The Gender Bias Dynamic Between Students and Female Faculty in the Engineering Classroom Through Autoethnography

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Abstract

In academia, many female faculty still face the challenges of socially constructed gender stereotypes and biases. One instance of such biases, whether deliberate or unconscious, includes women being held to a different and more rigorous standard by their students, colleagues, and senior administration compared with their male counterparts. As a result, feelings of imposter syndrome, being overworked, and not fitting in is all too common for female faculty to experience in today’s higher education settings. Does gender bias against female faculty by students, both male and female, also carry over into the classroom?

Faculty strive to create an inclusive, supportive, and stimulating learning environment where students are challenged in their problem-solving ability but also are comfortable to “fail” and learn from their mistakes. Thus, the interaction between the student and faculty is crucial to support the learning. Gender bias and stereotypes can hinder the instructor’s teaching ability and student’s ability to learn. Research has shown that female instructors tend to be judged more severely by their students. Students tend to request more special considerations and favor from a female instructor compared to a male one. This puts the instructor in a difficult situation which could lead to having a higher workload, lower course evaluations, and an emotional strain on their mental health. However, if the student-instructor interaction is cultivated to be more open, personable, and motivating it can improve the learning environment. Gaining the respect of the male students and developing a role model relationship with female students are positive examples of overcoming some of the gender bias challenges.

In this paper, three female engineering faculty will use autoethnography to explore their past and present teaching experiences. Using the current literature on gender bias in engineering and academia, the authors will identify the challenges they have faced and ways to improve the learning environment in engineering classrooms.
Introduction

As an engineering educator, the day to day classroom interactions with students can make the job rewarding. Through teaching, mentoring, and advising the students are learning and challenged to become the next generations of engineers. However, some of these interactions can become difficult when gender bias exists. Gender bias, as defined in this paper, is the unfair differences in the way a person is being treated because of their gender. This can be conscious or unconscious prejudice in thoughts and or actions.

Research suggests that gender bias in academia is not only a question of whether male and female professors are evaluated more or less favorably but that women are also judged on different criteria than their male counterparts [1, 2]. The authors in [1] argue that female faculty are evaluated differently in intelligence/competence and personality. In the engineering disciplines, female faculty members are still in the minority representing only 15% of the total faculty [3]. They commonly find themselves teaching courses where close to 80% or more of the students in the classroom are male [4].

Students are not intentionally dismissing or diminishing a female instructor’s contributions and potential but more unaware their implicit biases exist. The previous work done on gender bias in engineering programs has mainly been focused on student evaluations of teaching [5, 6]. Very little work exists on the interaction between the female faculty member and the students in and outside of the classroom. In this paper, we seek to understand and relate our own teaching experiences to the literature on gender bias through collective autoethnography.

Methods

Autoethnography is a qualitative research method that aims to improve sociological understanding through drawing on personal experiences with social phenomena [7, 8, 9]. It looks at what existing literature says about these topics and relates it to one’s personal experiences through rigorous self-reflection [10]. The researcher becomes the research subject. The process can be subjective and, as such, can only be properly experienced and understood by the self [7].

This study originated when an informal discussion between two of the co-authors occurred about the struggles female faculty face when teaching a predominantly male student population. Many of the experiences articulated were found to be similar to those of individuals facing gender bias. Published autoethnographies on female faculty in academia are limited [2, 11]. This research gathered autoethnographic stories from three female faculty members in engineering, the authors of this paper, who had also experienced gender bias in their teaching. This was then organized into a "collective autoethnography". The analysis and writing-up of the project were also completed by the authors. According to Ellis’s autoethnographic principles [8], stories are central to this paper. The literature presented and the emotions evoked after the stories are told is all done to change the understanding of what it means to be a female instructor in the engineering classroom.

The three authors of this paper are early-career faculty in small teaching-focused institutions. Two of the authors are faculty members at York College of Pennsylvania, a private four-year
college with an engineering student population of approximately 400 students. The other author is an instructor at Iron Range Engineering, a project-based learning program through Minnesota State University Mankato, that has approximately 50 third and fourth-year engineering students. One of the authors has five years of teaching experience while the other two authors have three years of experience.

One of the authors who is currently teaching at York College of Pennsylvania completed her higher education in Turkey and the United States. My teaching experiences started when I was studying for the University Entrance Exam in Turkey. Due to the highly competitive environment and the sheer number of students taking the exam, being admitted to one of the best universities in Turkey was not an easy task. As one of my teachers once told me “you know that you really learned the subject when you are able to teach it to others”, so my friends and I practiced teaching to each other. After a whole year of hard work and with a few good friends, I ranked in the top ten thousand students that took the exam that year. I was admitted to one of the best universities in Turkey to study a six-year Physics Education program including a year of English at a combined Bachelor’s and Master’s level. I finished the program with a Master’s degree in physics education a year early with plenty of experience in teaching physics at high schools. Shortly after graduation, I continued teaching physics at a private high school. I decided to further my education and I was admitted to the physics doctorate program in the United States. As a graduate student I taught various physics and science courses every semester including winter and summer sessions for more than five years, both as a laboratory and discussion session instructor.

When I teach, I think about my past experiences with all of my professors. Unfortunately, I cannot count many excellent teachers in my education but I learned a lot from the ones who had flaws. To be a good physics teacher it is not enough to possess the knowledge but have the ability to effectively transfer that knowledge to the students. When teaching introductory-level physics courses, I think it is very important to be able to stay at the same level as the students and be aware of different learning styles that students may have. I frequently think about my undergraduate years, especially the challenges I encountered, so I can be empathetic to my students.

Another co-author, also currently teaching at York College of Pennsylvania, completed her higher education at two public research universities in Canada. Growing up I always wanted to be a teacher. I spent many summers as a camp counselor or day camp leader working with children. During these work experiences, I would often find myself developing and teaching a variety of STEM-related activities which was enjoyable and rewarding. As I got older I wanted a career that would challenge my math and science abilities, so I decided to become an electrical engineer. Upon nearing the completion of my doctorate in electrical engineering, there were two main career paths: academia or industry. At the time I didn’t think I had the required skills to be an engineering professor as most of my university experiences were in technical research with limited teaching experience, but I still applied to positions in academia anyways. I came to realize that not all jobs in academia are the same. The institutions that I have worked for are strongly teaching-focused where the student comes first. Being an electrical engineer professor allows me to have a direct impact on the future of engineering through teaching and mentoring engineering students daily while tying in my technical interests in electrical engineering.
In my role as an engineering educator, my priority is to the students. I want to create an engaging and inclusive environment for the students to learn and be successful. I use many active and collaborative learning strategies, such as peer-to-peer learning and gamification tools, in the classroom to engage with them. This allows me to breakdown many of the abstract concepts of that can be hard to visualize in electrical engineering so that students can absorb the information I am trying to convey to them.

The final co-author currently teaches at the Iron Range Engineering program, where she also received her Bachelor’s degree. I work in academia because I like working with people and I hope to positively affect the engineers of our future. I have always been a "tomboy;" in other words, I generally like to do things that traditionally males prefer. Some examples of these activities are construction/building, working on cars, inventing mechanical things, and fixing things around the house. In much of my work experience, in automotive technology/auto shop/engineering/restaurant, I have had to work around mostly males. I learn to adapt quickly and I have never really felt a disparity in being a female working among males; I usually get along with everyone. I have talked with other females who have had negative experiences in working with males; I really can’t recall any. Because of this, I wondering I take a different view on gender issues? I don’t know and I am not sure why I have not experienced situations that some of my counterparts have.

My approach to classroom instruction is to pull as much from my industry experience as possible. Application is what I try to focus on. My hope is that I can get the students informed on what matters most. For example, rather than just having them understand how a multimeter works, I also want them to know how to use one and feel confident in using a multimeter. Another example is rather than having the students understand the Nyquist Sampling Theorem, I want them to understand why it matters in regards to cost, data storage, and data interpretation.

Each author developed their narrative in an attempt to answer the three questions below.

1. What do you believe are the gender biases and/or expectations of students?
2. As a result of these gender biases what has been your experience in the classroom?
3. What are your recommendations for reducing gender bias?

The limitations of this study are those common to qualitative research such as small sample size and the analysis of the findings being difficult as the responses were not standardized or systematic. To strive for consistency, the narratives focused on early-career female faculty interactions with students. The narratives also intentionally included specific aspects of the experiences so it could be compared and contrasted to find similarities and differences.

Findings

The stories that follow are narratives that illustrate the answers to the three questions posed in the Methods section. Each narrative is a recollection of the author’s experiences described without identifying information to maintain some of the author’s anonymity. Accompanying literature follows each of the narratives to contextualize the experiences presented.
One of the themes that emerged in this study is how students address faculty in an academic environment. It is not uncommon in higher education that students have the perception that male professors possess a Ph.D. degree but female ones may not.

As the lead instructor and the course coordinator, I oversee several male adjunct instructors for each course I teach. I develop all of the course materials and work with the adjunct instructors to ensure each section is teaching the same material at the same pace. Some of the other adjuncts will take on the secondary instructor role and help out during the in-class activities. The adjuncts all have a master’s degree and I have a Ph.D. One of the other instructors was confused as to why a student kept calling him "Doctor" while the same student was calling me "Ma’am". He had already told the class that he doesn’t hold a Ph.D. and calls himself a professor instead of a doctor. Honestly, I don’t care what they call me as long as they are respectful. Cases like this happen quite a lot but I try not to get affected negatively as it doesn’t matter what they think. On the other hand, of course, I worked hard to earn my Ph.D. title so I wish that I was given the respect I deserve.

In our engineering programs, we have many first-generation college students. Male students usually don’t see female professors as role models. They see us as their moms or big sisters who care and nurture them, not professionals. This could also be the reason a young female colleague of mine is repeatedly confused as the secretary by parents who visit our department although her name tag clearly says she is a professor with a Ph.D.

A similar sentiment was reiterated by another co-author.

I remember the first time this happened like it was yesterday. A student I was talking to was taken aback when I told them I had a doctorate. I don’t remember how we got on this conversation but I remember their response being "I knew you had a master’s degree but you seem young to already have your Ph.D." At the time when this incident occurred, I had just started a few months into my teaching career so I was relatively young, but couldn’t figure out why the student’s comment rubbed me the wrong way. Why was the student misinformed or had assumed less of my credentials? Maybe it was the more relaxed atmosphere of this engineering program where all the faculty were addressed by their first name by the students. However, since this initial incident, it has happened to me again in numerous situations. At my current engineering program, first-year students will rarely address me if at all with most common is calling me “Miss”. Third and fourth-year undergraduate students are more likely to be professional in addressing me as “Professor” or “Dr”. Is the difference due to more exposure to female faculty in the STEM fields throughout their years as an engineering student?

The situations expressed above are not at all uncommon in higher education institutions. In previous studies of gender bias in university settings, students were more likely to assume a male instructor holds a Ph.D. as compared with a female instructor [12]. Students were also more likely to refer to male instructors as “Doctor” or by their last name [13]. One reason for this bias, of women perceived as having a lower academic rank than men, is that academia is still primarily a male-dominated profession. There have been significant efforts over the last twenty years to making the faculty more diverse at universities and colleges. However, although women now hold 49% of total faculty positions only 38% are in tenured jobs [14]. Fewer than one in ten women faculty are full professors [14]. In universities and colleges of engineering in the US on average,
only 17.4% of tenure/tenure-track faculty are women [4].

This bias of assuming a female faculty does not have a Ph.D. can also be related to how competent a student perceives a faculty member to be. In a 2006 study completed by Schulze and Tomal on student perceptions of their professors, one-sixth of all respondents view male professors as more competent compared to female professors [15]. More specifically, 13% of male students and 18% of female students in the study viewed male professors as more competent [15]. Why is there a difference in the perception of competence? Higher education institutions hire faculty members who are competent regardless of gender so what indicators are students sending in the classroom that would lead students to view female professors as less competent?

Another all too common theme that emerged in the narratives was that female faculty are expected to be friendly and sympathetic.

During the semester I have students regularly show up to my office and/or email me to ask for help or to talk. As an educator, I am more than happy to help students in any way I can, but it gets to be exhausting. In addition to technical and academic advising questions, I tend to provide a lot more interpersonal support for both male and female students compared with my male colleagues. Some students will constantly complain about everything in the course and expect me to change things such as the grading policies to fulfill their every request. They expect the female faculty to be friendly and nurturing as opposed to firm and strict. I have heard of instances were male students, in particular, were hostile towards a female faculty member both in and out of the classroom and she ended leaving that engineering program. This is something I hope not to experience but the adjustment period for early-career female faculty seems to take much longer than a male faculty member. With age and experience, I have noticed the respect from students does go up for more seasoned female faculty members.

My interactions with female students, however, have been very positive. In the classroom, the female students warm up to me, and my teaching style more quickly. They are usually one of the first to answer or ask questions in class. In some interactions, outside of the classroom, I feel like I am acting as their part-time therapist. Since they are often lacking a role model in the engineering field I do try and provide the necessary support they need. It is time-consuming leaving me feeling tired at the end of each day but it is also rewarding as I get to know them on a personal level. They interact with me more as their friend and I listen while providing them constant reassurance that they are on the right track.

A co-author agreed that the caring nature of women is something students expect.

Some students see a female professor as someone who should give in more than a male professor. They expect more of you because they know you usually care more as it is in your nature. I make myself more inviting by encouraging them to come by as long as they see my door open even if it is not during my office hours. In class, I also talk about some of the mistakes I made and how I fixed them. I try to show them that I am not perfect either and making mistakes is fine as long as you try not to repeat them and learn from them. This allows them to see me more human that way and they can relate more. That removes the barrier between me and the student. I think that’s why they ask for help more from me than they do to a male professor. Every semester, I have several students coming to my office outside of my office hours to get help or just to talk to me about their struggles in life. It is all worth it when the student comes to your office at the end of the semester
to say “Thank you, I wouldn’t make it through the semester and would have dropped out of school if I didn’t have your support.”

Not just help though, there is also an expectation of you to be more lenient. It is more likely a student will ask for a raise in their test grade from a female professor than a male professor, again, because they know that you care and are nice. For example, when I co-teach my courses with several male adjunct professors if an assignment is graded by one of them, instead of taking it to the male instructor some prefer to check it with me to see if they could have granted more points. As the course coordinator, I provide the grading rubric to adjunct instructors and can tell if the grader was inconsistent. Unless there is a discrepancy in grading, the student doesn’t get any points back. At the same time, I do encourage them to talk to me if they see any discrepancies in grading probably more often than a male professor would do. This does add more to my workload. Once or twice I even regraded an entire assignment already graded by an adjunct because it wasn’t going to be fair to the students.

However, at the end of the day, I find myself worn out more than others because of the extra workloads I take on. Before starting this teaching job I never lost my voice in my life but now I usually lose it once or twice a year. I am always sick at the end of the semester due to over-exhaustion. Emotionally, I am worn out as well since being a mother comes with more expectations in the family as well. Although I have a very supportive husband who cares and helps a lot in the house, I feel bad that sometimes I don’t get to spend enough time with my son because of the work I bring home. It hurts even more when my son during his pre-kindergarten year had his teacher write a Mother’s Day note saying “My mom is usually too busy with work to play but I love her snuggles”. Cases like this make me admire females who take leadership roles as I know what they are sacrificing at home.

Many interesting points brought up in the narratives on a student’s expectations of a female faculty were consistent with the literature. Women are expected by students to be warm, compliant, and agreeable instead of cold and unapproachable [16, 17]. In a focus group on gender bias in academia [16], the female participants expressed being treated with less respect than their male faculty. They can be reluctant to say no when taking on additional responsibilities for fear of upsetting the balance between being accepted as a competent individual and judged as being too difficult [16]. Students will also challenge the female instructor’s authority [16]. One faculty noted she was the target of many arguments and at times aggressive “requests” for increases in grades [18, 19]. This was analogous to our own experiences. All of this extra work can leave the female faculty as worn out and emotionally drained at the end of the day [19].

In Mitchell and Martin’s paper [1], it found students require women to offer more interpersonal support than instructors who were men. Female instructors had more meetings with students outside of class hours but students were more likely to say female instructors were insufficiently available compared to male instructors [20]. This is not to say that male professors do not offer support to students but we found incidents like the ones mentioned above occur more frequently to females compared to our male colleagues. One encouraging result was some of the relationships developed with students were positive. In a study done by El-Alayli and her colleagues, female professors reported more acts of friendship from their students in [19]. This allows students to get to know the female faculty on a personal level hopefully reducing biases they had prior.
Student evaluations of teaching can be another indicator of gender bias. One co-author reflected on a few comments she had received on her evaluations.

A few years ago, I was accused of being too nice in the classroom. For two different semesters, I got course evaluation comments like “Have a backbone! Dr. X always seemed to take everything that someone said to heart.” and “I would suggest taking more control over the class, be mean to people. If the student is being disrespectful to you and talking when you’re explaining something get mad! Don’t let the class run you, it’s your class and you can’t let the idiots push you around. So just be more enforcing.” Note that out of two hundred students only two students wrote such comments so it is not common feedback but it exists. As the former commenter said I did take these comments to heart and it hurt. I criticized myself for not being “mean enough”! Even the thought of being mean made me uncomfortable. A classroom is a place I want every student to feel safe. I didn’t want any tension between me and my students as it would affect their learning as well as me negatively.

After teaching for almost 5 years now, recently some students in the course evaluations still say that I am nice but in a good way. “Everyone loves how nice X is as a teacher as she really cares for the class.” Another student also said “She is the perfect combination of strict and approachable. She does not allow goofing off in class which is a very good thing and she is the type of professor that I love talking to in the break and when I see her in the halls.” Like most women, I empathize a lot and know that most of the time the reason for a student not showing up or coming late to class has some underlying factor. Life is hard and I try to be understanding and give them the benefit of the doubt for the first incident. I think everyone deserves that. You never know the reason for being late for sure. It could be because the student works three jobs to pay off their tuition or they are trying to reduce the amount of medication because they are afraid of getting addicted to it.

Like most women, I try to be caring and prevent this from happening without creating more tension or being mean as some students expect me to be. That’s the behavior they see from their parents and/or male professors. Between parents, in general, a mother looks after her kids and constantly thinks about whether they are hungry, clean, healthy, etc. The father is the protective one who also “disciplines” his kids. Male professors are usually more authoritative or perceived stricter like the father role in a family. I overheard a conversation between a student and a male professor and felt bad for the student. I believe the student was asking for a few more hours of extension on an assignment and was listing the reasons for the delay in finishing the assignment. The professor was on the move while the student was talking and did not even stop to listen and instead simply said: “I don’t care”. The student was very disappointed, I think, more on not being heard than not getting the extension. If that was me I would at least listen to the student and even if I may not accept the assignment late I would give the student constructive feedback so they would understand the reason for me saying “no” to an extension. I think cases like this explain the expectation of a professor to be mean. I might also be the only female professor or amongst the few so they are comparing me mostly with the other male professors.

Although this is not the focus of this paper, it is worth noting there is extensive literature that studies the impact of gender bias on teaching evaluations [1, 6, 13, 17, 20, 21, 22, 23]. Some studies measured no differences or small differences in the student evaluation of teaching scores for female and male professors while other studies found that students rated female professors
lower than male professors [6]. These investigations do not control for differences in teaching styles and teaching effectiveness, making it difficult to determine the influence of gender bias. A few studies have controlled for differences in teaching effectiveness when exploring possible gender bias in the evaluations [6, 22]. Students who do not interact much with an instructor rely more heavily on stereotypes for judgment rather than relying on the instructor’s actual behavior [6]. However, due to the low percentage of women faculty in engineering, there are fewer opportunities for students to have personal experiences learning from a female instructor [6]. One study found that previous exposure to female instructors has been shown to reduce the bias in student evaluation of teaching [21].

As part of a larger study on the climate in the classroom [15], approximately 85% of both male and female respondents believed that male and female professors were treated with equal respect. Although this encouraging, the perceptions of the students may not always be the reality of the classroom environment. It is noted in the study that students who have faced gender and race differences may be more sensitive to minority treatment.

When going through the process of developing the narrative for this paper one co-author was unsure if what she had experienced was gender bias or adjusting to teaching as a new faculty member.

I cannot say that the following recalled event occurred because of gender bias, but it is an event that occurred to me, a woman instructor. The students had been assigned their grades for the course. One student stopped me in the hallway and asked how he could increase his grade. He had always had a 4.0 GPA, and he admitted it was silly, but he wanted to keep it. I told him if he added more to his final paper, it would help. I was then emailed by another student asking me how she could get a better grade. I thought this was strange that two students were asking for a grade increase. Before I could even come up with an answer, I received a third email asking for an increase in grade. This was enough to make me realize that they were trying to take advantage of me. I was still very new to teaching. I had five years of industry experience as an engineer and was teaching in a role similar to an adjunct. I felt very emotionally torn over how to proceed. I consulted other instructors. I researched the internet on what other instructors do for students asking for an increased grade. I thought for a long time about how I should react. Finally, I decided to write each of these students explaining that I would not change any of their grades and that I assigned each grade as fairly as I was able. Looking back, I still do not know why they asked me or why three of them from the same class. Would they have asked a male instructor the same question? I don’t know. Was it because I was new? I don’t know why. All I know is that it was a point at which I had to choose whether to increase my confidence or to stop teaching. It was a very difficult learning experience for me.

Not knowing if a situation is motivated by biases or something else makes it difficult to know how to handle it appropriately. As the co-author wrote it could have been because of a lack of confidence as a new faculty member. Most women are on their own in recognizing and dealing with gender bias. Being aware of what gender biases exist and proactively trying to prevent them from occurring will help ensure that every student learns and develops in a safe, inclusive environment.
Recommendations for Reducing Gender Bias

Gender bias is an issue that needs to be resolved in many directions simultaneously. The following are recommendations we developed to help combat the gender bias of female faculty.

In the classroom, we encourage female faculty to grow their confidence in their abilities to control the class. As the instructor, you have to be firm at the beginning of the semester in regards to expectations and stick to what you say the first time [18]. One co-author reflected: I used to not know how to handle students who were not paying attention in class. They would blatantly not pay attention. I would do my best to ignore it, but in the back of my mind, I thought I should do something about it. These students are paying to be here; it is my duty to help them learn and to motivate them. I tried to talk loudly, to bring attention to them, but I did not like the way I felt when I did that. Now I wonder if I am just sensitive and can sense their reactions to my actions? I would end up trying to talk louder so the other students could hear me. I later received feedback from the students that I should have told those students to stop talking as they were distracting the students who were trying to pay attention. Now I have more confidence, and I can confront a table of students who are not paying attention. For example, a table in the back was laughing when they should have been listening. I said, “what’s so funny back there?” They stopped laughing and redirected their attention to the class. I did not feel bad. I have also put a lot of effort into adding my own style to my classroom. For example, I post videos that the students have to watch before class. I sometimes sing songs to convey my ideas. Some of the students (not all) get a kick out of it. This has helped me to gain confidence in who I am. It also helps me to continue to add more of myself into the classroom.

Providing diversity workshops and training can raise awareness of existing gender biases not only for faculty but also in engaging with students about biases in the classroom [6]. Recognizing that biases exist and then being aware of one’s own biases leads to a greater understanding of ourselves and how these influence the way we learn and interact with others.

Finding a mentor or other supportive faculty members you can commiserate with also helps to alleviate some of the struggles than going through the biases faced alone. This can occur in a few different formats. One way is in small groups during regular faculty meetings. This allows for a safe space to bring up some of the struggles faculty encounter. Another way is by talking one-on-one with other faculty members. It is helpful for both the female faculty and others to see that some struggles are similar. A co-author mentioned: I am fortunate to work with very supportive colleagues. I have never really looked at these issues from the viewpoint of me being a woman; rather I have thought that it was because I am new to the world of teaching and perhaps having a lower self-confidence. Either way, I have had difficulties, and it has been very helpful to be able to talk about my troubles with other faculty.

As engineering educators, we can also minimize gender bias in the academic environment through student support groups or clubs. Acting as an advisor for a SWE (Society of Women in Engineering) student club allows female faculty another opportunity to form personable, genuine relationships with students. It provides a place for female faculty to discuss issues they faced during their engineering career while also being encouraged to continue in their journeys [18]. One co-author echoed: These initiatives are necessary to motivate the next generation of women to follow their dreams and make them feel like they belong and are supported in the field. Once
those female students have enough support from faculty and peers, they become confident and ask as role models to younger students during outreach activities and workshops. They also become more assertive in the classroom to ask questions or help out to a peer because they feel safer.

Student evaluations of teaching need to be revised as it does not take into account differing teaching styles or personality of the instructor. An evaluation based on teaching effectiveness regardless of style and personality might give a more accurate representation of what is going on in the classroom but how does it factor in gender bias? One study showed including a simple change in language to the student evaluations proved to be effective at reducing the bias against female professors [23]. However, the authors were unsure of how to effectively have widespread adoption of this change as the students and their biases might adjust to the new system and be less likely to notice the language and its effects would lessen [23].

At the university level, changes need to be made so more female faculty are in leadership roles. This can be in the form of department chairs, deans, or other senior administration roles. Current administrators need to be more open-minded towards females asking for those positions. They may not have “enough experience” because they are not offered enough opportunities to gain “enough experience”. Female faculty need to be encouraged to improve their leadership skills by attending training, workshops, conferences, etc.

Conclusions and Future Work

Autoethnographic narratives of three female faculty in engineering who have experienced gender bias have enabled this topic to be explored. The findings from this research are consistent with the large body of literature on gender bias in academia. The recommendations indicate the need for further research, support, and awareness for female faculty who face these biases.

The authors plan to continue their work on gender bias. The next steps include developing a survey to see how aware students are of their implicit biases. At York College of Pennsylvania, a workshop is now being held once a semester for second-year engineering students on diversity and inclusion in the workplace. A deeper and long-term assessment approach would reveal if this activity had a substantial effect on reducing biases students have.

There is still much to learn about female faculty in engineering, as there is about gender bias. The challenges that female faculty face in a male-dominated field is difficult, but with awareness and inclusion, it can improve the learning environment in engineering classrooms.

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