**How does your professor respond to you outside of class as far as office hours and meetings?**

Generally fairly receptive. In office hours, that’s what they’re there for. They’re supposed to be for students to come in and talk, so if you are there during their actual office hours they are usually fairly receptive to it. If you are trying to set something up outside their normal office hours, if you are asking them to make an exception in their schedule, then it’s a less receptive feeling but that’s to be expected. They’ve got their schedule too. They’ve got the things they need to do. [Right. Okay.]

**Describe any difference you see in men’s and women’s out of class participation as far as coming to help sessions and working in groups together.**

I didn’t go to a lot of the help sessions that classes did. I didn’t do a lot of the supplemental instruction. Again a lot of it seems to depend entirely on the individual. [Mm-hmm.] Um, if I had to draw a gender specific generalization, I’d say that women had a higher percentage of going to supplemental instruction type things, but I don’t know how firm that would be and I think a lot of it is..... I’m not sure why it is. I’m really not sure why it is. A lot of guys just don’t think that supplemental instruction is something they want to do. I think it is more the autonomy mentality, I’ll do it myself type thing. [Okay.]

**Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?**

To put it shortly, no. [No?] The old rumor or the old myth that men are better at math or women are better at math or whichever way it went, I’ve seen both ways. I’ve known people on both sides of the gender tree that are brilliant at math and like me kind of helpless when it comes to the advanced concepts. In lab sections a lot of times the females seem less, I don’t want to say technically competent, less practically experienced maybe. [Okay.] That probably still speaks to the gender gap from their parents’ generation though. Boys are taught to do hands-on physical things when they are young. Girls aren’t. It’s not to say they can’t do it. They just haven’t had the experience. I am almost in that same line just because neither..... My parents are both liberal arts majors, so I’ve got friends who are engineers who could disassemble and reassemble an internal combustion engine by the time they were eight. I couldn’t do it now. But again that is just a result of the upbringing. I don’t think it speaks to the individual’s capabilities. [Okay.]

**Describe your own strengths and weaknesses in engineering.**

Ha, my own strengths and weaknesses..... oh, man. Well, one of the strengths I’m sure is my determination or stubbornness, however you want to label it. I’ve done three years at this point. I’ve said I was going to be an engineer since sixth grade. By God I’m going to get the degree, even if I come back to school in two years for something else just because I can’t stand it anymore. People would say, and they’re right, that I’m a fairly academically gifted person so that definitely helps in a major as demanding as engineering. The weakness is I’m an academically gifted person so in high school I never had to study. I just didn’t have to.
My high school was not a challenging place so when I got to college, I have no study skills - at all. So now all of a sudden I am in a place where I need them, I don’t have them, and that has come back to bite me more times than I care to remember. So, those are probably the biggest. [Okay.]

What do you find most difficult about your program?
Again, just the necessity for the self-discipline to do the extra work. You can’t just sit in lecture and understand it all. You have to put in the extra work outside and that is not something I never had to do, so it’s something I have trouble making myself do. [Okay.] If I can find the motivation to get myself to put in that extra hour a night, it’s dramatic how much more confident I am about the material, how much better I feel going into it, how much better I do. It’s just a matter of getting that push to do it. [Mm-hmm. Okay.]

What are your expectations in engineering, for yourself in engineering?
To graduate first of all, hopefully. I am hoping that a degree from Iowa State will still mean something when I get to the work place. It’s..... The program has been having trouble, so we’ll hope that a mechanical engineering degree from Iowa State still means what it used to by the time I actually graduate. I would hope that I can find a position that I am happy in. I don’t want to end up taking a job because I need a job. I’d like to end up taking a job because it sounds fun, it sounds like a rewarding career, and honestly I would expect that I am probably not going to be a stereotypical pigeon-holed engineer for my entire career, if even for any of it, because that’s not quite where I want to end up. I want to do something a little bit different with it, whether that be ending up someplace that’s doing leading edge research or taking the engineering background and going on to somewhere else in the industry or an entirely different direction. Maybe getting my degree, getting my professional engineering license, and going back to my theatrical design. [Mm-hmm. Good answer.]

END - Scott interview (23)

Follow-Up Interview with Steve - April 15, 2005
(tape 5-A, interview 2)

Describe your view of how students participate in class.
Well, I guess, larger classrooms the students will often times sleep in class. They might have little conversations amongst themselves and not really pay attention to the teacher, just what they put on the board. [Right.] Smaller classrooms, it seems to be that there is more interaction with the teacher. There is asking questions. It is just more of a social environment with a teacher. [Okay.]

Do you think that in classes there are obviously really dominant students and timid students? In class? [Yeah, are there kind of established people that talk a lot and participate or people that really don’t?] I haven’t seen a whole lot of anybody really who talks a lot besides just students that might just talk a lot to someone who is sitting right next to them. [Oh, okay.] but mostly it is just listening to the teacher. [Okay.]
Can you give an example of a time when you felt really comfortable participating in class? Maybe what kind of environment you like in class.
Well, I have been really comfortable in Chemical Engineering 210. It’s a small class. I think there’s just less than 20 people in there, so it’s just a really small environment. Like I was from a small school so that is kind of like what I was raised with. [Okay.]

How about really uncomfortable?
Definitely probably my organic chemistry class. It is big. There’s hundreds of students in there. [Yeah.]

How does the way you participate in class differ from the way you wish you participated?
Well, I wish I went to class more often sometimes. I sleep through a few sometimes. I just sleep through the class. I go and then I lay my books right on my desk and I go to sleep. I wish I could stay awake a little better. [Okay.]

Are there times where you really wanted to contribute but you didn’t?
Yeah. [Why?] Because I guess sometimes I just feel like being quiet. [Okay.] I don’t know. My parents always told me to be quiet, so I was raised up to be quiet. [Laughs]

Could you describe the climates of the groups you have been in, how comfortable you were working with other people?
I have been really comfortable working with groups as long as it’s a nice small group. That way you can have plenty of interaction with your group members, your project members. You get to know the people a little better. It’s like part-time friends I guess you could say.

Do you feel people listen to you and give you equal opportunity to participate?
Yeah, because that is the whole idea behind the group project, that you are supposed to listen and hear everybody’s views, and it seems like that is done pretty well in the groups that I have been in. [That’s good.]

What factors do you think most strongly affect the classroom climate as far as how comfortable students feel there?
Definitely if the teacher does a better job teaching than just reading out of the book, just reading the summaries out of each chapter. It just seems like that’s not very….. I don't know. It’s not a very fun class that way. [Okay.] I don’t know. [No, that’s good.]

How does your professor’s response to you when you ask questions compare with the way that they respond to the other students?
It’s the same. [The same?] Yep. He’s very unbiased.

Does he encourage everybody equally?
Yes. [Okay.]

How would you ideally want your professor to respond to you in class in comparison with how they do?
They seem to do a pretty good job in my smaller classes. In larger classes I don’t bother asking the questions so..... But out of class you can talk to them and they are usually pretty friendly and willing to help.

**How would you ideally want your professor want to respond to you outside of class in comparison with the way that they do?**

My experience has been that they are really helpful. They won’t tell you how to do a problem, but they’ll tell you the way to do the problem. I don’t know. They won’t tell you the answer but they will tell you the route to take to get the answer. [Okay.] They are helping. They are just not giving you the answer, which doesn’t help much.

**How do you think your class work matches up with those of the opposite sex in your class?**

What was that? [How do you think your class work matches up with that of women’s in your class?] Do you mean like required work out of us or? [Yeah, just homework, tests, work.] It seems to be..... I don’t know. They get some better grades than I do sometimes [laughter] but, yeah, it’s pretty even in my classes. [Okay.]

**How are your strengths in engineering recognized and acknowledged?**

Well, I have..... Usually I try to schedule meetings, try to see what fits for everybody else. I’m not one to leave people out because I was left out a lot in high school, so I try to encourage teamwork. [Okay and you feel other people respond to that well?] Yeah. [Okay.] It seems to me.

**How do you feel that your weaknesses are improved upon in engineering?**

Well, I suppose not too many engineers have great social skills as I don’t either, so just meeting in our groups and just interacting that way seems to build on that. That’s a weakness that I have that has been improved. [Okay.]

**Describe the most supportive part of your engineering classrooms.**

Hmm, what do you mean? Give me an example. [Um, like the other students are really supportive of you or the professor, or maybe you feel really comfortable with the material.] Sometimes I work with the students, but a lot of times I find it really helpful to go to the professor. He is usually pretty good help. [Okay.]

**What do you find the most unsupportive?**

Unsupportive? Hmm..... I don’t know. [Laughter] [All supportive?] Yeah. [That’s good.] I’m trying to think of anything that would be unsupportive if you went to a class. [Yeah, I mean the only thing I guess would be specific examples of when people maybe discouraged you from participating or......] Well it doesn’t seem to the case yet. In my major I haven’t seen a lot of that, which is really good. [Yeah. Okay, well that’s great.]

**END - Steve follow-up interview (24)**

Interview with Jacob - April 18, 2005
(tape 5-A, interview 3)
What factors affected your choice of university?
Mostly just the closeness and then since Iowa State’s, you know, just an engineering college in general. I wanted to go into engineering to begin with so mostly that is what affected it. I wouldn’t have chosen any other college anyway. [Okay.]

What factors affected your choice of major and what would cause you to change your current major?
I have kind of known I wanted to be a mechanical engineer every since like eighth grade. You know, I’ve dealt a lot with like Lego’s and stuff like that, but then my dad was in the automotive industry for years just being a mechanic, so I was around a whole bunch of hands-on things like that so that’s what mostly influenced my decision. And as for changing majors, unless there was like a huge change in the actual mechanical engineering field, you know, like there were no more engineers or something like that [Laughs] you know that is probably the only thing that would cause me to change anyway. [Okay.]

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?
It’s kind of hard with the M.E. because there is not a whole lot of girls in the Mechanical Engineering department but, I don’t know, it seems like they seem to do better, I guess, you know. Because personally like I have to study my butt off [laughs] and then like you know I was just talking to one of my classmates and stuff and she didn’t study for the test at all or whatever but still does awesome. So I don’t know. [Okay.]

What about as far as how much they participate in class?
I would say, you know, again since there is a lack of females and what not, but the males seem to participate more and I don’t know if it’s just because there are more of them obviously, but I think they are more outgoing and just like to participate and kind of voice their opinion more. [Okay.]

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, and how others really view them and respond.
Well, I think they kind of perceive them as “weak” because they are women and it’s kind of the male testosterone thing, but well, like my M.E. 270 class. You know, we’ve got three girls in our group and stuff and so it’s male dominated out of 12 people there. So like obviously, you know, the males are going to take the leadership role, just kind of a back of the mind thing, [mm-hmm] but I will notice that, you know, they will step in when necessary just to get the job done, so….. [Okay.]

Describe your own classroom participation.
Lately I have been trying to participate more. Before I used to just sit back and kind of ‘yeah, maybe, well somebody else will ask the question I have’, you know. I am kind of shy but I have been trying to get more of the leadership role, so….. [Okay.]
Describe the classroom climate in your engineering courses as far as how comfortable you feel in the class to speak up and with other students.

I guess I am a little intimidated by the professors and stuff, like thermodynamics take for example. Like, you know, the guy wrote the book, you know, so any question I seem to ask, you know, it’s going to be like “Why did you ask that?” You know, he’s already got everything down pat. And then, you know, just I’m a little shy anyway so [Laughs] I’m not likely to raise my hand and ask a question. I will usually just ask someone else before I’ll ask a professor. But as for being comfortable, you know, usually lectures I’ll just sit back and listen, so…… [Okay.]

How does your professor respond to you in class?

They are all good. I don’t know. You know, they’ll answer your questions. They won’t downsize you or anything like that. They are more than happy to help, so…… [Okay.]

Describe your classroom versus lab interaction with professors. Is one more formal or informal? Is one more focused on course content and one more social?

For example my E.E. lab, the TA, it’s at four o’clock in the afternoon on a Friday so he has the same mentality we do. We’re just trying to get done with it and got out of there, but it is a lot more informal and I think that’s just because it’s a smaller group and you can have that interaction between the TA and the students. As for a professor, you know, he’s got to deal with umpteen million kids everyday so it’s kind of hard to just, to pull him aside and say hey, you know, I have a question about this, but yeah I think it’s more informal with the smaller group. [Okay.]

Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor and with other students.

Again, I think it is just the formality because like with the TAs and the little labs, you know, you are more liable to just go up there and say “Hey, you know, can you help with this little thing?” because in a big old lecture hall, you know, you have to wait until the class is over or catch the guy beforehand or e-mail him or whatever, and then, you know, you got all those other students trying to talk to him at the same time, so, yeah. [Okay.]

How does your professor respond to you outside of class in office hours and in meetings?

I really haven’t had a whole bunch of opportunities to talk to my professors outside of class. For my M.E. 270 class, uh, e-mail mostly and that is probably the best way to do it as opposed actually to just going up there, trying to find him, but e-mail is probably the quickest most efficient way to talk to professors.

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help sessions and working in groups.

I’m trying to think because I know I used to go to like SI sessions last semester and stuff and it was pretty much equal for the bigger classes where like, you know, you’d have equal amounts of men and women like for physics and stuff like that. [Okay.] As for participation, it’s pretty much - it’s up in the air, 50-50. [Okay.]
Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

Um, I’m trying to think. Nothing really comes to mind. I mean maybe attendance but [Laughs] I think that just is kind of whoever, you know. [You think women or men attend more?] I would say probably women, you know. Men are pretty lazy. [Laughter]

Describe your own strengths and weaknesses in engineering.

Like I am really good at like taking apart things like mentally and if I look at an assembly I can, you know, take it apart and see what makes it tick. And as for….. I don’t know, like I kind of got tripped up in physics and stuff. Like I understood the concepts, but like when applying it to the problems I would like miss one or two things and that is kind of the same thing with thermodynamics and E.E right now, so that’s probably my weakness, is just actually applying the concepts but I understand the concepts so….. [Okay.]

What do you find most difficult about your program?

Oh, I’m trying to think. Just all the little classes that don’t matter, kind of like the tech electives and things like that, or just like the humanities. It is good to diversify yourself, but I don’t know, just staying on track with the actual M.E. courses would probably be more beneficial to me anyway. [Mm-hmm.]

And what expectations do you have for yourself in engineering?

I hope to just get out there in the field and find something I like to do, you know, not just sit behind a desk all day. You know, actually hands-on things, stuff I like to do as opposed to someone giving me, I don’t know, stuff I don’t want to do, you know, so hopefully I just find something in my area that I like and that would be the best for me, I think. [Okay. Good answer.]

END - Jacob interview (25)

Follow-Up Interview with Alison - April 19, 2005
(tape 5-A, interview 4)

Describe your view of how students participate in your class. Are there obviously dominant students and obviously timid students?

Yeah, in every class there are those people that are obviously like that will ask questions and then there are obviously like the students who are just kind of there because they have to be. [Laughs] And then there’s the people who don’t come to class and they just come to like test days and stuff like that so, yeah.

Do you notice any gender traits that fall into that like…..?

Let me think. The girls are more quiet. [The girls are more quiet?] Yeah. [Okay.] I usually am. I just kind of like sit back and just kind of take everything in, and then like if I have questions I’ll ask after class or something. [Okay.]

Can you give an example of a time when you felt really comfortable participating in class, like what made you feel…..?
Like when for sure I know what I’m doing, then I’ll….. Like the other week I did a problem on the board, but it was because I knew the answer was right. [Laughs] Otherwise I probably wouldn’t have. [Laughter] [Okay.]

Can you give an example of a time when you felt really uncomfortable participating in a class?
Yeah, I don’t like asking questions or like doing stuff in front of people if I’m not 100% sure what I am doing because, I don’t know, I don’t want people to think I don’t know what I am doing. [Laughs] [Okay.]

How does the way you participate in class differ from the way you wish you participated?
Most of my classes aren’t like huge, like we participate a lot in class, you know. We don’t have like full debating conversations but, um, I’d probably do more of like an active listener maybe. Like sometimes I listen and take notes and sometimes I just kind of go off on my own, which is not good [Laughs] and I try to stay away from that [Laughs] but it happens when you’re tired, so….. [Laughs]

Can you describe the climates of groups you have been in as far as how other members work with you. Do they listen, give you equal time to participate?
We have been working on our group project in chemical engineering and we have all the problems, you know, equally distributed and there are two girls and two guys in our group so….. And I think that we are given equal opportunities in this group anyway.

What factors do you think most strongly affect the classroom climate as far as how comfortable students feel participating?
The teacher, um, wanting participation and like encouraging questions. Like when people do ask questions they’re like “Oh, yeah, that’s a good question. Sorry I didn’t…..“, you know, instead of like “You should have known that, blah-blah-blah-blah…..” [Right.] Because otherwise it makes people look stupid. [Right.]

How does your professor’s response to you when you ask questions compare with the way you wish they did?
The class I just came from, the differential equations class, he does not answer questions well at all. Like you ask him a question and it doesn’t even seem like he answers it, or like maybe he just doesn’t understand what the question is and you’re just kind of like ‘oooo-kay, never mind’, but in most of my other classes it seems like they do a pretty good job of answering questions pretty well. [Okay.]

Do you think your professors encourage everyone equally?
I have to think. I think, um, they kind of….. Like there’s this one and he always like a teacher’s pet, you know, and it seems like, you know, the kids who get to know the teachers then they encourage them more than the kids they don’t know. Especially if you don’t come to class, the teacher is just going to not really care because if you don’t have enough, you know, if you don’t care about going to class they are not really going to care if you are doing good, I mean, as much as….. [Right.] [Laughter] I know I wouldn’t [Laughs]. If someone
doesn’t come to my class it would be like, “You don’t come to class.” Unless they have a really good reason, I mean like missing class, like once or twice, or I don’t know a few times, is not like missing class two times a week. It’s just like ridiculous.

*How would you ideally want your professor to respond to you in class as far as like more formal or informal, more social or more course content related?*

I like it when the teacher knows your name and they’re like “Oh Amber that was a good question,” you know, and then maybe like repeat the question, you know, for everyone because sometimes students will ask questions and you don’t know what they said, like what the question was, and then you get an answer but you’re just like ‘well, what was the question?’ I don’t know. It’s just not a good answer.

*How would you ideally want your professor to respond to you outside of class in comparison with the way that he or she does?*

Let’s see. It really bothers me when, you know, you are in like a semester with the teacher and then they don’t recognize you. [Laughs] I know like I wouldn’t expect my sociology professor to recognize me because we have like 300 people in the class but, you know, in smaller classes if you see them and say hi, you know, kind of act like if they don’t know you or something, I don’t like that. Otherwise I don’t have too much contact with my teachers outside of class so I don’t have anything picky to say. [Laughs]

*How do you think your class work matches up with the class work of people of the opposite sex in your class?*

I get pretty good grades so I think it’s, uh, like the same, but it always seems like, I said this before, it always seems like it takes me a lot longer to understand and figure out. Like it will take me two hours to do my homework when it would take like my partner an hour to do the homework, and like I ask questions, like more so towards…… I ask my friends questions more than I ask the teacher questions because maybe I….. I don’t know. I just feel more comfortable asking my friends and seeing like, well, maybe if they don’t know it then we go ask the teacher. Like I always try to do my homework in the group so I know that….. It always feels more comfortable. I don’t know why, but like if you are in a group with guys….. I don’t know why, (but) you’re just kind of like well, then they probably know what they are doing and make sure I’m doing it right, and I’m like ‘okay, yeah, they are doing it the same way so……’ I don’t know. I always work with guys in my group so I guess….. I don’t know if that’s subconscious or…. [Do they seem more confident?] Yeah, I think so. Maybe when I get more experience under my belt I’ll be more confident, but…… [Okay.]

*How do you think your strengths in engineering are recognized and supported?*

I think I have been personally, like, really supported to stay in engineering because I’m a woman and like a minority, and there’s like LEAD and you know I have like a mentor for Carver Academy that’s like in engineering and just I think I have been. Then like Dr. Richards really encourages, you know, you staying in engineering so I think I have been encouraged a lot, so…… And especially by my parents, they want me to stick to it. And like last night I got an award from sorority for being, all of us “engine-nerds” got awards for, you
know, being really, really smart and studying in engineering and, you know, I think it’s recognized. I think people are really impressed when you say, you know, I’m in engineering, so I like that.

**How do you think your weaknesses are improved upon?**
Like how they have improved, or? [Yeah, like what do you think your professor or maybe group members do to help you with areas that you are weaker in.] Okay. Can I come back to that question? [Sure.]

**Describe the most supportive part of the engineering classroom.**
Let’s see. I really like how we have recitation for our ChemE 210 class. I think that is really nice and Dr. Richards also does like surveys on how he is doing in class and like how we are doing and why we think..... like what we are having trouble with and why we think we’re having trouble with that and then, you know, they are like confidential but then he will go over all the statistics in class and be like “Well here’s what’s going on and I’ll try to change this,” and I think that is really impressive. I hope all the teachers do that. I mean I’m sure they don’t but I really like that a lot. [Yeah and that could even fit into helping your weaknesses, like really figuring out what you’re having trouble with.] Yeah, that really helps. That really helps you there. And then he also like prints out the notes. It is not on the... It’s just like actual written down notes, not PowerPoint, and then you have the notes when you come to class or he gives them to you and then you can like follow along and highlight and then write extra notes instead of constantly trying to write down everything they are saying instead of soaking it in. [Right.] I know some students take advantage of that and just like don’t come to classes, but you know it’s not like that. It’s not like oh you have the notes and all we do is read over them, you know. We like work through the problem more in-depth and, you know, you definitely take notes and look in the book and stuff, so..... [Yeah, that is really, really cool.]

**What do you think is the most unsupportive part of the engineering classroom?**
Hmm..... Definitely like the...... There’s definitely not as many girls as there are guys, and you know when you have more girls there’s more support there because it’s obviously, like people like to stay with their own. I don’t know, because when you sit down next to someone, you’ll most likely sit down by someone you know or if you don’t know anybody someone like your same sex or something like that, and usually for the first year you are not going to know that many people, but I think the classes probably get smaller and you’ll get to know more people but..... [That’s a good answer.]

END – Alison follow-up interview (26)

END of tape #5-A

**Interview with Angie - April 19, 2005**
(tape 5-B, interview 1)

**What factors affected your choice of university?**
What factors affected your choice of major and what would maybe not cause you to change your current major now but what would have earlier on in your program? Can I skip the first two (questions)? Yes, you can. I have to think about those. Otherwise it’s going to be a lot of silence. Oh that’s fine. {See end of interview.}

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex? Well that one’s kind of hard because there are less women, but I think as far as…. Are you talking about these three things here mainly? [Yeah.] Class participation - I think that they are better with working in groups than working in front of like, the whole class. [They, meaning girls?] Girls, yeah. [Okay, just making sure.] Level of performance - I have seen that girls perform lower. I have seen that a lot but they don’t necessarily have to perform bad, and they are less vocal, but I mean you can’t really look at it that way though because if you compare a class of 55 guys to 3 girls, yeah, there is going to be..... The girls are going to talk a lot less because there are a lot less of them. [Right.]

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, and how others respond to them. They participate. I personally like to take leadership positions because I know what I am competing against and I like to feel that I’m….. What is the word? I don’t know, that I am an asset to the group other than just somebody who sits there and watches, but I have worked in groups with other girls and I think they try to pull their weight because they don’t want to be thought of as less than the guys or whatnot, so….. [Okay.]

Describe your own classroom participation. It has gotten worse. [Laughter] Like my freshman year, like I came and I talked and I asked questions all the time, I met with all my professors, and then I just started getting into the more difficult classes. Like I got more ashamed to because it was….. I felt like my questions would be stupid so my class participation has went down. Like unless I am 100% sure, I won’t participate in front of a whole group of people, so….. [Okay.]

Describe the classroom climate in your engineering courses as far as how comfortable it is speaking up or how comfortable you would feel speaking up. Like I said, I am only comfortable if I am 100% sure. I won’t speak up if I am not sure because I am sure there is somebody who will tell me I’m wrong. [Meaning a student or?] Or the professor and I would rather just not. [Okay.]

How does your professor respond to you in class? I guess just when I have questions? [Yeah.] I guess it can be a lot of things. I’m not good at this. [You’re doing fine.] Um, regularly. I don’t know, just normally. [Just normally? Okay.]

Describe your classroom versus lab interaction with professors. Is one more formal or informal, focused on course content, or are there social aspects?
I don’t know. They are more formal than social, I guess. You have to interact more in lab with people, so… [Okay. That’s good.] I don’t know. I’m terrible at this. [No you’re not. You’re good.]

Describe any difference you see in communication from lecture to lab as far as how much you communicate with the professor and with other students.
You communicate more but I think I communicate with students really well and professors a lot less well. [Okay.] I am always really good about students and I think the reason it is easier to communicate in lab is because you have your TAs and they are more your age and you feel more comfortable. [Okay.]

How does your professor respond to you outside of class in office hours and in meetings?
I haven’t been to most of my teachers’ office hours this semester, but when I did they responded really well. Like I used to meet with one of my teachers twice a week, just to go over extra stuff because he didn’t have homework, so I have had pretty good luck with office hours, and in labs, my electrical engineering teacher, he was pretty good at helping us because the labs right now are pretty hard. [Okay.]

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help sessions and working in groups outside of class.
I guess I don’t see any difference. Everybody works in groups. Everybody works with everybody. Girls work with guys, too. I work with a study group of guys out of class, so I guess I don’t see a difference. [Okay.]

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
Only a little bit. Like when we talk about pistons or engines and stuff like that which I can’t visualize, when I have to like draw a picture and write them down, like that is the one thing that I am not up-to-date on is my engines. [Okay.] I am not good at that.

Describe your strengths and weaknesses in engineering.
Um, weaknesses are that I don’t have a lot of building experience and with my major I don’t get a lot of design so I am less in those areas. My strengths are that I do like leader position. I work really well with other people and I learn really well, so when….. I work in the lab in Howe Hall so when we attack something I usually do pretty well just by listening to how they do it. [Okay.]

What do you find most difficult about your program?
Can it just be particular classes, or? [Sure.] [Laughs] I don’t know. Um, just anything to do with structures. I don’t know. [Ha-ha.] I don’t know. I don’t feel like I am answering these right. [No, you are doing great.] Okay.

What expectations do you have for yourself in engineering?
Just that, um, to become a good engineer and not….. I want to do something great, not just something small. [Okay. That’s good.]
Did you want to answer the first two or would you rather skip them? [Laughs] I’d rather skip them. I can think about it. Can I write stuff down like later when I think of them? [Sure.] I think that would have probably made this easier if I had like time to sit down and write. [Okay.]

What factors affected your choice of university? I guess for the first one it would have been that you know, Iowa State is close and it has a really good engineering college. [Mm-hmm.] Whereas I am from South Dakota and they do have engineering colleges there, but it wouldn’t have been the same and they don’t have a program that includes engineering and acoustics, which that is what I am doing here at Iowa State. And that sort of answered number two also, what factor affected my choice of major. What would cause you to change your current major? [Laughs] If I can’t find a job. [Laughs]

END - Angie interview (27)

Follow-Up Interview with Dan - April 19, 2005
(tape 5-B, interview 2)

Describe your view of how the students participate in class. Are there obviously dominant students and obviously timid students?
Yeah, probably, because I mean, people that really know the material and study it hard, they just aren’t afraid as much to speak up and stuff, so yeah, there’s bound to be people that don’t participate as much. [Okay.]

Do you see any gender traits associated with that?
Not necessarily like for the same reasons, I guess. I would say probably females tend to hold back a little bit more because they are I think afraid that being the minority, that if they are wrong, it’s already hard for them to kind of step up, so..... [Right.]

Can you give an example of a time when you felt really comfortable participating in a class like what factors helped that?
I don’t know. I don’t like really public speaking or anything like that [Laughs] so I’m probably a bad example. I just don’t like participating at all. [Okay.]

What about what factors do you think make it really uncomfortable for you to participate in class?
Just the possibility that I might be wrong or [Laughs] just yeah, I just don’t like to. I guess there is no real..... There is nothing anybody could probably do that would make me comfortable doing it. I just don’t. [Okay.]

How does the way you participate in class differ from the way you wish you did?
Um, I wish I felt more comfortable doing it. [Laughs] It really….. I mean it doesn’t bother me, I guess. I don’t mind not participating and I don’t feel like I learn less by not participating, so….. [Okay.]

Describe the climates of the groups you have been in. How did other group members work with you as far as did they give you equal time to participate, listen to you, encourage you? Most of the groups that I have like had to be in, it’s kind of like most people make sure that everybody kind of holds their own and you are not like holding up everybody else and doing their work for them, so you kind of have to do your own part. Otherwise most of the time, um, I think that is actually a big thing in the Engineering College. Like if you are put into a group and you don’t really participate or hold your own weight, your group members a lot of times will just go to the professor and say “Hey, this person’s not in our group anymore,” and most of the time they, you know they let it go that way and you are just kind of shutout. [Do you ever feel overpowered by other students?] No, not really. [Okay.]

What factors do you think most strongly affects the classroom climate as far as how comfortable the students feel participating? Um, I don’t know. I mean, it seems like most of the time no matter how hard the teacher tries it is just some people, you know who will speak up usually. There’s like out of 50 there is probably three or four that will obviously feel comfortable just speaking up anytime and they do it all the time, and the rest of the class even you know, even if they really try to get them to participate people just don’t. They just don’t want to. [Okay.]

How does your professor’s response to you when you ask questions compare with the way he or she responds to the other students? Do your professors really encourage everyone equally? I think so, yeah. [Okay.] Yep.

How would you ideally want your professor to respond to you in class in comparison with how he or she actually does, more formal or informal, conversational? Probably informal conversation would make more people comfortable doing it than a formal setting, I think. [Okay.]

How would you ideally want your professor to respond to you outside of class in comparison with how they do? Um, pretty much it is informal when you go like to visit them during office hours or anything. Most of the time they are just kind of sitting in there waiting for somebody to come in, you know working on something of their own. [Right.] I don’t see anything wrong with the way that they hold office hours or outside of class then. [Okay.]

How do you think your class work matches up to that of the opposite sex? My class work is probably about the same, I guess. [About the same?] Yeah, I would say that, um, everyone….. Most of the females in engineering that make it to the like upper classmen level are probably 3.25 to 3.5 level I would just guess from the ones that I know, and I would match mine right up about the same level. [Okay.]
How are your strengths in engineering recognized and supported?
Um, I don’t know that they really do anything to kind of recognize and support things that you are good at, I guess. I mean that’s just kind of up to you to take more of those classes I guess, I mean if you want to. I don’t think they really….. Nobody really, you know says “Well you did outstanding in this. You should really do more of it,” or anything like that. I have never had anything like that happen, so….. [Okay.]

What about your weaknesses? How do feel that they are improved upon?
Um, I guess the only thing with a weakness would be if you asked for help, you can get it. I mean they’ll do whatever you know. They’ll help you as much as they can to try and [Right.] get you to understand it. [Okay.]

Describe the most supportive part of your engineering classrooms.
Um, probably interaction between students, like most of the time it’s pretty relaxed. Nobody seems to really mind if you are, you know asking for help from the person sitting beside you. I mean, it doesn’t really interfere with the class or anything so that is probably the best way.

What is the most unsupportive or challenging part?
Um, I don’t think in most of the upper level classes, I don’t think there really is a whole lot that’s what I would call unsupportive. Um, in the lower level classes where the entire College of Engineering is thrown into the same lectures, you know large lectures, it’s already hard. If you can’t grasp it then it’s really hard, but that’d be probably the only thing I can think of that would be unsupportive. [That’s a good answer.]

END - Dan follow-up interview (28)

Follow-Up Interview with Jared - April 20, 2005
(tape 5-B, interview 3)

Describe your view of how the students participate in class. Are there obviously really dominant students and really timid students?
Um, yeah, I would say there are, um, usually one or two people per class. Um, you know some of the bigger ones like lectures I wouldn’t say as much, but more in the smaller ones there are.

Do you notice any gender traits in that?
Um, hmm, no, I wouldn’t say so. [Okay.] Not that I have noticed, I guess, but….. [Okay.]

Can you give an example of a time when you felt really comfortable participating in class, like what factors made you really comfortable participating?
Um, hmm, I guess for me it’s nothing really big I guess. I would rather….. I felt more comfortable in maybe a smaller class than a bigger class. Um, other than that I guess there is no, no uh, no one thing I guess. [Okay.]
What about really uncomfortable in a class, any factors that…..?
Um, well, if I really feel uncomfortable in a class I just usually wouldn’t ask a question. I’d rather wait until after class and ask him directly or something like that, so….. [Okay.]

How does the way you participate in class differ from the way you wish you did? Are there times when you wish you would have spoken up?
Yeah, there are times. You know if I had a question like before a test or something and I didn’t ask. Other than that, that’s about it. [Okay.]

Describe the climates of the groups you have been in. How did other group members work together? Were there obviously leaders or did everybody seem to really collaborate equally?
Most of my groups we have, you know collaborated equally. There have been a few where, you know people haven’t done all their stuff they are supposed to or whatever, but it’s never been too much of a problem. It’s been small stuff, but I’d say it’s been pretty well spaced out. [Okay.]

What factors do you think most strongly affects your classroom climate as far as how comfortable the students feel?
I would say the big thing is just how the professor or how the teacher, um, runs his class. You know if he’s approachable or not, or you know if he’s standoffish. I’d say that’s probably the biggest factor.

How does your professor’s response to you when you ask questions compare with the way that you wish they responded? Do they encourage everybody equally?
Um, I’d say they encourage everyone equally. You know, most of the professors around here are pretty good. Some of them, I don’t know. Some of them seem to be like you know, ‘that’s kind of a stupid question and why are you asking that’ but usually they are pretty good about you know, answering the questions. [Okay.]

How would you ideally want your professor to respond to you in class in comparison with the way that they do? Would you rather it was more formal or informal, conversational or professional?
Um, I would say more conversational. I mean you know, as long as they answer the question you have, I think it would be better to be more you know, conversational than you know, just answering the question and just that’s it you know. [Okay.]

How would you ideally want your professor to respond to you outside of class in comparison with the way that they do?
Um, have more office hours I would say is the biggest thing. A lot of them are kind of hard to get a hold of outside of their office hours but other than that. I’d say that. [Okay.]

How do you think your class work matches up with that of the opposite sex?
Um, all the classes I have been in, what I have observed, it has been you know the same. I don’t think that, um, you know different type of work has been given to different genders. I guess not that I have noticed. It has been about the same. [Okay.]

**How do you feel that your strengths in engineering recognized and supported?**
As far as the school or? [Yep.] Um..... Yeah, that’s a good question. I never thought of that. [Laughter] Um, I don’t know. I mean, you know besides getting good grades, you know other than that, I guess I’ve never gotten any recognition from the professor for doing, you know that great a job or something except, you know ‘good job’, or you know something small like that, so.....

**How do you feel that your weaknesses are really improved upon?**
Um, as far as you mean how that, how the teachers improved on your (weaknesses) or make you improve upon them and stuff like that? [The teacher or other students.] Um, I would say you know, being with groups and stuff it is nice because you know, if you ever have any kinds of questions about stuff you don’t understand they are..... You know the likelihood of someone knowing what you don’t know is pretty good, so I’d say that has helped me out when I don’t understand stuff, so.....

**Describe the most supportive part of your engineering classroom.**
I would say probably you know, other students, getting help from other students, that probably I would say is. I would go to that first before I went to the professor, so I would say that would probably be it.

**What about, do you find anything unsupportive? What would be most unsupportive?**
There’s nothing I can think of off the top of my head. Yeah, I don’t know. There’s nothing, nothing particular, when it comes to that I guess, so.....

END - Jared follow-up interview (29)

**Follow-Up Interview with Rose - April 20, 2005**
(tape 5-B, interview 4)

**Describe your view of how students participate in class. Are there obviously really dominant students and really timid students?**
I think that is pretty common in classes. I don’t know, probably. I was thinking maybe it would be more one way or the other in large classes versus smaller classes, but I really think that in all the classes it seems to be that way. Some people really feel like they are the only person in the room and are really vocal and you know, everything has to stop if they have a question. Then other people will go, you know the whole semester without a clue just because they are afraid to ask a question in class, so yeah I think that is pretty common. [Okay.]

**Do you notice any gender traits with that, or?**
I don’t know. I don’t really think so, not in my experience. I mean, you know because you have females that are really outgoing and males, and you have both of both genders I think, so…… [Okay.]

Can you give an example of a time when you felt really comfortable participating in class, like what factors affected that?
For me I think class size makes a big difference. Um, I know for example like in my upper level classes as an undergrad I had much smaller classes, like you know 12 or 15 people as opposed to 300 people, and I think that makes a big difference for me.

Really uncomfortable in a class, would it still be just size?
Pretty much class size, yeah. [Okay.]

How does the way you participate in class differ from the way that you wish you did? Are there times that you wish you had spoken up when you didn’t?
I think in my first couple of years I was more timid in general because….. And class size is a factor there too, because you know your beginning classes are typically a lot bigger than your upper level classes [Right.] so I wish that I had kind of had the confidence that I gained later on but you know….. Retrospect, you know you always learn something so….. [Always, yeah, ha.]

Can you describe the climates of the groups you have been in? How did the group work? Was there a definite leader or was it more evenly collaborative?
I think whether….. Sometimes the professor will try to assign a leader, you know, assign you different positions and things like that and sometimes that works out good, and even when they don’t I think generally a leader kind of emerges, somebody that pulls everything together and makes sure deadlines are being met and all that kind of thing, so….. Whether it is intentional or not, I think usually someone emerges as the leader. [Okay.]

What factors do you think most strongly affect your classroom climate as far as how comfortable students feel participating?
I think again class size first of all. And then second just kind of the personality of the professor makes a big difference, because some people stand up there and they are lecturing, pure and simple, like they are just reading whatever, they are writing notes on the board, and some people really make an effort to be more interactive. And I think that plays a huge role in whether people feel comfortable asking questions and you know, participating in general. [Okay.]

How does your professor’s response to you when you ask questions compare with the way that they respond to other students? Do you think that everyone is encouraged equally, or?
I think as the semester progresses in a class the people that have kind of been the ones that ask all the questions are….. They automatically kind of go to those people, because they know if something is going to be said it is going to be you know, one of those people, but I think there’s not really anything discouraging. If someone that doesn’t speak up often has a
question they may be even more excited that, hey, somebody else has something to input, so I think it is probably pretty even. [Okay.]

How would you ideally want your professor to respond to you in comparison with the way that he or she does, more formal or informal, more social or more professional?
I think in the classes where I have been most comfortable they have been more informal, laid back, and really encourage interaction as opposed to just reading off a paper, so I think for me that is a really good way to learn and you feel less restricted in the things that you can ask and you know, interrupting class and things like that so I think informality is good for me.

How would you ideally want your professor to respond to you outside of class in comparison with the way that they do?
Probably the same kind of thing. I mean I always like professors that as opposed to having really strict office hours and things like that, they’re more kind of an open door policy, “If you’re having problems please come see me. I want to help you,” not “You’re bugging me with your questions” you know, so just a real like focus on their teaching and wanting to help and that kind of a response. [So still focused on course content but more informal in their interaction?] Yeah I think for, yeah for a course professor, and you know if you had other questions like career advice or something like that, it’s always good to have somebody that you feel like you can sit down and talk to about non-course related things too. [Right, that’s a good point.]

How do you think your class work matches up with that of the opposite sex?
As far as like quality? [Yeah in any area like writing, group work, individual work.] I think (for) overall quality it’s probably, you know again just like in participation, you have strong students and students that are less comfortable with doing whatever they’re doing, but maybe writing. I think females in general are just more perfectionists when it comes to writing and more conscious of making something flow and sound good than just putting the facts on the paper, especially engineers you can….. Because the male engineers are very logical people, very just fact oriented people, so I think in the writing especially is where you can see a difference. In group work, you know, in my experience the leaders that emerge have been both male and female so you know, that is not really a big gender difference I don’t think, but writing I think that shows a difference. [Okay.]

How do you think your strengths in engineering are really acknowledged and supported?
Hmm….. Well I have had, I’ve been very lucky I think, and I have had good professors that have been responsive and have encouraged participation, so I think that you know, when I would speak up in class and have something to add or have a question or whatever that has been really encouraged rather than discouraged so….. [Okay.]

How do you feel your weaknesses are really worked with and improved upon?
Well, again, you know just informality and being willing to answer questions and clarify things that….. Because people are on different paces and so you know, sometimes you just get stuck on something silly but they have been you know, very encouraging and state you know, “We need to clarify this before we can move on,” so I think that’s been good. [Okay.]
Can you describe the most supportive part of your engineering classroom?
I think the most important environment I have had has been in smaller classes and I know that is hard at a large university especially with undergraduate classes to, you know be able to shrink the class size, but I really think that is important and that that makes a supportive environment and a more comfortable learning environment.  [Okay.]

What about the most unsupportive?
Um, just the opposite - big classes, boring lecturing professor, just makes you kind of, like you know.... I’m the kind of student that I am excited to learn, but I have had classes where I literally just go to sleep because there is nothing exciting happening, so I think that you know, even if you have to have a big class and it’s a professor that is excited about what they are doing and is really interactive, that makes a big difference in the learning environment. [That’s a good answer.]

END – Rose follow-up interview (30)

END of tape #5-B
Follow-Up Interview with Teresa - April 21, 2005
(tape 6-A, interview 1)

Could you describe your view of how students participate in class. Are there obviously really dominant students and really timid students?
Um, as far as gender-wise or just overall? [Overall and then if you see any gender.] Overall I would say more dominant people are definitely the people that are smarter people and are definitely getting the material, who know their stuff, or the people that get called (on) who have to answer the questions. [What’s that?] The people who have to answer the questions, [Yeah.] who get called on but, yeah, I would say the people who actually know what they are doing or who are more boisterous personalities.

Do you notice any gender traits in that?
Usually I would say men usually have the more boisterous traits as far as in the classes that I have been in. [Okay.] I usually don’t see the girls.....

Can you give an example of a time in class when you felt really comfortable participating?
Probably in my 270 class when we were doing the project and we had a meeting with the teacher. We all knew what exactly like, what part we were working on, and we really knew exactly which..... We really knew our part really well. So when we knew we were going to present it beforehand, I was really comfortable with what I was going to present, because I knew beforehand what I was going to present as opposed to being, like, called on in class about some particular problem and not expecting it. [Okay.] I’d have to say I would be a lot more comfortable.

What about a time when you felt really uncomfortable participating?
Yeah, I would have to say being called on in class when I wasn’t expecting it. [Laughter] I am not very comfortable in those situations at all. [Okay.]

**How does the way you participate in class differ from the way you wish you did? Are there times when you wish you would have or wouldn’t have spoken up?**

Well, I wish, you know overall I’d paid attention just more overall [laughs] because I know sometimes when someone says something and I am like, why in the world would they ask that question or why weren’t they thinking, I wish I would have said something you know, or been like….. Or asked a certain question because it really bugged me later. You know, those kind of situations, but I never do. [Yeah, okay.] I usually ask like my classmate instead.

**Can you describe the climates of the groups you have been in? How did other group members work with you? Was there an obvious dominant leader, or is it more equally collaborative?**

Um, the dominant leader is usually the person that, um….. It definitely usually ends up being a guy, usually, but it is usually a guy who is, um, on top of his stuff and doesn’t slide behind in his classes either. It’s usually that kind of person and is, um….. Yeah, he really just knows his stuff and just doesn’t want the class to slack, or he wants to get a good grade on the project so he just makes sure that nothing falls behind, so he will just fall into that role and make sure everything gets done. Like before what I said - it just always ends up usually being a guy - but usually there are not very many other girls in the class so it’s not very likely. I haven’t seen it yet, although I usually see girls taking more of the organization. [More like facilitating stuff?] Yeah, more behind the scenes like organizing, so they are….. I can see like us being leaders as far as like organization definitely, because without us they’d be all over the place. [Both laugh]

**What factors do you think most strongly affect your classroom climate as far as how comfortable students feel participating?**

Um, definitely the teacher. [The teacher?] I have really noticed that this semester a lot. [Okay.] Uh, yeah, because specifically in thermo when Schwartz is not there, people just don’t care and they’re not very into the class, talking during class, not answering questions. The guy, he just can’t get anything done in class, I mean he just goes about doing the problem but there is no one really paying attention. But when Schwartz is there, he gets stuff done, we are all into it, we actually understand what’s going on, [right] you know. And then my other class, it’s like people are falling asleep in classes. It is just lecture, slides, and of course it is a lecture class and so it’s a lot more formal type of setting too. [Okay.] And like as far as like other classes even before that, like the teacher didn’t seem like he even knew what he was doing and so in those cases we didn’t really care as much, but since we wanted the grade we did work hard for it so it was kind of….. We were working hard for it, but we didn’t really listen to what he was saying. [Okay.] So we kind of did it on our own, which that was a weird case. That was kind of an interesting class. That was 270 class. [Both laugh]
How does your professor’s response to you when you ask questions differ from the way that they respond to other students? Do you think that your professors really encourage everybody equally?

Um, I’d say they are fair pretty much across the board. [Okay.] I think that if they know you are struggling in the class more, they will be more concerned, you know. I have noticed that. Like once I was struggling in class I noticed more concern, you know. And I have noticed that. But once I was like having trouble in a class - but it was a different class so maybe the teacher just went about it a different way - they just seemed more concerned with the class. And, um, I have always had teachers in classes like ** **. They are always telling you where they are going to be, you know, and teachers are usually like ‘well if you are, you know, below this certain grade or something you should probably come in’, and so they always say that stuff but they’ve done pretty fair in letting me know, so as far as I have noticed.

How would you ideally want your professor to respond to you in class in comparison with the way that they do? Would you make it more formal or informal, more conversational or more professional?

I would have to say I would like it to be probably more informal in the sense that they get to see (and) they get to feel how you work with the material and so they can see where you are at and exactly how you deal with it, but formal in the sense that they still keep it you know, class work and like make sure that you know, you are on top of your stuff and not to the point where it is just like ‘na-na-na-na, this is just uh’, so like keep it serious but you know, make sure they you know...... [Keep it on course content?] Pretty much. [But in a more conversational communication way?] Yeah. [Okay.]

How would you ideally want your professor to respond to you outside of class in comparison with the way that they do?

Probably just the same. [Just the same?] Yeah, I haven’t had any problem, so I’d probably say the same. [Okay.]

How do you think your class work matches up to that of the opposite sex?

Um, it probably..... I think mine is below the opposite because it is just tougher for me to really..... I have to work a lot harder and it really hurts the gut of me when I think about it that way. I am just like [Laughs] they can just understand it like that and some people just don’t have to study whatsoever, and I feel like I just have to you know, try so much harder. And since the majority of my class is guys it feels like you know, it is because of gender but maybe it’s not you know. [Right.] But because you know I’m a girl with a majority of guys, it seems like, [Laughs] okay, I just have to work so much harder just to understand the exact same way, just for like them studying two hours.

How do you think your strengths in engineering are really recognized and supported?

Specifically? [Yeah.] Me or as.....? [Yeah, you.] Um, I have no idea. I don’t know. I wouldn’t know how they’d be recognized. [Just otherwise than, you know, the grades that you get?] Yeah. [Okay.]
How about is there any specific way that your weaknesses are really improved on, from either like professor or classmates?
Well, yeah, I go to help sessions and stuff. [Okay.] Help sessions, SI, tutors, working with groups, I mean that’s like what engineers do. Third floor library, that’s like engineering floor, always with the groups [Laughs]. That’s like what they do. [Laughs] [Okay.]

Can you describe the most supportive part of the engineering classroom?
Supportive part? Um, I’d have to say that everyone just always does stuff together. [Okay.] Ever since like I have been in an engineering class, like I have always been in a group working on homework together, I’d have to say. And teachers have always like encouraged getting in groups, and that’s probably why I have always been like in a group I’d have to say, because I’ve been a different group every single time. I haven’t stuck even with the same people. [Oh, wow.] I mean I’ve had some of the same friends and I can see them in the other classes next time, but sometimes I mean I’ll like have them but then someone new and stuff, so…..

What is the most unsupportive? Is there any unsupportive part?
Probably every time you go to a test and thinking “Why did I pick this major?” [Both laugh] Your mind playing tricks on you. [Laughs] There’s nothing really that’s unsupportive. I haven’t really seen anybody that really puts you down. [Okay, good answer.]

END - Teresa follow-up interview (31)

Interview with Carolyn - April 22, 2005
(tape 6-A, interview 2)

What factors affected your choice of university?
Well, I was interested of course in the quality of education. I wouldn’t go to a school that I didn’t think was good, but the primary factor was money because I have to pay for most of my education by myself and Iowa State gave me a scholarship, so that’s why I chose Iowa State. [Okay.]

What factors affected your choice of major and what would cause you to change your current major?
I chose mechanical engineering because, um, I have always been interested in math and the basic how things work, which is pretty much the average engineering answer. I guess I didn’t really have any definite idea. I just felt like it was a good choice to go with. So far as what would cause me to change my major, basically if I took classes and felt like I couldn’t understand what was going on - not that I didn’t then, but that I would not be able to understand what was going on or that I would never be able to, um, to perform at a level that I would like to perform at - I think I would change my major then just because I don’t want to go and be a lousy engineer. [Mm-hmm. Okay.]
How do you perceive the performance status of the women and men in your classes as both individuals and as compared to the other sex? Do you mean, um, how well they achieve or their role in the class? [Um, both, like their level of performance as far as how well they do in the class and maybe how vocal they are, how much they participate.] Okay. Um, from my experience I would generally say that there isn’t much difference between the actual performance of men and women, but there are more men in the class so probably not a greater percentage of men are being more vocal but more men are more vocal. And I know I am only speaking as an individual, but I don’t feel quite as comfortable speaking up a lot of the time if I am in a class that is primarily men if….. Sometimes there is, um, there is just a feeling in the classroom that if I answer a question I had better be right, but sometimes I really do feel like if a guy answers a question and if they are wrong, then there’ll be an explanation and the teacher will help them learn it, where sometimes I think that if I get it wrong it’s just wrong. [Mm-hmm. Okay.]

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate and take leadership roles and how others really respond to them.
I think, um, in the groups that I have worked with generally men step up first to be in the leadership roles. I have been in leadership positions. I normally am, but once again there is really a difference whereas I think a lot of time people are more willing to listen to the man who’s leading, or if the woman is leading and giving directions or delegating duties then you know, she is being pushy where if the man is leading then he is a natural leader.

Can you describe your own classroom participation?
It really depends on the class. For classes that are generally project based, I am very active. I normally take a leadership position. I normally am the person who organizes what is going on, who makes sure that there is definite plan and that there’s a time line. In larger classes I generally am not a very active participant. I generally just talk when I have a question or occasionally if I am very sure of the answer of a question that the teacher asks. [Okay.]

Describe the classroom climate in your engineering courses as far as how comfortable you think students feel participating.
I think the level of comfort is pretty much the same in the classes. I know the teachers say that they do welcome questions (but) very rarely are the teachers actually able to answer the questions in a way that helps the student understand better. I have only had a handful of teachers where it’s worth asking questions, so I think most teachers want to create a climate where everybody can ask and there’ll be an active discussion, but in many classes it’s not really worth it to the student because it would only get more confusing. [Okay.]

How does your professor or your professors respond to you in class?
Once again that really varies. [Okay.] I think in my thermodynamics class that you’ve witnessed, he responds really well to questions. If there’s a question that is on material that should have been covered previously, he does bring it up and say like, make a joke that you should have had it done earlier, but he will still answer your question. In other classes, if you ask a question about material that was covered a few days before and he feels that you should
have done it your question will not get answered, but I think a lot of that is also that they
don't want to waste class time on something that should have been figured out and may be a
more personal issue. I think the response really depends on the professor and the situation.

Okay.

Describe your classroom versus lab interactions with professors. Is one more formal or
informal, focused mostly on course content, or are there social aspects?

Within the classroom generally all of my interactions with professors are formal, because
even if it's a lab class, even if it's a class where it's one huge group project like ME 270, my
professors are the people who will be evaluating me and, uh, I think a lot of that may just be
my own attitudes, how I was raised, where if it's somebody who is in a position of authority
you always treat them with respect. You don't really joke around, because you want to look
competent all of the time. Um, hmm, let’s see, course content - yeah, uh, I would have to say
that my professors are always focused on content, and as a student if they are not I generally
try to lead them that direction, because once again they are trying to..... My purpose is to
learn and they will be evaluating me, so I want to keep focused on content. Okay.

Describe any difference you see in communication from lecture to lab as far as how often
you communicate with professors and with other students.

Hmm, well, of course in lab most of the time it is a more open environment. The objectives
aren’t quite as clear and I think it requires a lot more participation on both the behalf of the
professor and the student, because a lot of the times you do have to work to understand
exactly what is expected, exactly what you have to do, and of course in lab classes, most of
my labs I am working with other people. There has to be constant communication with
students whereas in lectures the professors generally talk and we as students listen, and if we
have any questions we will ask the professor then maybe or maybe we’ll ask the person next
to us, but neither of those is very likely so there really isn’t much communication at all.

How does your professor respond to you outside of class in office hours and in meetings?

I think in class and in office hours the professors are generally very willing to discuss course
topics. I really haven’t tried discussing anything else. Um, outside of class and outside of
office hours though it is very different. I mean I am the kind of person who says hello, but a
lot of the time I just don’t feel comfortable saying anything else and I don't even feel
comfortable asking for a meeting sometime else during the week that is not..... Um, I don’t
feel comfortable asking for anything if it’s not in class or in office hours, so if I run into them
I don’t feel like I can get any help that way.

Describe any difference you see in men’s and women’s out of classroom participation as
far as coming in for help sessions or working in groups.

I really haven’t seen much difference. Okay. I actually haven’t been to many help sessions
so I’m not quite sure if there is a difference there, but so far as working groups outside of the
class, most of the groups that I have worked in are required or if they are not required they
are pretty much necessary to get through the class, so anybody who does well in the class has
to work in a group.
Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
Do you mean how we are going to actually be evaluated in the class, or? [Um, in any area like as far as doing homework or performance on tests, writing, communication, any that you see.] Okay. Well, I think for doing really the required work in the class like the homework and tests once again men and women are pretty equal, um, and I think women generally feel more comfortable writing and speaking, but in my experience the men have been more effective because they don’t talk as much but they generally talk when there is actually something to be discussed, when there is something to be decided, and they get directly to the point whereas the women are more likely to just chat or to try to warm up the conversation, so I think women talk more but men are a lot more effective. [Okay.]

Can you describe your own strengths and weaknesses in engineering.
I think I am very good at organization. I am very good at realizing what needs to be done and the time line that I need to do a quality job. I am also very willing to go outside of the classroom to figure out what I need to find out. Like if I need extra help I am perfectly willing to go and ask for that and I do that often. My weaknesses in engineering are, um, generally deciphering the math. I am not or I… That seems to me the most difficult part. It is not intuitive for me. I understand the concepts, but I have to work more to not only memorize the formulas but to understand what they’re really telling me. [Okay.]

What do you find most difficult about your program?
I think that would definitely just have to be the amount of time it consumes. For example, I am taking a three-credit class. It’s ME 270, but we are actually in class for seven hours out of the week and on top of that we have research, and the other classes that I take also require extensive studying. Almost all of them have projects that are done exclusively outside of class and what is most difficult about the program is finding the energy to devote the time necessary to do well with the program.

What expectations do you have for yourself in engineering?
What specifically do you mean? Do you mean my like ultimate goal or? [Yeah, it can be any, either academically or professionally what you want to do, any general expectation.] Well, I don’t have any real expectations for the short term. I am not sure how I am going to perform in classes in the future but to be honest I am not very concerned with how well I will perform, because I know that I will devote what time and energy that needs to be done to become a good engineer and that is basically what I expect. I expect to have to work hard, I expect to have to work a lot, but I expect to ultimately be able to produce the quality designs and the quality analysis.

END - Carolyn interview (32)

Interview with Ryan - April 25, 2005
(tape 6-A, interview 3)

What factors affected your choice of university?
I probably mainly chose Iowa State because I was really good at math and science in high school and Iowa State is about as good as it gets in-state. Tuition is a little cheaper that way and I got some scholarships, so..... [Okay.]

**What factors affected your choice of major and what would cause you to change your current major?**

Kind of the same thing. Math and science I really enjoyed in high school and was good at it, so engineering seemed to be the thing for me. What would change my major? If I was really struggling and not doing very well, I suppose I would think about changing my major. Otherwise, I probably wouldn’t. [Okay. ]

**How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?**

Well, there are definitely more guys in engineering than there are girls, but I think girls that are in the engineering field are very driven and they are very determined to make it and it’s good to see that and it kind of challenges everyone to do better and compete. [Do you see any difference in how much they participate in class?] Not really. It’s probably about the same I would say. [Okay.]

**Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, how others respond to them.**

Probably in groups I would say women are much more willing to be like the secretary, to write it down and stuff like that, and a lot of times guys will take the vocal but they don’t really want to do the book work, that stuff. [Okay.]

**Describe your own classroom participation.**

I am kind of more on the quiet side. I mean if I’m called on or if I am absolutely sure I know the answer I will gladly say it, but if I’m kind of unsure of this I will just let someone else [laughs] and..... [Okay.]

**Can you describe your classroom climate in the engineering courses you have?**

Pretty open. It’s not..... Everyone can participate if they want to. It’s not..... I don't know. Is that what you are looking for? [Pretty comfortable?] Yeah. [Okay, yeah.]

**How does your professor respond to you in class?**

He is kind of..... He will explain in greater detail what he thinks you are saying and what the answer is, and I really like how he puts a spin on the answer and connects it to everything that you are talking about. [Okay.]

**Describe your classroom versus lab interaction with professors. Is one more formal and informal? Are they focused on course content or are there social aspects to the classes?**

I haven’t had a lot of labs, but I would usually say the labs are probably a little more informal. Like you’d usually find a buddy or two that you can make your lab group with usually and so then it is kind of, you can have a little bit of fun while you’re doing your work. [Okay.] It is mostly based on course content I would say. [Okay.]
Describe any difference you see in communication from lecture to lab as far as how much you communicate with the professor and with other students.
It’s probably a little more student-to-student communication in labs and a little less of the teacher communicating with you. They usually talk a little bit in the beginning and then that’s all they talk about, whereas in class and lecture the teacher does a lot of the talking obviously, but… [Okay.]

How does your professor respond to you outside of class in meetings and in office hours?
They try to help out as much as they can. Um, I know they’re really busy and so, I mean, they want to help you but yet they want to get you going and try to do it on your own so they can do their thing and you do your thing, but he is definitely open to ask questions if you need to.

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help sessions and working in groups outside of class.
I would say there’s probably… A greater percentage of women participate in help sessions than men, but as far as working in groups I don’t think it really… It is about the same either way because if you have group work to do you kind of have to do it. It is not something you can duck out of. [Okay.]

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
Not particularly, I guess. [Okay.] I don’t think so. [Okay.]

Can you describe your own strengths and weaknesses in engineering?
Um [Laughs] I guess if I get going and I like a subject, I kind of get going and I just get going a thousand miles an hour. And then it’s like when you are doing group work, I’m not very good at helping people that don’t understand it because it’s just to me, if it makes sense it’s like ‘well, duh, just do it’ and it doesn’t work like that. I don’t know. [Laughs] It’s kind of a tricky question. [Laughs] [Okay.]

What do you find most difficult about your program?
The homework, the amount of time you have to spend on the homework. It’s a lot of time. [Okay.]

What expectations do you have for yourself in engineering?
Well, I guess I hope to probably have an internship this summer and kind of hope that I can find out what areas I like, what areas I don’t like, and then when I graduate based off of that kind of find a job that fits what I like doing and is good for me and maybe have a good career off of it. [Good answer.]

END - Ryan interview (33)

Interview with Susan - April 25, 2005
What factors affected your choice of university?
Iowa State is close to my hometown which is by Waterloo, so far enough away but not too far.

What factors affected your choice of major and what would cause you to change your current major?
I actually started out in a different major and my roommate had a mechanical engineering major, and I discovered that it was fun which was not something that I thought originally, but it also fit my aptitudes very well. Nothing at this point would cause me to change my current major because I am so far along in my course work.

Okay.

How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?
As individuals I don’t….. I can’t say that…. Well, I guess that in my classes there are a few people who usually speak out and participate more than others. They are not necessarily more….. I think they are proportionally about the same as the amount of females as there are to the men. But, uh, level of performance I think is pretty equal, and it’s hard to say individually versus compared to the other sex because there are so few females in my course work.

Okay.

Vocally, I think it’s all proportional to the amount of females per males.

Okay.

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, how often they take leadership positions, and how others respond to them.
Um, I really don't see any difference in the way men and women communicate. As I said before, there’s always a few people who are a little more outspoken than the others. How often they participate - I really haven’t had that many females in groups with me, so I’m not sure if I can fairly answer that one. How often they take leadership positions - That is pretty much equal. I usually end up taking a leadership position in my groups just because I like things to run smoothly, but I am not sure if that is standard or….. I doubt it. How others respond to them - There is a slight difference in the way people take what’s coming out of woman’s mouth in a group. Sometimes a guy will say something and everybody will be ‘okay, let’s go with that’ whereas sometimes myself or another female will say something and it’s a little more….. It’s critiqued a little more before it’s an accepted answer or whatever.

Okay.

Describe your own classroom participation.
I usually don't volunteer any answers. If I am asked to answer something, then I will. I usually don’t participate, or I don’t volunteer answers or questions in class, but if I’m asked then I will say what’s on my mind. I usually always go to class though.

Okay.

Describe the classroom climate in your engineering courses.
It varies a lot actually. There are very few where we are asked to participate as much as in the thermo class. A lot of the people in engineering are very intelligent and it’s kind of intimidating to volunteer too many questions. There are…. I mean there’s always a few that will speak up and say whatever, but it’s generally overall fairly intimidating.

How does your professor respond to you in class?
I don’t think it’s any differently than anyone else. As far as responding to my answers or to? [Yep, when you ask questions or when you answer things.] It’s….. [Laughs] It varies a lot depending on whether my answer makes sense or not, I guess. [Both laugh] Sometimes you know I get the ‘what are you talking about’ look, but most of the time it’s fairly positive. Did I answer that one? [Um, professor responding to you in class.] Yeah, I don’t think it’s any different than anyone else. [Okay.] 

Can you describe your classroom versus lab interaction with your professor? Is one more formal or informal, focused on course content, or are there social aspects to class?
Generally in engineering courses they have grad students or TAs or someone else teaches the labs rather than the professor, so it is for the most part more informal and more conversational just because they are more, I guess, they are more of a peer level than a professor would be. [Okay.] Really in lab work you don’t focus much on course content. The lab, it usually is separate, a separate sphere completely from what we are working on in class. [Okay.]

Describe any difference you see in communication from lecture to lab as far as how often you communicate with the professor and with other students.
Definitely you communicate with other students more in labs, just because you are usually assigned to a group to work on things. Um, communicating with the professor, I imagine it has a little bit more because they….. It is more of a travelling professor scenario where he goes and visits all the groups instead of a lecture, so….. Yeah, I suppose it’s a little more with the professor then.

How does your professor respond to you outside of class in office hours and in meetings?
I really don’t meet much with my professors outside of class, but whenever I have it’s always been a positive experience.

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help sessions and working together in groups.
I guess I haven’t had many females in groups with me, but everyone I’ve had has shown up for groups for the most part. I mean, they miss about as often as the men do.

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?
No. [No? Okay.]

Can you describe your own strengths and weaknesses in engineering?
I guess… That’s a tough one. Um, my strengths? As far as engineering, my strengths probably lie in… I’m able to think of things analytically. Um, well, like I can usually breakdown a scenario and think of what’s really important and think of different solutions. I am a Libra, so I always have a billion different options being weighed in my mind and I guess that’s good for engineering. Weaknesses in engineering, I don’t know. I guess another strength is that I am very confident now that I have done six internships, so I know what the field is like and I know what I need to do. Weaknesses, I guess, um, there’s… You really need to be clear, I guess. I’m talking more about internships now, but like when you go out into the field you really need to be clear of what is required and what is expected of you, and if your communication skills are lacking then that would hurt you, but I am not really… I wouldn’t say it’s a weakness for me but if there’s definitely an area that would be not considered a strength, it’d be some communication skills and with, uh, like upper management. [Okay.]

What do you find most difficult about your program?
The course work is generally just difficult to understand and that is probably the hardest part. [Okay.]

What expectations do you have for yourself in engineering?
I expect to [Laughs] get a full-time career. I would personally like to go more up in the managerial side of things rather than the technical side. [Good answer.]

END – Susan interview (34)

END of tape #6-A

Interview with Cale - April 25, 2005
(tape 6-B, interview 1)

What factors affected your choice of university?
There were a couple of different things. One was a scholarship helped and then also family has come here. Coming and taking a tour of the campus was a huge thing and just kind of the overall feel when I came here and checked it out. [Okay.]

What factors affected your choice of major and what would cause you to change your current major?
I ended up being in ME because that is where, I guess, when I came for orientation that was the LAS open option and they saw that one of my choices was aerospace engineering so they asked me how serious I was about that. I was like “I-I-I don’t know…” so they threw me in the College of Engineering so I wouldn’t fall behind and I’ve never gotten out, so I guess if there were….. Like I’ve looked for other majors that are more interesting to me, but I don’t know. Like I’m probably not going to do anything with engineering but it is a good degree so I’ll stick it out. That’s kind of the way I look at it.
How do you perceive the performance status of the women and men in your classes as individuals and as compared to the other sex?
In engineering classes, I would say performance-wise normally women are a little bit above men, but I guess the reason I see that is because the numbers are so, like so much different, and the women who are in there are serious about this and they know what they need to get done whereas sometimes with the guys - I hope this doesn’t sound too sexist, but - they are just like ‘okay, I’m going to be a engineer’ and don’t really realize what they are getting into. So I don’t mean that to sound sexist but I think that is kind of how it plays out, and a lot of times the women in the classes are the ones who are overachieving a little more than the overall average of the men. [Okay. What about how vocal they are in class?] I don't think there's much of a difference really. [Okay.] Not from what I’ve seen. [Okay.]

Describe any difference you see in men’s and women’s communication in groups as far as how often they participate, take leadership positions, and how others respond to them.
I think that a lot of times that will just depend on the group dynamics itself and again I don’t know if that is as much of a male/female role as what the dynamics of each individual in the group are. A lot of times people will sit back and see who is going to take charge. If not, someone will eventually step up and take charge hopefully, but between male/female I don’t think there’s too much of a difference honestly.

Describe your own classroom participation.
I guess it depends on the class. Sometimes it will be….. It depends on the class and then the actual climate or environment in the class. A lot of engineering classes, even if they try to get discussion going, a lot of times it is just not going to happen just depending on the class. I would consider myself to be someone who talks up a little bit more in the class. In the class you sat in, not very - I don’t speak up very much at all just because….. I don’t know why I don’t. But I really don’t speak up that much in that class, but other ones I’ll talk quite a bit so it depends on the environment really in terms of the amount of discussion that’s had in the class and the importance of discussion. [Okay.]

Describe the classroom climate in your engineering courses. Does it feel very comfortable? Do you feel free to speak up?
Uh-huh, yeah, I definitely feel free to speak up. Dr. Schwartz is an amazing teacher and I have been very impressed with him. Definitely the best engineering teacher I have had so far and probably the best teacher I have had so far, so as a climate he has done a great job. He has got a class full of engineers, not always the most talkative people, and he is doing all he can to get people to participate, work in groups, and I think he is doing an excellent job. [I am really impressed too, yeah.]

How does your professor respond to you in class?
He is open. Like he is willing, he is there, he realizes it is his purpose to help us and he really makes it apparent that he wants us to succeed. [Okay.]

Describe your classroom versus lab interaction with professors. Is one more formal or informal? Are they focused on course content or do you find social aspects creep in?
I think that depends a lot on the professor themselves. Personally lab experience, I haven’t really seen much of a difference in interaction. I can see how lab experience could be a lot more personal, but again I think it’s solely how the professor wants to teach a class, how they want to relate to students. [Okay.]

Describe any difference you see in the communication from lecture to lab. Do you communicate more or less with professors and students?

With, I guess I’ll break that down further. For the lecture standard, like if it is a large lecture hall communication is slim to none. When you get down to classes the size about 50 like Dr. Schwartz’s there is a little bit of communication going on. You can develop the group work. Where I have the most communication is in, like I’m in a Spanish class right now of 15 people, a Conversation in Spanish, and everybody speaks for almost the entire period there, so it really depends on the size of the class itself and the purpose of the class. With labs, communication is, I guess it depends on the lab, but….. Again if it is group work communication is going to be essential, so labs are like inherently more of a communication based learning style.

How does your professor respond to you outside of class in office hours and in meetings?

He encourages students to come and see him as much as possible. He is excellent.

Describe any difference you see in men’s and women’s out of classroom participation as far as coming in for help sessions and working together in groups.

From what I have seen no difference [Okay.] but I have been limited to…… I have only spoken to him two or three times in his office and that’s it, and then limited to my group work and that’s just three guys working together, so I don’t have very much experience with watching the women in the class and their group work. [Okay.]

Can you identify any areas of your class requirements in which men and women differ significantly or noticeably in their performance?

I wouldn’t say any significant differences, no.

Can you describe your own strengths and weaknesses in engineering?

In engineering….. [Laughs] I am lucky in that I can pick up on things pretty quick. I guess this semester has been kind of a crazy one with all the out of class stuff going on and a lot of it has been me, just barely staying caught up, not really staying caught up at all until we get to a test and then cramming for two or three days before the test, which is by no means the ideal way to succeed in the classroom but I have….. Right now I am managing to stay on top of it with my grades, but I guess my strength is just being able to pull it off somewhere on the test still and make it all work. Hopefully I will be able to get back to actually doing the full-time student, studying it more than just the couple of days before tests, but [Okay.] we’ll wing it. [Laughs]

What do you find most difficult about your program?

Mm, it’s probably just the amount of time that they ask. Like I said I’ve been lucky, and I definitely haven’t put in the amount of time that I should have and I’m still getting by pretty
well, but with working in groups, the emphasis on team work, is a good thing but it also requires a lot more time than some other majors. *Okay.*

**What expectations do you have for yourself in engineering?**

*In general, any.* I guess I am very tough on myself. I hold myself to like the highest standard possible, so I expect A’s in all classes. I expect to be able to understand everything we are doing. I expect myself to take charge in groups, things like that, just kind of giving 100% with everything I do, and then also I expect to succeed in all I do. I hope that doesn’t sound cocky, but that’s kind of how I approach things is I am going to do this, I’m going to put all my effort into it, and I will find a way to succeed. *Good answer.*

END - Cale interview  (35)

END of tape #6-B

CONCLUSION
Gender and Communication in Engineering

Sarah M. Brown and Rebecca E. Burnett, Department of English, Rhetoric & Professional Communication, Iowa State University

Problem
Engineering programs need to attract and retain more women students.

Status Quo
Current enrollment of women
- Mechanical Engineering: 5.4% (among the lowest percentage of women)
- Chemical Engineering: 37.6% (the highest percentage of women)

Project Goals
- Gain a better understanding of gender and communication issues in engineering
- Characterize engineering classes that include (a) a high percentage of women students and (b) a low percentage of women students
- Provide print and electronic information for women students about strategies for communication success in engineering

Participations
- **ME Students**: one sophomore class and one senior class
- **ChE Students**: one sophomore class and one senior class
- Instructors of these four classes

Data Collection
- **Observe**: 10% of selected classes
- **Analyze**: course materials
- **Survey**: all students and professors
- **Interview**: 20% of students and all four professors

Preliminary Observations
- **Participation**: Men participate more in class—both positively and negatively than women

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME Students</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>ChE Students</td>
<td>77%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Figure 1. Number and percentage of women and men in ME and ChE classes in the study

- **Leadership**: Men are more often elected as formal leaders while women often facilitate group activities.
- **Task Focus**: Women focus more on course content while men focus more on social interaction.

Special thanks to the ISU Women’s Enrichment Fund for funding this inquiry and to Assistant Dean Loren Zachary, ISU College of Engineering, for his ongoing support.
Gender and Communication in Engineering

Problem
Engineering programs need to attract and retain more women students.

Status Quo
Current enrollment of women in engineering here at Iowa State University
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- Chemical Engineering: 37.6% women students

Project Goals
- Gain a better understanding of gender and communication issues in engineering
- Characterize engineering classes that include (a) a high percentage of women students and (b) a low percentage of women students
- Provide print and electronic information for women students about strategies for communication success in engineering

Participants
- Students in Mechanical Engineering: one sophomore class and one senior class
- Students in Chemical Engineering: one sophomore class and one senior class
- Instructors of all four classes

Data Collection
- Observe 10% of selected four classes
- Analyze course materials
- Survey all students and professors
- Interview 20% of students and all four professors
- Conduct follow-up interviews resulting in case studies of one woman and one man from each class

Preliminary Observations
- Men participate more in class—both positively and negatively—than women (e.g., typically asking and answering more questions in class).
- Men are more often elected as formal leaders while women often facilitate group activities.
- Women focus more on course content while men focus more on social interaction.

Principal Investigator: Rebecca E. Burnett, rburnett@iastate.edu
Researcher: Sarah M. Brown, sarbrown@iastate.edu

April 2005
APPENDIX F. OBSERVATION DATA SPRING 2006

FSHN 200
Professor Schroeder
24 March 2006

77 students; students asked 5 questions; students answered 4 questions
73 (95%) women; women asked 5 (100%) questions; women answered 4 (100%) questions
4 (5%) men; men asked 0 (0%) questions; men answered 0 (0%) questions

Observer’s Notes: | Observer’s Comments:
---|---
Before Class: 2 Fs are talking about homework/working together  F listens to her ipod and reads over her notes 2 Fs (different set) are talking about the assignment due today As more women come in they chat a lot together about the assignment—they chat a lot—all course related  
-10-0 Schroeder writes agenda on chalkboard 0-3 Schroeder starts—it talks a few seconds for students to quiet down, but they do. Students turn in their homework 4-8 Schroeder begins lecturing and students are silent—taking notes—he has diagrams on the board that he is explaining 9-35 Schroeder continues lecturing F asks ? F answers ? F asks ? F asks ? F asks ? and Schroeder calls on her by name Schroeder asks for questions every few minutes F answers ? F answers ? F answers ? 36-42: Schroeder uses overheads and makes good eye contact as he lectures Students are very silent and attentive—note-taking Schroeder moves around the front of the room well He seems to have a good rapport with the students—some light-hearted talk Schroeder seems to know all the students names, which is impressive since there are quite a few.
Schroeder continues lecturing with the overheads, which are notes he has typed up for the students and are found online. F asks ?

43-45:
Students start getting ready to leave
Students are really rude getting ready to leave.
2 girls say “Hopefully our question will come up”

FSHN 200
Professor Schroeder
14 April 2006

48 students; students asked 8 questions; students answered 9 questions
45 (94%) women; women asked 8 (100%) questions; women answered 8 (89%) questions
3 (6%) men; men asked 0 (0%) questions; men answered 1 (11%) questions

<table>
<thead>
<tr>
<th>Observer’s Notes:</th>
<th>Observer’s Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Class</strong></td>
<td>Kevin has good eye contact and a strong voice</td>
</tr>
<tr>
<td>3 F talk together</td>
<td>Class is very quiet as Schroeder lectures</td>
</tr>
<tr>
<td>As they come into class, students talk a lot to one another</td>
<td></td>
</tr>
<tr>
<td>Quite a few students come in late—women and one man</td>
<td></td>
</tr>
<tr>
<td>Schroeder writes schedule on board</td>
<td></td>
</tr>
<tr>
<td><strong>0-10</strong></td>
<td></td>
</tr>
<tr>
<td>Schroeder lectures and refers to his notes on the board</td>
<td></td>
</tr>
<tr>
<td><strong>11-20</strong></td>
<td></td>
</tr>
<tr>
<td>Projects note and lectures</td>
<td></td>
</tr>
<tr>
<td>Schroeder writes notes/problems on transparency as he talks through problems</td>
<td></td>
</tr>
<tr>
<td>F asks ?</td>
<td></td>
</tr>
<tr>
<td>Kevin asks ?</td>
<td></td>
</tr>
<tr>
<td>(bribes them with Reese’s eggs—class chuckles, it is right before Easter)</td>
<td></td>
</tr>
<tr>
<td>F answers ?</td>
<td></td>
</tr>
<tr>
<td>M answers ?</td>
<td></td>
</tr>
<tr>
<td><strong>21-50</strong></td>
<td>Schroeder is very in control of the class, no one acts up</td>
</tr>
<tr>
<td>F answers ?</td>
<td></td>
</tr>
<tr>
<td>Schroeder makes joke—class chuckles softly</td>
<td></td>
</tr>
<tr>
<td>F answers ?</td>
<td></td>
</tr>
</tbody>
</table>
Students seem very comfortable with Kevin
F asks ?—says “thank you” after Schroeder’s answer
Kevin asks ?
3 Fs answer ?
F answers ?
F answers ?
F leaves 15 minutes early
F asks ?
F asks ?
F asks ?
F asks ?
F asks ?
F asks ?
Schroeder gives thorough answers to all questions—seems approachable
Schroeder gives extra credit for students who showed up and he brought them candy, girl called him “fabulous.” He didn’t hear her.

FSHN 200
Professor Schroeder
28 April 2006

65 students; students asked 1 questions; students answered 10 questions
64 (98%) women; women asked 1 (100%) questions; women answered 8 (80%) questions
1 (2%) men; men asked 0 (0%) questions; men answered 2 (20%) questions

Observer’s Notes:                      Observer’s Comments:

<table>
<thead>
<tr>
<th>Before Class</th>
<th>Students are very attentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 F leave right before class</td>
<td></td>
</tr>
<tr>
<td>Schroeder writes on the board</td>
<td></td>
</tr>
<tr>
<td>This is the last lecture, so he writes some funny questions on the board</td>
<td></td>
</tr>
<tr>
<td>Students talk a lot before class</td>
<td></td>
</tr>
<tr>
<td>0-7</td>
<td></td>
</tr>
<tr>
<td>Schroeder begins last lecture</td>
<td></td>
</tr>
<tr>
<td>Students are silent when Schroeder lectures</td>
<td></td>
</tr>
<tr>
<td>Schroeder goes over basics for the final</td>
<td></td>
</tr>
<tr>
<td>4 F come in late</td>
<td></td>
</tr>
<tr>
<td>Schroeder jokes about questions on the board—students laugh</td>
<td></td>
</tr>
<tr>
<td>8-50</td>
<td></td>
</tr>
<tr>
<td>Schroeder moves well, and makes good eye</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Notes</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2-7</td>
<td>2 F come in late</td>
</tr>
<tr>
<td></td>
<td>Schroeder begins lecturing with the overhead</td>
</tr>
<tr>
<td></td>
<td>M answers ?</td>
</tr>
<tr>
<td></td>
<td>M answers ?</td>
</tr>
<tr>
<td></td>
<td>F answers ?</td>
</tr>
<tr>
<td></td>
<td>F answers ?</td>
</tr>
<tr>
<td></td>
<td>F answers ?</td>
</tr>
<tr>
<td></td>
<td>F comes in late</td>
</tr>
<tr>
<td></td>
<td>4 Fs answer ?</td>
</tr>
<tr>
<td></td>
<td>F answers ?</td>
</tr>
<tr>
<td></td>
<td>F asks ?</td>
</tr>
<tr>
<td></td>
<td>Students pack up before class is over-very rude</td>
</tr>
<tr>
<td>0-3</td>
<td>Lin writes on board and hands back test</td>
</tr>
<tr>
<td></td>
<td>M leaves after getting his test</td>
</tr>
<tr>
<td>4-25</td>
<td>Lin lectures on Chinese history</td>
</tr>
<tr>
<td></td>
<td>M comes in late</td>
</tr>
<tr>
<td></td>
<td>F asks ?</td>
</tr>
<tr>
<td></td>
<td>M comes in late</td>
</tr>
<tr>
<td></td>
<td>M in front of me is instant messaging his friend</td>
</tr>
<tr>
<td></td>
<td>F asks ?</td>
</tr>
<tr>
<td>26-75</td>
<td>Prof. asks ?—no one answers</td>
</tr>
<tr>
<td></td>
<td>F asks ?</td>
</tr>
<tr>
<td></td>
<td>Prof. asks ?</td>
</tr>
<tr>
<td></td>
<td>F answers ?</td>
</tr>
</tbody>
</table>

HIST 300
Professor Lin
13 April 2006

17 students; students asked 6 questions; students answered 1 questions
2 (12%) women; women asked 4 (67%) questions; women answered 1 (100%) questions
15 (88%) men; men asked 2 (33%) questions; men answered 0 (0%) questions

Observer’s Notes:

Observer’s Comments:

Before Class
M asks me how my paper is coming—describes project—student seems very unassuming
Students are very quiet before class starts

There were only two other girls and it is April—how can he not know I’m not in the class!!!
M asks?
F asks?
M leaves 30 minutes early
M asks?

HIST 300
Professor Lin
18 April 2006

17 students; students asked 6 questions; students answered 2 questions
15 (88%) women; women asked 4 (67%) questions; women answered 0 (0%) questions
2 (12%) men; men asked 2 (33%) questions; men answered 2 (100%) questions

Observer’s Notes: Observer’s Comments:

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Class</td>
<td></td>
</tr>
<tr>
<td>Students read quietly or stare off into space.</td>
<td></td>
</tr>
<tr>
<td>Students don’t talk to one another.</td>
<td></td>
</tr>
<tr>
<td>Prof. Lin puts notes on board.</td>
<td></td>
</tr>
<tr>
<td>0-7</td>
<td></td>
</tr>
<tr>
<td>Lin gives back students’ tests and gives information about the final</td>
<td></td>
</tr>
<tr>
<td>M comes in late</td>
<td></td>
</tr>
<tr>
<td>M asks?</td>
<td></td>
</tr>
<tr>
<td>8-20</td>
<td></td>
</tr>
<tr>
<td>Prof. begins to lecture</td>
<td></td>
</tr>
<tr>
<td>M comes in late</td>
<td></td>
</tr>
<tr>
<td>F asks?</td>
<td></td>
</tr>
<tr>
<td>Prof. asks for questions regularly</td>
<td></td>
</tr>
<tr>
<td>M emailing in class</td>
<td></td>
</tr>
<tr>
<td>F asks?</td>
<td></td>
</tr>
<tr>
<td>M surfing the net</td>
<td></td>
</tr>
<tr>
<td>M comes in 20 min. late</td>
<td></td>
</tr>
<tr>
<td>21-75</td>
<td></td>
</tr>
<tr>
<td>Prof. continues lecturing</td>
<td></td>
</tr>
<tr>
<td>F asks?</td>
<td></td>
</tr>
<tr>
<td>F asks?</td>
<td></td>
</tr>
<tr>
<td>M answers?</td>
<td></td>
</tr>
<tr>
<td>M answers?</td>
<td></td>
</tr>
<tr>
<td>M writing on blog on his computer</td>
<td></td>
</tr>
<tr>
<td>75-80</td>
<td></td>
</tr>
<tr>
<td>Prof. asks for questions</td>
<td></td>
</tr>
<tr>
<td>M asks?</td>
<td></td>
</tr>
</tbody>
</table>

Students are quiet some seem attentive and others seem spaced out

Lin moves around well and has good eye contact and tone but again doesn’t engage audience well as far as he seems to have his lecture path set out and goes forward, ignoring the audience

HIST 300
Professor Lin  
20 April 2006

19 students; students asked 7 questions; students answered 0 questions  
1 (5%) women; women asked 0 (0%) questions; women answered 0 (0%) questions  
18 (95%) men; men asked 7 (100%) questions; men answered 0 (0%) questions

Observer’s Notes: | Observer’s Comments:
---|---
Before Class  
Lin puts notes on the board | Students are very silent and inattentive as Prof. lectures

0-80  
M asks ?  
M asks ?  
Prof. lectures as usual  
M surfs online-blogging for the first half of class  
F who usually asks/answers almost all questions is gone  
M to my right is falling asleep  
M leaves 30 minutes early  
M asks ?  
M asks ?  
M rephrases ?  
M rephrases ? again  
M asks ?

HIST 400  
Professor Brooks  
2 March 2006

19 students; students asked 18 questions; students answered 22 questions  
14 (74%) women; women asked 16 (89%) questions; women answered 12 (56%) questions  
5 (26%) men; men asked 2 (11%) questions; men answered 10 (45%) questions

Observed Notes | Observer’s Comments
---|---
1-7  
Brooks discusses new articles and hands out new assignments | Brooks talks directly to the class/writes notes on the board—seems to know students’ names

7-15  
Brooks begins going over new materials/current topic of the week/stuff they’ve read for the day  
Male asks a question  
Female comes in late  
Female answers Prof. question
<table>
<thead>
<tr>
<th>Time Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>Female rephrases her question/explains more</td>
</tr>
<tr>
<td>20-25</td>
<td>Female answers Prof. question</td>
</tr>
<tr>
<td>25-30</td>
<td>Female answers Prof. question</td>
</tr>
<tr>
<td>30-35</td>
<td>Male answers Prof. question</td>
</tr>
<tr>
<td>35-40</td>
<td>Male answers Prof. question</td>
</tr>
<tr>
<td>40-45</td>
<td>Female answers Prof. question (Brooks called on her by name)</td>
</tr>
<tr>
<td>45-50</td>
<td>Female continues/rephrases</td>
</tr>
<tr>
<td>50-60</td>
<td>Brooks puts up an overhead with information she is going over. The type is a little small, but it’s readable.</td>
</tr>
<tr>
<td>60-65</td>
<td>Brooks lectures</td>
</tr>
<tr>
<td>65-70</td>
<td>Female asks Prof. question—Brooks is affirming and supportive with nonverbal communication—nodding</td>
</tr>
<tr>
<td>70-75</td>
<td>Female leaves and comes back after about a minute</td>
</tr>
<tr>
<td>75-80</td>
<td>Female asks Prof. a question—Brooks talks directly to her</td>
</tr>
<tr>
<td>80-85</td>
<td>Male answers Prof. question</td>
</tr>
<tr>
<td>85-90</td>
<td>Male answers Prof. question</td>
</tr>
<tr>
<td>90-95</td>
<td>Female asks Prof. question—Brooks talks directly to her</td>
</tr>
<tr>
<td>95-100</td>
<td>Female asks Prof. question—Brooks calls on her by name</td>
</tr>
<tr>
<td>100-105</td>
<td>Female answers Prof. question</td>
</tr>
<tr>
<td>105-110</td>
<td>Female answers Prof. question</td>
</tr>
<tr>
<td>110-115</td>
<td>Male answers Prof. question</td>
</tr>
<tr>
<td>115-120</td>
<td>Female answers Prof. question—Brooks responds using her name (affirming)</td>
</tr>
<tr>
<td>120-125</td>
<td>Brooks is talking directly to the students using good gestures and moving well. It is obvious she is very engaged with the students—using their names, giving them feedback, communicating verbally (orally) and nonverbally.</td>
</tr>
<tr>
<td>125-130</td>
<td>Brooks continues lecturing with the overheads.</td>
</tr>
<tr>
<td>130-135</td>
<td>Female asks Prof. question</td>
</tr>
<tr>
<td>135-140</td>
<td>Female asks Prof. question—she comments and rephrases with Brooks three more times</td>
</tr>
<tr>
<td>140-145</td>
<td>Male makes comment then rephrases once</td>
</tr>
<tr>
<td>145-150</td>
<td>Male makes comment</td>
</tr>
<tr>
<td>150-155</td>
<td>Female challenges male’s comment</td>
</tr>
<tr>
<td>155-160</td>
<td>Male makes comment—female then talks over him to rephrase</td>
</tr>
<tr>
<td>160-165</td>
<td>Female asks Prof. question</td>
</tr>
<tr>
<td>165-170</td>
<td>Brooks seems very approachable. She is very close in communication with her students, and she seems to engage in more discussion with students than in the engineering classes.</td>
</tr>
<tr>
<td>170-175</td>
<td>I was really engaged in the class. The topic was right up my alley. I wanted to participate.</td>
</tr>
</tbody>
</table>
Male argues
Female asks Prof. question then makes a comment
Amy redirects back to lecture
Male and female talk together in the corner. It is about class related stuff and isn’t distracting.
Female answers Prof. question
Female asks Prof. question
Female asks Prof. question
Female asks Prof. question
Female asks Prof. question — Brooks affirms
Male makes comment — Brooks affirms
Two females talk together

HIST 400
Professor Brooks
23 March 2006

20 students; students asked 5 questions; students answered 10 questions
12 (60%) women; women asked 3 (60%) questions; women answered 9 (90%) questions
8 (40%) men; men asked 2 (40%) questions; men answered 1 (10%) questions

Observer’s Notes | Observer’s Comments
--- | ---
Before Class | I found it a little quiet in the room, but everyone was certainly focused on what they were doing
F comes in first—20 minutes before class-turns off her cell phone, checks her makeup, she’s writing
F comes in second—twelve minutes before class-reads the paper
M comes in third—ten minutes before class-he is playing with his ipod
M comes in fourth—seven minutes before class-sighs and reads the paper
F comes in fifth—seven minutes before class-takes out her notes
M comes in sixth—five minutes before class
No one talks to one another at all before class starts

0-18
F student is talking to Brooks on her way to class
Amy apologized for canceling class on

I am really impressed with Brooks’s ability to address students by name. She uses good gesture and moves around in front of the room well.
Tuesday because of weather—she notes that she drives in from Missouri. She’s going to “pick up the pace” since they’re a little behind schedule. F comes in late. F comes in late. M comes in late. Amy hands out new articles for them to read (about abortion and birth control). M asks ? about first draft of paper. Amy talks about first draft. F asks ? and Brooks addresses her by name and affirms her questions. Brooks asks if there are any more questions—none.

| 19-52 | Brooks picks up lecture where they left off—she uses transparencies. F comes in late. F answers ? F answers ? F asks ? and Amy affirms—right, right. M makes comment. Brooks affirms his comment and elaborates. F makes comment. Brooks affirms and elaborates. M asks ? F answers ? F makes comment. | Brooks emphasizes concepts so well with intonation and gestures. Also, she uses a lot of “you”s to connect to the audience directly and says things are “interesting” really adding to the interest and excitement of information. Brooks jokes and uses stories of recent events in her lectures. She refers to visuals well and uses gestures. |
HIST 400
Professor Brooks
11 April 2006

17 students; students asked 8 questions; students answered 21 questions
11 (65%) women; women asked 6 (75%) questions; women answered 10 (48%) questions
6 (35%) men; men asked 2 (25%) questions; men answered 11 (52%) questions

Observer’s Notes:  Observer’s Comments:

<table>
<thead>
<tr>
<th>Before Class</th>
<th>Students are still very silent before class.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 F sit—reading and working on laptops, not talking to one another</td>
<td></td>
</tr>
<tr>
<td>2 M enter class—still no one talks</td>
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<tr>
<td>No one talks at all before class starts</td>
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<tr>
<td>0-20</td>
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<tr>
<td>Brooks apologizes for being late—she had a meeting and dropped her overheads (she’s ten minutes late)</td>
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<tr>
<td>Brooks asks if everyone is OK and talks about rough draft of paper and gives out new handouts</td>
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<tr>
<td>21-43</td>
<td></td>
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<tr>
<td>She lectures on childbirth with overheads</td>
<td></td>
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<tr>
<td>F answers?</td>
<td></td>
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<tr>
<td>M answers?</td>
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<tr>
<td>M answers?</td>
<td></td>
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<tr>
<td>F asks?</td>
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<tr>
<td>F answers?</td>
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<tr>
<td>M asks?</td>
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<tr>
<td>F asks?</td>
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<tr>
<td>M answers? (seems to try to talk over the lecture—and Brooks)</td>
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<tr>
<td>M answers?</td>
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<tr>
<td>M answers?</td>
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<tr>
<td>F asks?</td>
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<tr>
<td>F answers?</td>
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<tr>
<td>M comes in late (40 minutes late)</td>
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<tr>
<td>F answers?</td>
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<tr>
<td>M asks?</td>
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<tr>
<td>44-75</td>
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<tr>
<td>M answers?</td>
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<tr>
<td>F asks?</td>
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<tr>
<td>Brooks moves around well and connects recent events to her lectures.</td>
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<tr>
<td>She leans in on a podium when she listens to students questions and answers—very effective, she looks engaged</td>
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<tr>
<td>Brooks affirms and repeats phrases from students when they talk</td>
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<tr>
<td>F asks ?</td>
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<td>---------------</td>
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<tr>
<td>M answers ?</td>
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<td>M answers ?</td>
<td></td>
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<tr>
<td>M answers ?</td>
<td>(again M seems to try to take over lecture)</td>
</tr>
<tr>
<td>F answers ?</td>
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<tr>
<td>F answers ?</td>
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<tr>
<td>F asks ?</td>
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</tbody>
</table>

76-80
Brooks gives back papers


