

T-shirts and Ponytails: Women Students in Engineering Talk about Self-presentation

**Alisha A. Waller
Georgia State University**

Introduction

Over the past thirty years, educators, activists, and politicians have made many calls to increase the number of women in engineering education and practice. For example, in a public hearing conducted by the Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development in July of 1999, William Wulf, President of the National Academy of Engineering, testified, “Without diversity, we limit the set of life experiences that are applied, and as a result, we pay an opportunity cost – a cost in products not built, in designs not considered, in constraints not understood, and in processes not invented”¹.

In 1986, 14.5% of all engineering bachelors degrees were earned by women, and by 2000, 20.5% were, an increase of six percentage points. At this time, many engineering educators believed that these numbers indicated that sex equity would be achieved in engineering as quickly as it was in medicine. Unfortunately, further investigation by Waller² illustrates that such analysis does not provide an accurate picture. First, the total enrollment in engineering declined dramatically during the 1990s, therefore much of the increase in the percentage of women was actually due to many thousands of men leaving the field. Secondly, when the data is disaggregated by discipline, greater disparities are found. For example, Chemical Engineering increased their percentage of women graduates from 21.7% in 1986 to 35.4% in 2000; however, Electrical Engineering (the largest discipline) only increased their percentage from 12.4% to 13.3% in the same time span (which was not statistically different from no increase at all).

My analysis of this graduation data, my experiences as an engineering student and professor, and my involvement with the American Society of Engineering Education leads me to believe that a new phase of research on equity in engineering is needed. I believe this research needs to be grounded in students’ experiences and perceptions, to be based primarily in qualitative research methods, to draw from a variety of theoretical perspectives, and to be inclusive of gender, race, class, and sexuality. The project described in this paper is one small contribution to this new phase of research.

Why is self-presentation an important topic to study? Many researchers have linked a woman’s outward appearance or “self-presentation,” through clothing styles, makeup, and hairstyles, to others’ perceptions of her competence and success³⁻⁷. Also, for a woman in engineering, her development of an engineering identity which is consistent with her gender and racial identities is theoretically linked to her persistence decisions in engineering education and practice. Therefore, self-presentation has individual effects on female students.

One of the difficulties of previous research in equity in engineering education is the confusion between sex equity and gender equity. In my research, these concepts are distinctly different. Sex equity concerns the numbers/percentages of students who declare their sex to be male or female. This is the common measure of diversity. In recent years, many people have begun substituting the word “gender” for the word “sex” to represent the same concept. Sex is biological, manifested in anatomy, hormones, and chromosomes, and naturally occurs in a primarily dichotomous way. (I’ll leave the discussion of intersexuality to another paper.) Following the conventions of gender studies literature, I use the term “gender” to represent the idea which gives meaning to phrases like girly-girl, tomboy, 90’s kind of guy, manly man, biker chick, frat boy, sorority chick, etc. Gender is socially constructed through national institutions, such as the media and education system, and through local interactions which reinforce certain behaviors and punish others. Gender is also comparative: one is more or less feminine/masculine than another person or an ideal. In mainstream U.S. culture, one’s sex and one’s gender are highly correlated and mutually reinforcing identities for individuals.

Self-presentation is the primary way people declare their gender, so we can learn how gender equity and sex equity are related in engineering through studying self-presentation. In what ways do women display (or not) their femininity? What are the consequences of displaying more masculine or more feminine? I believe that we will not experience the diversity that Wulf calls for unless we have gender diversity as well as sex diversity on engineering design teams. *Having more biological women in engineering who behave and think like men will not change the engineering processes or products developed by teams.* Instead, we need a variety of femininities and a variety of masculinities to truly maximize the engineering work which is done. Therefore, self-presentation also has collective effects on engineering as a discipline and profession.

Other researchers have also found self-presentation issues to be important in students’ experiences in engineering education and practice. Perhaps the most well-known and broadest study was conducted by Seymour and Hewitt⁸. For example, they found that women in engineering were perceived as inherently unattractive by men in engineering (p. 248). Tonso describes an incident of team negotiation regarding self-presentation as influential to the team’s cohesion⁹. The essays in Pattatucci’s book also reflect the fact that self-presentation is an important consideration for women in science and engineering¹⁰. However, none of these studies interviewed engineering women students specifically about their self-presentation decisions. This study begins to fill that gap in the literature.

In summary, the motivation for this project began with my own experiences of altering my appearance in order to reduce the attention to my gender and increase my chance of being heard. Learning that other women had made similar adjustments and that research studies linked a feminine appearance with perceived incompetence further increased my interest. Theories of identity conflict predict that women who identify as feminine will have difficulty constructing themselves as engineers since the engineering culture is based in masculinity. Hence gender expression and identity may be a significant factor in the recruitment and retention of women into engineering colleges as well as their persistence in the workforce.

Goal of this project

The goal of this project is to analyze interview data collected as part of an earlier project¹¹. Since the pilot study had nine participants, my goal is not to derive “universal conclusions,” but instead to point to interesting findings that help us to understand some students’ experiences. Furthermore, I am interested in mining this data for clues leading to areas of further productive research.

Collection of data

The data was collected as part of a group project for a course on feminist methodologies. A. Fiona Pearson, Farrell Blaise, and I were interested in how women in engineering presented themselves and how it affected their treatment by others. Conceptualizing our project as a pilot study, we interviewed nine women at an urban college of engineering in the southeastern U.S. We asked the students about their self-presentation in three different situations: class or other learning situations on campus, professional situations, and social outings. We probed for information regarding clothing, hairstyle, makeup, perfume, and jewelry. We also asked the women to talk about how they were treated by others under various self-presentation situations. Note that each student chose her own pseudonym to shield her identity.

Significant findings

The immediate observations of this data are not surprising. These participants dress very similarly for academic situations, primarily in jeans and t-shirts with ponytails. They also dress up for social situations in skirts or slacks, “fixing” their hair and makeup. In professional situations, dark colored dress pants and button-up blouses predominate. Table 1 below summarizes how each participant described her own self-presentation.

Describing what the students wear is only the first part of the analysis. The second phase focused on the reasons why the students made the choices they did and what the effects of those decisions were. I state these findings as working hypotheses my desire in analyzing this data was not to develop some generalizable truth, but to develop working hypotheses which could be explored further. These working hypotheses could be used to refine the interview protocol and achieve more depth in exploring the reasons and implications of self-presentation. In this section of the paper, I state each working hypothesis, give quotes as evidence and motivation, and discuss connections to other ideas.

Table 1: Summary Description of Female Engineering Students and Self-Described “Typical” Wear in Three Social Contexts

	<u>On-Campus</u>	<u>Professional</u>	<u>Social Outings</u>
Victoria Indian-Asian Age – 21 Electrical Eng.	Jeans, knit shirt, sneakers, bun, body spray, no make-up, no jewelry.	Bun, black pants or skirt.	Bun, black pants, make-up.
Sara White Age – 19 Industrial Eng.	Jeans, sweater, sneakers, ponytail, perfume, make-up, earrings.	Dress pants, button-up shirt or blouse, hair styled and down, natural make-up, necklace and earrings.	Stylish pants or skirt, hair styled, perfume, make-up, jewelry.
Bonner White Age – 23 Industrial Eng.	Jeans, sweater, sneakers, hair down and curly, no make-up, contact lenses, bracelet, necklace, ring.	Black pant or skirt suit, khakis, wool pants, button-up collared blouse, high-heels, hair styled, perfume, make-up	Skirt, black or khaki pants, sweater or nice top, sandals, hair styled, perfume, make-up.
Alycia White Age – 22 Electrical Eng.	Khaki pants, T-shirt, ponytail, sneakers, no perfume, no make-up, no jewelry.	Dress pants, button-up shirt, black sandals, hair brushed and in headband or barrette, no make-up, no jewelry.	Make-up, hair down (wears Middle-Eastern dance clothes when dancing—harem pants, halters, etc.).
Cordelia White Age – 25 Mechanical Eng.	Jeans, T-shirt, sneakers, hair layered and bobbed, some make-up, no jewelry.	Dress pants, blouse or nice sweater, dress shoes or sandals, make-up.	More fitted and more colorful (“daring”) clothes, heels, make-up .
Lacy White Age – 18 Chemical Eng.	Jeans, fitted T-shirts, sneakers or flip flops, ponytail, no perfume, some make-up, necklace and earrings	High heels.	Ballet dancer – hair up in bun, leotard, tights.
Nea White Age – 22 Polymer & Fiber Eng.	Jeans or basketball shorts, fitted or non-fitted T-shirt, sneakers, ponytail, no perfume, no make-up, no jewelry.	Khakis or skirt, button-up shirt, high heels.	Skirt, high heels, more “girly.”
Justice African-American Age – 30 Industrial Eng.	Jeans, fitted T-shirts, sandals or casual shoes, no make-up, light perfume.	Olive or other dark-colored suit, high heels, make-up, perfume.	Colorful shirts, knit pants or skirt, make-up, perfume.
Amy Asian-White Age – 22 Mechanical Eng.	Jeans, “regular shirt,” loafers, ponytail or braid, no make-up, no perfume.	Nicer slacks, button-up shirt, hair pulled back or ponytail.	Some make-up, more “fun” clothes.

1) Peers are important influences on how students self-present on a day-to-day basis. Some faculty members influence some students to present more professionally during office hours visits or advising sessions.

When asked if they are treated differently when they dress differently from their normal attire, most of the students said no but then immediately commented that other students do react through comments and questions. They reported similar reactions from peers, but the participants had widely varying responses to the comments of their peers. Compare Alycia and Victoria for example:

Alycia: I think about the biggest difference that I ever get is my classmates or group members will - if I have to dress up for an occasion that's that they don't know about - they'll comment, "Ok, you're looking spiffy today". And that's about as far as it goes and I'll explain about the interview or the job fair or what not and that's the end of it.

Victoria: People always, most people are like, why are you all dressed up today? Oh my God you're dressed up! And they make a big deal about it. And that's why I don't like to dress up. I don't like attention being called on me for that. It makes me uncomfortable. It's surprising how much people notice about you. And you know, I mean, to me I realize that - because I notice other people - but you think about it and you formalize the thought, but you don't actually speak it out. And when someone really speaks it out to you, it hits you and I feel really uncomfortable with that. I try to, like, not do it too much.

One participant quoted her peers and herself as not only commenting on the appearance, but also requesting a justification for it, linking the change in appearance to heterosexual dating:

Justice: And then, um, the, some of the other girls that we kind of look strange at, are the ones, and maybe we shouldn't but we do, are the ones who wear dresses to class often. 'Cause we're like, are you trying to get a man? Why do you have a dress on, like, everyday?! It's just class! [laughs] Why are you so cute everyday? [laughs] I don't understand that-so, maybe it shouldn't be that way, but I do kind of look strange, like why do you have on a dress today? And so I get that same reaction, like if I put on a skirt or something, it's the same thing. But if they wear that everyday, it's, it's weird, to me.

Another student said that sometimes other students not only comment that she looks cute, but that she is "making them look bad" by dressing up.

The only times that students mentioned faculty was to comment that they would try to dress a little nicer to go to office hours or advising appointments. When directly asked, no student could think of a specific instance of a faculty member treating a student differently because of what they wore. There were two mentions of teaching assistants who treated students differentially, with more attention and help going to the ones who dress nicer and one mention of getting called on quicker if a woman is well dressed.

2) *Students respond that they are not treated differently, then follow with stories of how students comment on their appearance. Perhaps being “treated differently” is interpreted as being treated unfairly.*

Without exception, the response to the question “Do you notice any differences in how people treat you depending how you look that day?” was no. Then participants would explain how people commented on their appearance as I discussed above. One possibility for this reaction is that students believe that differences in treatment are negative, associated with favoritism or discrimination, or are inappropriate. The rhetoric in engineering education around diversity supports the idea that treating each person the same is what is fair, right, and desired. Perhaps the students’ initial reaction accesses this belief. Several participants later commented that any differential treatment is subtle and not overt. They claimed no differential treatment while also saying that male students interact differently with females who dress up.

Bonner: I think males are more likely to talk to the girls who are a little more dressed up, but, not even, like, that's I think very subtle and slight not yeah.

Sara: Um, well, if you go in a class wearing, like, a really short skirt and you know just really revealing clothing, I don't think that you're going to be respected really, and um, like - I mean I think you should look decent and you should look nice and, and then people will listen to what you have to say, because I mean, if you are wearing something that is really revealing people are not going to be listening to you, say, you know they're just going to be thinking "Oh my gosh- this- I can't believe what this girl is wearing " or you know both boys and girls would be thinking that. I think, um, and so I think, that definitely like making sure you look presentable is important, um, as far as, like, working with people, and having people like listen to what you have to say and things like that.

One question raised by this treatment is whether the same kinds of comments are made to male students who dress differently. My hypothesis, based on my own experiences, is that people also comment to men, but the content of the comments are different. People comment on men’s clothing: “That’s a nice tie!” but they evaluate how women look: “You look spiffy today!” Especially if comments were broken down by sex of commenter and sex of commentee, I would expect that men only comment on other’s men’s clothing, but that men and women comment on women’s appearance. Women probably comment more often on men’s clothing and less on men’s appearance, lest it be taken as an invitation.

3) *More women in a department leads to more variety in self-presentation and less feeling of restriction.*

This working hypothesis is stated directly by one participant and supported by another one.

Bonner: Well, actually my engineering department has many more women in it, so it's more - I think more of the women dress nicer. And I think part of that is because there's more of us, so you can be more comfortable, because there are many different - there's a lot of diversity in how women dress. So I think because - Because you have so many more women you have a little more flexibility. But, um, my experience is with some of

the other engineering departments, there are not as many women and they do not dress as - there's more conservative dress - more of my type of dress.

Nea: If you have got an aerospace engineering girl, one of the five [laughs] that are in our department, or whatever, those girls, they just really blend in., um, in their classes with the rest of the guys. Ya know, just nothing flashy with their clothing at all

Bonner, an Industrial Engineering (IE) major, is in a discipline which has the longest history of more than 20% women. IE has a reputation as “Imaginary Engineering” because it deals with the “softer” side of engineering. Some people claim that IE “naturally” appeals to women through its transparent concern with people. An interesting comparison department would be Chemical Engineering, which has recently achieved the distinction of graduating the highest percentage of women. If this working hypothesis is true, then Chemical Engineering should have a variety of self-presentation as well as IE, while Electrical Engineering and Mechanical Engineering would have less variety since they have much smaller percentages of women.

4) Engineering students see spending time on appearance as indicative of less commitment to academics.

At this particular institution, the College of Engineering historically was the largest and most well known of the academic units on campus. Other colleges in the institution were basically in support functions to engineering. More recent decades have seen a rise in the prestige and influence of these other colleges, causing internal competition. Engineering students developed and maintain a sense of superiority, believing that other majors are easier and not as valuable. Many students transfer out of engineering into management and liberal arts, but few students transfer from them into engineering. Although students may be unaware of the academic pecking order that puts physics, engineering, and other sciences on top, they enact a belief that spending time on appearance takes away from academic performance which reinforces the academic pecking order based on “difficulty” of major.

Bonner: I wouldn't want to be perceived as someone who is particularly worried about appearance. ... I don't think it's very – it's not what I'm here for – It's not what I think students are around for – I think they're around to learn. And I think it's kind of ... off topic, if you will, to think about appearance too much when you're in a classroom setting.

Lacy: If you have time to worry about how you're looking then, you know, you can do that, but engineering students have very little time [laughs] to spend on stuff like that

Victoria: I'm EE I'm always studying and my sleep schedule is always messed up so I just try to make life as simple as possible.

This hypothesis is congruent with other findings regarding appearance and women in engineering. Seymour and Hewitt⁸ found a strong belief among male engineering students that women who study engineering are not as attractive as other women. Seymour and Hewitt state:

Because they [male engineering students] tended to view any woman's interest and ability in science or mathematics as "unnatural," they were apt to portray those women who chose S.M.E. [science, mathematics, and engineering] majors in one of four ways: as inherently ugly; as having been too busy with academic work to learn the arts of attractive self-presentation; as having lost their attractiveness after they entered the sciences; or subtly inferred they might be lesbian. (p. 248)

In this study, Sara also expresses this view, even seeming to repeat that what academic subjects a woman likes determines her attractiveness.

Sara: when you think of, like, women in engineering, you don't think, um, you know, like really pretty or you know anything. You just think of, like, they're like guys because they like math and science and stuff like that (laugh) but um I don't know I just - I really think it does vary a lot (laugh)...

Sara does not seem strongly committed to this viewpoint however. She says she just doesn't know and is convinced that it is not true of all students.

Interestingly, two of the participants said they do not wear makeup because they do not know how. One specifically discussed how her mother, a scientist, taught her how to "throw like a boy" but never taught her about makeup (and the mother never wore any). Another student revealed her family has given her books on "dressing for success." This raises the question of how do women in engineering learn about self-presentation, especially makeup, and is it different from non-engineering women?

5) Some women use self-presentation as a way to express their agency, despite the conformance pressures of their peers.

Why do students choose to present themselves the way they do? Most participants eventually gave multiple reasons, but first discussed issues of comfort, ease, practicality, and time efficiency. Then, collectively, they gave a variety of reasons that point toward using self-presentation strategically or to express their agency. By agency, I mean their conscious choice to behave in certain ways to accomplish particular goals or to reject societal expectations. Blending in, not calling "attention to the fact I'm different," was important to several women. This may indicate a high comfort level with being "one of the guys" or it may indicate an intentional strategy to avoid the unwelcome comments. Amy commented that she refused to "sacrifice your personal comfort for everyone else's enjoyment." Cordelia uses the standard attire when she is "feeling really comfortable with myself and don't require it" as well as when she feels like she "looks awful" and "doesn't want to mess with getting dressed." She later observes:

So because I do, I have a lot of clothes, actually, um, because I worked in manufacturing environments, so I was pretty much hit on continually - you know, if I was on the floor I was being hit on. And so, so, I, uh, I, I really had to limit what I, I could wear. And, but unfortunately a lot of my clothes, you know, cause most clothes now a days just are flattering. You can't not do something - flatter your figure somehow.

Cordelia points to another arena of interesting research - investigating the “professional attire” available at different types of clothing stores. Professional clothing for men is generally the same in terms of how much of the body is revealed and/or emphasized, but for women, the picture is completely different. Skirt lengths were considerably higher when Melrose Place was a popular prime time soap opera. How has the media influenced what is available?

Why do students choose different self-presentations on some days? Several participants noted they dress up more to feel more feminine, to feel pretty, to look older or more professional, or for a confidence boost. One participant discussed how she would wear a skirt to her internship on the days she did not want to do field work because pants were required in the field – a definite strategic use of self-presentation.

Another student dresses up to “remind them I’m not just another guy.” This comment particularly spoke to me because it highlights the sacrifice of their gendered presentation that some women (including myself) make. Being “one of the guys” is a commonly accepted and, many times, assumed role that women can play in engineering. However, Kvande⁹ documents four different “femininities” enacted in a software engineering firm, so being one of the guys is not the only possibility. The belief in same treatment as the hallmark of equality supports this role for women and, for the most part, leaves the status quo intact. Women are incorporated into engineering by being one of the guys and engineering itself does not change.

6) Some students make strategic choices when others behave unprofessionally toward them.

In everyday life there are times when people behave unprofessionally or inappropriately. Although anyone may experience this, women in engineering experience it often. Engineering women have to learn how to respond to unprofessional behavior. I have often heard faculty and practitioners (especially male ones) state that females need to “learn to stand up for themselves.” There seems to be an assumption in this rhetoric that women do not necessarily respond through formal channels because they do not know how to file a complaint or that they are too weak to protect their boundaries. In this study, Bonner and Amy related stories of inappropriate behavior during their internships.

Bonner: I generally interacted over the phone and there was a difference, because I was a girl and a young woman, um, and I was talking to these Construction men who’d been around since for 50 years, and I got called “Honey” and “Sweetheart” and all these things that I thought were horribly inappropriate, um, but didn’t feel like I had a lot of power to do anything, about because of their age and their respect that the other people in the business had for them and their competency – they were very good at what they did, so, uh, but I didn’t...

Bonner not only realizes the inappropriateness of the comments, but she also realizes what might be at stake if she formally reports them. She indicates their competency and others’ respect for them as mediators to her response.

Amy: Being the first woman engineer in the shop, it was just, you'd think they'd never seen one before. But um, actually someone once told me "Little girls aren't allowed in here." And stuff like that. ... Yeah, just kidding around, like you know. His name for me was "little girl." He wouldn't call me, you know, by my name. He would, he would say "little girls aren't allowed in the shop." And then he told me a story about a guy with long hair who worked in the shop once and he got, like, partially scalped. And he's like, "you might not want to come back." And I'm like, yeah. [laughter] ...

Interviewer: That's really interesting. Did he have nicknames for any of the other co-ops?

Amy: Not that I know of, he just picked on me in particular. It didn't really get bad. Some other people were, um, weren't unprofessional. There was only one person I had to speak to my manager about and have my manager speak to him about it. And then, you know, everything was corrected pretty, um pretty fine. I don't know if it was because of my age or my gender or if it was because I was a co-op or.. you know, it's just a personal thing. You run into people and they're wanting to be buddies and chum-chum and have you fit in, but they kinda tease you and stuff like that. And that's fine. But um, you know, as long as when I have work to do, you know, I prefer to be treated, you know, professionally. And um, but different people behave in different ways. Sometimes people in the shop don't treat you the way other engineers usually do, so.. You have to learn to work with different people. And uh, hopefully the people that, um, I worked with kinda see me as a competent engineer, and that kinda of, well, that helps.

Amy subtly acknowledges class differences in her description. She discusses how the shop floor workers treat her differently than the other engineers treat her. Amy also indicates that learning how to get along with many different kinds of people is important for professional success. She obviously knows how to handle someone who goes way out of bounds, giving the example of talking to her supervisor, but she also seems reluctant to assume that the differential treatment is due to her gender even though the person did not treat the other students unprofessionally.

In this section I have laid out six working hypotheses generated from the interview data. The trustworthiness of these hypotheses needs to be developed through interviewing a larger sample of students. Replication of this small study on a larger scale would give more confidence in the hypotheses and perhaps allow the development of educational responses.

Further research

As a pilot study often does, this project generated more questions than answers. In this section I suggest six additional studies which would add to our understanding of self-presentation decisions of engineering women.

1) Compare engineering to other majors to tease out what is "college" and what is "engineering." Several participants in this study claimed that management majors dress very differently from engineering majors; although several claimed that they wear jeans and T-shirts because that is "just what everyone wears." Perhaps this consistency in dress is not unique to engineering, but simply reflects being in college.

2) *Larger sample to see what reoccurs most often.* With such a small sample size, we can make no claims about the prevalence of any particular response. Expanding the study to include more women would give us an idea of which responses are common.

3) *Compare students who are returning (e.g. for master's degrees) or have significant work experience to traditional age students without experience.* For the students who did have significant work experience, they reflected lessons learned about self-presentation at work in their interview responses. This study may also provide guidance regarding what preparation women students need to enter the workforce with a smooth transition.

4) *Interview male students in engineering regarding their self-presentation decisions and how they respond to different presentations of female students.* Since peers are hypothesized to be major determinants of self-presentation decisions, a study of male students' responses to different presentations of female students would be very interesting. In addition, knowing whether male students spend energy on self-presentation would clarify whether this is another area of "additional burden" with which female students must contend¹⁰.

5) *Cross case analysis of several institutions, covering different regions of country and schools with mostly local students as well as more diverse schools.* Regionality likely influenced this pilot study since the culture of the southeast is different than other regions of the U.S. and the expectations of how women should present themselves is deeply ingrained. It also stands to reason that if an institution has students from a wide variety of geographic regions, the variety of self-presentation would be larger than an institution with primarily local students.

6) *Non-participant observation of interactions in classes and study groups.* The students who we interviewed could not recall specific incidences of differential treatment, but it would be interesting to see if a non-participant observer also reached the conclusion that there was no differential treatment. Karen Tonso's dissertation¹¹ provides one example where an observer saw differences in treatment during group design work that the students did not perceive.

These comparison studies would contribute to the scholarly literature and deepen our understanding of engineering students' self-presentation.

Conclusions

Although self-presentation may at first seem to be "off topic" in an investigation into equity in engineering education and practice, this paper demonstrates that it is highly relevant. Not only does it affect individual women in terms of their comfort level in engineering classrooms, but it also collectively affects engineering practice through the diversity that is (or is not) brought to bear on engineering work. Through analyzing these data, I have developed six working hypotheses for further exploration. These hypotheses and their supporting evidence demonstrate that self-presentation decisions are made strategically, reflect cultural norms and expectations, and impact the affective component of these students' educational experiences. Hopefully other researchers will join me in conducting additional studies which incorporate qualitative methods and a variety of perspectives to investigate the construction and maintenance of gender, race, class, and sexuality in engineering education and practice.

Bibliography

- [1] Wulf, W. A. (1999). Testimony from the July 20, 1999 public hearing of the Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development. Available on-line from www.nsf.gov.
- [2] Waller, A. A. (2003). Sex equity in engineering. Unpublished manuscript. Georgia State University. Atlanta, GA.
- [3] Clayson, D. E. & Maughan, M. R. C. (1986). Redheads and blonds: Stereotypic images. *Psychological Reports*, 59, 811 – 816.
- [4] Glenn Wiley, M. & Crittenden, K. S. (1992). By your attributions you shall be known: Consequences of attributional accounts for professional and gender identities. *Sex Roles*, 27, 259 – 276.
- [5] Kyle, D. J. & Mahler, H. I. M. (1996). The effects of hair color and cosmetic use on perceptions of a female's ability. *Psychology of Women Quarterly*, 20, 447 – 455.
- [6] Synott, A. (1987). Shame and glory: A sociology of hair. *British Journal of Sociology*, 38, 381 – 413.
- [7] Weitz, R. (2001). Women and their hair: Seeking power through resistance and accommodation. *Gender & Society*, 15, 667 – 686.
- [8] Seymour, E. & Hewitt, N. M. (1997). *Talking About Leaving: Why Undergraduates Leave the Sciences*. Boulder, CO: Westview Press.
- [9] Kvande, E. (1999). 'In the belly of the beast': Constructing femininities in engineering organizations, *The European Journal of Women's Studies*, 6, 305 – 328.
- [10] Pattatucci, A. M. (Ed.). (1998). *Women in science: Meeting career challenges*. Thousand Oaks, CA: Sage Publications.
- [11] Tonso, K. (1997). Constructing engineers through practice: Gendered features of learning and identity development. Unpublished dissertation. University of Colorado – Boulder.

ALISHA A. WALLER, Ph. D.

Alisha A. Waller is a doctoral student in Educational Policy Studies at Georgia State University. Her concentration is qualitative research methodology and her dissertation work focuses on equity in engineering education. She earned her first Ph.D. in Operations Research at Cornell University in 1991 and is an active member of the ERM Division of ASEE.