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”What can you Teach me?”: (Re)thinking Responses to Difference for Multi-disciplinary Teamwork

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"What can *you* Teach me?": (Re)thinking Responses to Difference for Multidisciplinary Teamwork

Abstract

Skillful multidisciplinary collaboration will be paramount for engineers working in a global society.[1] Much of their industry work will require that they partner with people from various backgrounds, areas of expertise, gender, ethnicity, etc. Despite the importance of learning about different perspectives relevant to problem solving, it seems that engineers accept difference conditionally.[2] That is, individuals who exhibit ways of thinking, doing, and being that are "outside the norms" of engineering are marginalized within engineering culture.[2] This attitude toward difference may present challenges for engineers when they enter the workplace. Thus, the question becomes how do we adequately prepare engineering students for the diversity of values, ideas, and approaches to problem solving that characterize the workforce? The purpose of this project is to explore the concept of difference as represented through gender.

A thematic qualitative analysis of data revealed that engineering students experience dissonance and (re)negotiate their positionality of being an engineer in the presence of difference. These findings not only have implications for how we model interdiciplinarity in the classroom, but more importantly, results from this project show that acceptance of difference is conditional. As educators, we have more work to do to prepare students for the multidisciplinary work that will be required of them as practicing/professional engineers.

Background

Engineers of present and future will be tasked with multidisciplinary projects teams. Exposure to these teams is inherent to different ways of thinking, and thus students need to be introduced to difference through multiple disciplines. Difference, especially difference from the norm, is a key characteristic of multidisciplinary work. It is through experience that students can begin to have a degree of empathy, and perhaps engagement in difference, and therefore other disciplines. As past studies have shown, there are a multitude of ways in which difference can be manifest in the classroom. For example, the differences of disciplinary cultures,[3] differences in teams,[4] difference through the gendering of academic cultures,[5] and academic colleges coming together to teach professional communication skills.[1,3] This study recognizes and builds on this past work but specifically looks at gender as the vehicle for understanding difference. Gender provides generous explanatory power of difference within the engineering classroom, because as the data suggests, it truly epitomizes responses to the "other" within this context.

Thus, the research question guiding this study asks, what are engineers (both students and faculty members) attitudes toward difference? I argue that through their discourse in an attempt to negotiate difference, engineering students and faculty devalue difference to various degrees. In this study, gender is the characteristic in which the rejection of difference is illuminated. To this end, female/feminine is devalued while the discourse suggests a preservation of the male/masculine. In the following pages, I will explain the importance of multidisciplinary collaborations as a context for study, explain a theoretical position in examining the consequences of difference discourse and how this relates to the context of engineering.

Multidisciplinary Collaboration Multidisciplinary collaboration is an effort to increase the breadth of experience and knowledge in and through working with others. Upon leaving the college setting where students are frequently the same age, major, and often gender, the workplace can be a surprising change with increased diversity. The new setting often forces individuals to negotiate difference for productivity. Thus in order to better prepare students for the professional workplace, many colleges have taken up the call of the future worker and require that students complete multidisciplinary teamwork. For example, general education courses require students take classes in multiple disciplines and more specifically, "hard" sciences are seeking integration with "soft" sciences. The latter example usually means that colleges of humanities help colleges of science and engineering with their writing, communication, and teamwork through multidisciplinary collaboration.

Multidisciplinary research can encompass many different disciplines (i.e., engineering, health, communication, English, etc.) and negotiating the mergers of colleges or it can also denote the coming together of multidisciplinary education (e.g., electrical engineering, mechanical engineering, civil engineering). The premise of this type of setting is unlike minds coming together for the possibility of a better-informed cause through the exercise of multidisciplinary teams. It is important to explore the consequences and successes of multidisciplinary collaboration because working together will be paramount for engineers working in a global (diverse) society.[1] Much of their industry work will require that they collaborate with people from different backgrounds and areas of expertise. However, despite the reality of their futures, Godfrey and Parker found that currently engineers accept difference conditionally, in that they only accept those who resemble the major marks of being an engineer,[2] making the reality of teamwork a potential crux in progress. This notion of the current "typical engineer" will be investigated in more detail later in this study.

Previous research in engineering education has examined the unique culture of engineering and students' socialization experiences.[2] Faulkner explored the role of masculinity within engineering settings.[6] She clarified that engineering is a predominately masculine setting and because of that there is a gendered consequence of privileging male as the powerful/predominate perspective. Because of this, Faulkner explained that there is resistance to the difference of a more feminine/soft approach or integration into this disciplinary space.[6]

The coming together of two disciplines simulates a multidisciplinary workspace and requires people to negotiate difference. This act not only prepares students for professional life, but also for a more intelligent and holistic student life. As an instructional model, multidisciplinary education has the potential to be a beneficial learning environment, where instructors model multidisciplinary teams and students have the opportunity to both simulate and learn from various areas of expertise.[1,4,5] However, this merger is not without tension. As suggested by Sullivan and Kedrowicz disciplines operate as separate cultures, which helps make sense of why there is tension when two attempt to merge.[5] Moreover, disciplines are cultures that are informed by taken for granted assumptions, rules, rituals, practices, and epistemologies through customary practices.

Recognizing cultural differences is most prevalent when we see two contrasting disciplines attempt to negotiate the coming together in order to enhance learning. When these academic cultures merge, there is likely to be ideological contradictions or power concerns because of clashing beliefs. For example, gender marks a moment of potential unknown, or reaction to difference. More specifically for this study, the engineering discipline is commonly characterized as masculine, privileging hard science, objectivity, rationality, hegemonic ideology, and even male bodies.[7] This is in juxtaposition to humanities, a more feminine discipline where scholars engage in "soft" science, teach "soft" skills, and embrace subjectivity, emotionality, and female bodies.[5] Due to the merging of two cultures in an effort to have multidisciplinary education, different through the representation of gender is illuminated.

Difference Discourse The concept of difference is important to examine because it helps us to recognize what is not "standard" or normal within certain contexts. Organizational communication scholars take up the idea of difference in order to understand how organizations are functioning around or because of majority vs. minority voices. Ashcraft suggested that seeking or understanding the "difference discourse" in and among organizations at large illuminates relations or the workings of institutionalized power which, in this sense, is confirmed and (re)produced through discourses.[8] As Foucault remarked, discourse is not a single utterance, but rather a series of texts or utterances that produce and (re)produce ideological beliefs.[9]

To this end, discourse is an expression of power.[9] Discourses give insights into what is different and what is not. For example, studies about engineering education have suggested that masculinity is the norm, and anything not traditionally masculine is different. From the discourse presented in this study, how much difference is accepted within the engineering culture in regard to a certain characteristic will be highlighted.

According to Putnam, Jahn, and Baker, difference (presented through discourse) as being deficient within organizational settings is represented in three themes: 1. Difference as deviations from an ideal or *valued* model:[10] is understood through dichotomous relationships (e.g., man/woman) or desired qualities (masculine vs. feminine) in the workplace. In the end, the scholars found that the norm or standard for most workplaces is masculine, and thus the deviation is anything feminine. 2. Difference as devalued categories: this theme identifies the characters or typologies that typically women represent in the workplace. Generically understood as gender schemas, these representations of women tend to keep them in a box, and stereotype women into devalued categories (e.g., mother, seductress, pet…). 3. Difference as unsuitable fit: this theme works specifically at an organizational level in regard to gender in jobs and division of labor. Using gender at the base, this theme focuses on different assignments, and levels of expertise in order to contend that females and males should not be a part of the same jobs.

In the end as explained, difference discourse helps us to examine the ideological powers and patterns that are in play and prevalent within organizations. In addition, once those differences are located, we are able to make sense of why certain differences are considered or treated as deficient within multidisciplinary settings. However, in order to understand the tensions within the context of engineering, we must first understand what engineering culture suggests is the norm or privileged.

The Typical Engineer Engineering culture represents a masculine culture[2,5,11] and difference is marked as anything non-masculine. Godfrey and Parker found that understandably (due to organizational culture) engineers prefer engineering ways of doing, being, thinking and tend to disregard the rest.[2] Taking into consideration Godfrey and Parker's findings, this study begs exploration of the negotiation or regard for difference and the consequences of such.

What we know about engineering culture or the typical engineer is that they are masculine. Objective ways of knowing, doing, and thinking are advantaged. Masculine in this setting is the typical normative behaviors in how we train young boys to do gender. Gender scholar, Sattel talks about the conditional inexpressiveness of males and that as a culture we privilege men who hold power, display power, and show power but never tears or stereotypically feminine emotions.[12] In this sense, one could make the leap that to be masculine means to *not* be feminine. And thus, the feminine in any representation is devalued.

Consequently, the dichotomous relationships ensue. For example, understanding that to be an engineer is to not be a student in the humanities. The two colleges and cultures represent gendered disciplines in this sense.[3] Using Putnam et al.'s, explanation of hierarchy in difference, masculine is privileged and so it becomes the ideal.[10] Therefore, anything outside of this standard arguably will be a tension.

Examining the culture surrounding this tension and in order to better understand the output of graduates, Godfrey and Parker found that engineers have certain ways of performing engineer.[2] They contend that as long as people stay close to the engrained way of "being an engineer" they are accepted; however, if the individual is far off, they will not be accepted. As a result, Godfrey and Parker recognized that math or mathematical models/systematic thinking was at the core of engineering thinking. This notion is justified through the need to make sure that bridges are exact, and that there is "no non-sense" and nothing is "common sense." Hence, math or mathematical connections suggests power and knowledge in this context. When examining race and gender in engineering education these variables were considered a "constraint engineering solutions must work within" rather than a place for integration of alternative viewpoints.[2] In the end, engineers defined themselves as "can do" people, thus engineers respect other engineers and hold each other in esteem.

Consequently, difference among engineers is accepted conditionally as a whole. Remarking that it was not within the purpose of their study, Godfrey and Parker noted the lack of presence of women in engineering and their demarcation and treatment as different. They wrote, "Over a number of years it was observed that acceptance and respect for them appeared to be a slow and painful process…" these women did not embody the engineering way of thinking, doing, or being and thus "this accentuated their 'difference'."[2] In a world where more women are becoming CEO's and people are asked to negotiate difference, it is imperative that we explore response to difference in engineering education. Therefore, the purpose of this study is to explore engineering attitudes toward acceptance and appreciation of difference. In the following pages I will outline my methods and then explain the findings.

Methods

This project was born out of experiences in the on-going collaboration between the Colleges of Humanities and Engineering at a large western research institution. This collaborative program is designed to prepare engineering undergraduate students for the professional communication demands of their work in industry. Collaboration occurs in at least one required course for each engineering student from freshman to senior year. Communication and writing instructors are Ph.D. students from the College of Humanities. These graduate students provide communication instruction in the classroom, consult with students on their writing and speaking, and work with engineering faculty on assignment (re)design.

I worked with the Electrical and Computer Engineering (ECE) department. Electrical Engineering can be characterized as a hyper-masculine discipline, consisting of mostly male student and faculty bodies.[5] The ECE department at this university currently contains less than 10% female faculty members (three out of thirty-four) and similarly, less than 10% of the students are female, thus, making this context a exaggerated contradiction of masculine and feminine cultures for study. Over this specific year, I was the oral communication instructor for ECE students; my counterpart was a male writing instructor, and together we worked with a male engineering instructor. Each semester, I received about 25% of class instruction time, and worked with each student for 15-30 minutes for an individual presentation consultation.

Data Sources The data was derived from the regular class experience of being an instructor/student and thus according to the IRB criteria, the study was exempt. Data collection processes were within the parameters of an ordinary teaching day, making the interactions true to everyday experiences within this context. Over one year's time, data was collected in semester-by-semester student evaluations, daily teaching journals, email interactions, and daily interpersonal communication experiences. The end-of-semester evaluations are administered in-class and the focus of the evaluations is to gain understanding on how students perceived communication instruction/instructors. These questions were largely open-ended, requiring students to use their own discourse to describe their experiences/feelings. Both the teaching journals and email interactions are snapshots of teaching data in that they are student reactions throughout the semesters. In all, this data set yielded approximately 87 pages of single-spaced text, organized in columns by class, gender of instructor, and medium used (i.e., talk, email, or course evaluation). It is important to note that within the interaction experiences, comments received from the male instructors were documented in order to ensure that there was not a gendered bias from the author; rather that this was genuine data (this juxtaposition will be presented in within the results).

In all, the students collegiate-level demographic ranged from freshman to senior. I spent approximately fifteen to twenty hours of face-time a week with this demographic of students. Lecture time allowed students to witness either comparisons or contradictions in teaching styles with other instructors. Individual consultations, where I spent a majority of my instructing time, allowed for personalized conversations, meeting, and quality time with each student. On the other hand, the male communication instructor spent the same amount of lecture time (varied per week, approximately 3 hours a semester), and then an optional fifteen-minute writing

consultation per student. The male engineering professor did not engage in individual consultations and took the majority of the lecture time each week (1.25 hours).

Data Analysis I conducted a qualitative thematic analysis of the data. Information from end of semester evaluations, journal entries, and interactions were interpreted using grounded theory techniques.[13] To this end, the data was open-coded, and then constant comparative methods were used through an *en vivo* method of data interpretation. In other words, the data is made sense of and represented through the words of the participants. Themes were identified as patterns emerged within the discourse. In order to confirm coder reliability, another scholar performed a thematic analysis on about 25% of the data, and then helped with data interpretation of the remaining data.

Researcher Position The idea for this paper emerged out of a recognition that difference was not readily accepted within Electrical and Computer Engineering (ECE) classrooms. As a non-engineer, I was not only the other in discipline, but also the gendered other, and distinctly different from them (students and faculty alike). However, through two years of contact and collaboration, I noticed that while in the beginning students rejected my instruction, they began to try and negotiate my position within their educational lives as time went on. My purpose in responding to the call from Godfrey and Parker was to continue to explore negotiations of difference in the engineering classroom.[2] However, in this study, difference is marked as the presence of gender. Two important points of note: 1. My position and performance of female instructor embodies more feminine communication styles that align with my feminine performance informs the data. 2. Because of the plurality of language and multiplicity of positions, findings cannot be generalizable across all lived experiences by women.[14] Rather, the findings begin to illuminate the discursive responses to differences within this specific context. The following sections explore three themes of difference (deviation, devalued, and unsuitable fit) as they are related to the difference of gender, and these are followed by an identification of the implications of the data.

Difference as Deviation: *Not Masculine*

"Difference as deviation," acknowledges that masculine is the norm within engineering and any deviation is marked "different." This theme explains how engineering students and faculty alike respond to difference in the way that they try to protect what they know. They do this in two ways: a lack of naming or identification of the different other, and male instruction inserted into the different instruction. The examples provided here are anecdotes that come from my teaching journal that were completed following each class and meeting session.

First, through their discourse, engineering faculty and students responded to difference through an appearance of rejection of my presence with a lack of direct identification. Throughout my first semester within an engineering classroom, while in front of the students, the male engineering professor would address me as "her" or "she;" whereas, my male counterpart was consistently identified by name. For example, the professor would say to the other male communication instructor, "Can you tell *her* to [insert task]?" This communicative event assumes that difference is either not worthy of a name or just so uncomfortable that naming

becomes impossible. Consequently, through this act the object of difference is not invited into the conversation, making in this case, gender always the dissimilar variable.

The second example of how engineers attempt to negotiate difference is through the known voice, or male instructors knowledge insertion into lectures. Before lectures I was asked to provide all of my teaching notes and presentations so the male faculty member could approve them before delivery. On the other hand, the male writing instructor was never required to provide documentation of his competence or readiness before lectures. Additionally, each time I would lecture, my male co-instructors would interrupt my lectures restating information I had just presented, almost as a way of validating my content. Preceding one lecture during the semester, as we were walking to class, the engineering instructor claimed, "I was thinking, I know a lot about visual aids and teamwork, and so I will just give the lecture today." I was scheduled to instruct on this day, and then right before, he took the lecture time. Even though I have an advanced degree in the content area I was teaching, the practice of interrupting and being replaced was only made common during *my* lectures. In examining gender as the representation of difference, male or masculine representation is accepted, and female or feminine representation is spoken over in order to protect or illuminate the difference or undermine expertise from the other.

Difference as Devalued: *Female Stereotypes*

As difference literature suggests, difference is devalued though the use of female stereotypes, specifically in the workplace.[10] Stereotypes are generalizations or perceived characteristics that people ascribe to others in order to make sense of them and place them in a box. The gendered difference in the engineering classroom can be understood in two categories, either mother or seductress. In other words, a binary for performing gender presents itself, and neither is an acceptable difference presentation within this context.

The category of mother becomes the stereotypical caring role for females. Knowledge and competence become obsolete, in a sense that kindness and a level of compassion become the forefront of what is important. Even though gender is represented in an instructor, for some negotiations of difference, the female plays the role of mother.

In interpersonal interactions, the role of mother was apparent. During the first couple weeks of the semester students attempted to get to know me on a more personal level claiming, "you are nicer than the *girl* last semester" (noting that I replaced a female instructor who was more masculine in nature). Questions of nurture came in nearly everyday at the end of class. In three subsequent weeks one male student explained "I know what a chi-straightener is." Another student questioned, "can you help me out with marriage advice?" and "is your hair curled with at triple-barrel?" Clearly, these are questions and observations that attempt to get at a level of connection with the instructor. In these examples, the men in the classroom are using what knowledge they have about women in order to relate to difference in the room. They use knowledge from other sources, such as their wives or relationships in order to make a connection.

A demographic that cannot be excluded from the data is the few female students within the room and what their interactions were with difference. Even though the female body is something that they are able to understand in a general sense, within the engineering classroom, the body becomes a foreign object as they are usually interacting with male colleagues and faculty. One of the two female junior engineering students seemed to attempt to try to understand my presence through friendship. She would often comment on my clothes and shoes, asking where I purchased them. Another day she said, "Next semester, I am dyeing my hair brown, can you help me with my make-up?" This becomes a way again for difference to be negotiated. While seemingly accepting, none of these comments embark on knowledge, or intelligence of the instructor, rather just female stereotypes. Thus, devaluing the potential knowledge of the different body through an unknown way of negotiating.

Traditional feminist scholars contend that commonly male figures sexualize the female body in order to keep her in a box as an object and silent. In this sense, the female body is understood as different, and sexualizing becomes a way of identifying her body and placing her a stereotyped role. Mostly, throughout this section, I argue that the feminine is objectified, because it allows the masculine tradition to understand or contain (often unconsciously) what is not understood through the female form. In a way, devaluing the difference becomes a way controlling the unknown through an identification of stereotypes.

Media often sexualizes as a way of making women seem vulnerable, silly, and powerless. Consider female superheroes, their representation of difference is sexualized in a way of seeming to still represent the "damsel in distress." This stereotype can function in a similar fashion in the classroom; students sexualize teachers as a way of devaluing their authority. On an end-of-semester evaluation asking what was effective about the female instructor a student wrote, "My friend likes you, check yes or no if you like him." This student uses the check yes or no comment to revert back to days of note passing, and hair pulling on the playground. This nod to elementary ways demonstrates an attempt to infantilize the female body, suggesting an amount of intimidation and need to dethrone by the other sex. In this sense, only further justifying the choice of sexualizing the female, when the female body becomes only an object, if is conquerable, and no longer intimidating. Thus, the sexualization devalues the female body as a way of making sense of her difference.

Because I was female, students were more likely to view me as a friend, not a figure of authority. Bolder students chose to tell me things one would typically only tell to a romantic interest. For example, I was often asked for my phone number so that they could contact me after class hours. Also, one student of color asked if I liked "dark chocolate;" not initially understanding the sexual undertone, I replied "yes" and he smirked "so you want a piece? It's wrapped, I always wrap it up." Noting that the comments are inherently inappropriate, overtly sexual, and undermined my authority as an instructor, they are important to include because they help to highlight the larger implications of understanding negotiations of difference especially with consideration of gender. A few students claimed they only come to class because as they said "you are nice to look at and your curves inspire me. We don't get to see many beautiful, intelligent women here [engineering]." Played as a pick-up line, these students refer to and trivialize the presence of the other according to representations shown in media. Subsequently, other is powerless through difference because she is not who the students are used to seeing in the classroom.

Difference as Unsuitable Fit: *Gender in Jobs*

The final theme is the negotiation of difference in conjunction with the understanding of typical jobs requirements. In this setting, engineers are accustomed to seeing male faculty members as instructors (previously stated only 10% are female at this institution). As the discourse suggests, difference of gender in the role of instructor becomes an unsuitable fit. Successively, unprofessional interactions from students spoke to the assumption of an unsuitable fit. For example, within the same week there were email exchanges between a freshmen level engineering student, the engineering professor (male), and myself. When the male student emailed me, he student did not include a salutation, rather just demanded that he meet with me for a presentation consultation over a scheduled school break. I responded that I could not meet over the break. In return, the student emailed the male engineering faculty member, addressed him in a professional manner, thanked him for his time, and signed off in the email. This communicative moment suggests a suitable fit, or non-difference with occupation choice. When speaking with me, negotiation with difference is enacted and the student devalues the position held. Whereas, when the student corresponds with the engineering professor, he respects his position and grants him respect through the discursive structure produced. While this event may seem isolated, it is in fact one of many examples that highlight an apparent negotiation of difference regarding the gender of an instructor in an engineering classroom.

In another situation, at the beginning of a consultation with a sophomore, I asked the student if he had any questions I could answer before he began. He questioned, "What can *you* teach me?" After a few awkward moments, he presented with an error in his visual aid. At the conclusion of his presentation I simply stated that his circuit explanation was, in fact, inconsistent with his drawing. His engineering classmate confirmed that I was correct, and the student claimed, "Wow, you really are educated." From thereon, every time I interacted with this student he remarked about this meeting, as if it really was a shock that I understood what he was talking about. This moment of negotiation suggests that my gender is undoubtedly not what this student knows to be the norm in engineering. More specifically, the undeniable difference in gender, for the student, assumes that through his male-ness he should be more knowledgeable than the female communication instructor.

Similarly, another student challenged the presence of otherness. A junior engineering student who I met with weekly was upset with the amount of reading and writing that he was asked to complete for his technical writing engineering class. He stated that the communication instruction (feminine) was too much and that he did not have time to waste because his engineering (masculine) assignments were more important.[3] While there are two communication instructors in the class (one male, one female) and one male engineering professor, the email was sent solely to the female communication instructor. I responded in a way that suggested stereotypical masculine communication behaviors, devoid of emotional verbiage and presenting facts that would help this student in his academic endeavors. Moreover the response can be understood as a moment of attempting to make the dichotomy a both/and, representing a new performance of female instructor. To this, the student responded:

> Thank you for the update. On another, more important note, I want to take the opportunity to apologize to you for the tone of my most recent email. I could have said the same things I said in a different, more patient, less emotional way. I realize anyway that I was, if you'll please pardon the metaphor, shooting the messenger. You were just doing your job. I'm embarrassed that I let my emotions and frustrations, unrelated to the situation, get the best of me, and that I directed that frustration at you. I'm sorry. And, I hope you'll accept this apology.

Within this we see a step toward negotiating power roles and, inadvertently, difference. As students struggle to identify with or understand the other in the room, they barter with communication styles unsure of how to acknowledge the new body, but in the same breath protecting what they know. More specifically, a conflict exists within the dialogue of student/teacher because of the initial reaction to protect what they know. In other words, the female body as the other posts a contradiction to the norm, creating uncertainty. Thus, requiring that male engineering faculty and students (re)negotiate their roles in regard to a female body.

The final way in which difference is negotiated was through the end of the semester evaluations that asked questions about the male and female communication instructors. In a question asking students to identify effectiveness of the male instructor, students responded in a fashion that assumes consistent with "us" or as Godfrey and Parker would contend a minor variation from "being an engineer" which meant acceptance.[2] Students wrote, that the instructor was "knowledgeable," he made "very technical improvements," "very specific," he had "clear, effective comments on assignments," "he's technologically competent," and "he cut through the crap and said what needed to be done." Most of the comments suggested a level of technicality and competence most consistent with an appreciation of the masculine ideal.

On the other hand, the same group of students spoke of feminine ideals (or difference) for the female instructor, negating a chance at authority or power within the context of an engineering classroom. Students wrote: "good communicator," "very good info," "interesting to talk to," "criticism was positive," "gives great advice." To this end, both instructors held the same title, but the female instructor was praised for relatability, suggesting that an occupation of talking or advice giving is perhaps more appropriate than knowledgeable lecturer. To this end, talking or communication is deemed appropriate within certain interpersonal contexts (i.e., gives great advice); but as a person in charge of an engineering class, this trait was not desirable.

Discussion

As Godfrey and Parker found, engineers accept difference *conditionally*.[2] If the person has similar ways of being, thinking, or doing, they are accepted; however, if they are different, as this study suggests, difference is negotiated through struggle. In this turn, difference becomes negotiated and devalued moments. Specifically in this study, gender was examined as the vehicle representative difference. In all, I sought to better understand how engineers tried to make sense of difference and to what consequences.

First, I looked at the negotiation of difference as a deviation from the norm, and in this sense, the masculine. Students and faculty alike attempted to ignore or name the female body as a way of

negotiation with the unknown. Another strategy was to insert the male voice or perspective into the female instruction time as a way of over-coming difference. In the end, through the discourse we see that the initial negotiations have to do with protecting the known, or the masculine ways of doing, being, and thinking engineer.

Second, through the use of female stereotypes we see through the presence of gender that difference devalued. The two stereotypes represented through the data were mother and seductress. Mother suggested a caring role, not the assumption of knowledge that comes with the role of an instructor. The other was that of seductress, or better, a sex object. In order to devalue the difference in gender, the female instructor was reduced to a sexual trope, a mark that leaves here with little to no knowledge or position of power within the classroom. In sum, both stereotypes place difference second to what is known, masculine.

Third, through the student and faculty discourse, we see that they highlight difference, and gender assumes a suitable fit for the job at hand of either engineer or more specially instructor in engineering. The students discourse suggests a type of body they are comfortable representing instructor, and feminine-female while not out rightly rejected, it was not unquestionably accepted either. To this end, what is commonplace is comfortable, and thus what is accepted writ large. Another possibility however, is that there is a summative effect in that being a little different (i.e., from a different discipline) is acceptable as long as other attributes are similar (e.g., both males). Perhaps, it is only when the difference becomes magnified through the negotiation of more than one dimension that problems arise (as demonstrated through treatment of male versus female communication instructors).

Implications

Godfrey and Parker agree with the summative effect suggesting that minimal differences are typically ignored due to a desire to progress projects and desired outcomes.[2] In order to explore difference in the context of engineering the glaring variable of gender was explored, because as Hacker noted, engineering, and specifically ECE, is a masculine discipline.[11] Most important to this study is the connection of understanding negation of difference within multidisciplinary work or with instances that represent difference. Because engineers will be engaging in a global society, requiring them to work with different ideas and people, preparing them for this move is imperative in order to fully prepare them to be successful in the working world.

In other words, engineering students need to be educated about cultural and gender differences to a degree where they begin to appreciate the positive impact difference has on their education and future work. Thus, gender becomes a medium to begin to see the rejection of difference. As we see a rejection of gender difference as educators we are called to action in order to more adequately prepare students for their futures. In order to help students negotiate a world that is not within their norm, they must be presented with differences early on (and consistently, as one encounter will certainly not change their opinion/stance) in order to be successful in the workplace.

The most evident implication that comes from this study of gender as difference is the reality that broadly engineers participate in a "boys club." In this context language and actions preference the masculine, not thinking of consequences of gender. As we saw in the theme of stereotypes, sexualizing the instructor became a response from engineering students and faculty as a way of devaluing the female position. For example, if not directly objectified, the female body is or can be viewed in an animalistic sense. In other words one more object to be trivialized and conquered, or in this case devalued. To this end, attempting to compliment the instructor, a junior ECE student wrote, "I like her. Keep her and giver her a longer leash." Exemplifying the intrinsic tension in negotiating and responding to difference, and in the end placing her back into a sexualized role of animal through the visual of "leash." While not out rightly accepted, by not disciplining these actions and attitudes, we affirm that the "boys club" mentality is both appropriate and acceptable in the presence of women. However, this is problematic because if this behavior continues in the work place, the consequences will be more than an uncomfortable instructor, it could mean a sexual harassment charge or the loss of a job. Albeit, an extreme consequence, it is the reality of consequences currently created by engineering culture.

Recommendations for Instructors

As demonstrated through the data presented here, gender is one variable of difference that students must engage. As instructors in interdisciplinary programs, we must continue to encourage female participation in engineering classes and in engineering education. Through this the feminine body establishes ethos from continued presence and positive collaborative work within the College of Engineering. Clear communication and positive affirmations from male colleagues will being this process as difference in (re)integrated a new way. In turn, the female other will become a typical body in the engineering landscape. In addition, instructors can begin to ask that students attempt critical thinking, requiring them to see the world as systems working together rather than just one right or wrong answer. This effort creates more engaged citizens, and enhances negotiations and appreciation of difference.

Conclusion

In the end, multidisciplinary education is the perfect context to unpack engineering responses to difference. The typical engineer represents objective and masculine ways of knowing, being, and thinking.[2] Thus, when the opposite or variations of those characteristics are introduced into their culture, engineers must learn or figure out how to negotiate the difference. Through the data we say that difference was conditionally accepted, but not for the long term, meaning that the culture continues to (re)produce itself as it was. Allowing students/engineers to only understand, think, and learn under the guise of one-way of knowing is inherently problematic when they are sent into the workplace. This asks us, as educators, to think about how to continue to provide variables and moments of difference for more critical engagement and acceptance to create better and more well-rounded engineering thinkers.

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