

Examining Gendered Experiences in Engineering Workshops

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Research Questions

What experiences are meaningful to the female students in these workshops?

In what ways are these workshops shifting or expanding female students' identification with STEM and engineering, both as an intellectual interest and as a potential career path?

These research questions came out of my experiences during the summer of 2017, where I was a summer intern at the Center for Engineering Education and Outreach (CEEEO) at Tufts. I had the opportunity to staff workshops for the CEEEO, that ranged in topic from robotics to superheroes, to coding. When staffing these workshops, I began to notice that not only were there many fewer female students than male, but also that the female students seemed to be having a much different experience than the male students. They often had never used the materials we brought in, enjoyed the artistic aspect of the project more than other parts of projects, and tended to want to work with only other girls. This sparked the idea that gender was having an impact on the young girls' experiences with engineering. This has been studied extensively at an undergraduate and professional level, when looking at differences in gender makeup of engineering majors, and motivations and career paths of different genders.

Methods

Ten interviews were conducted with young girls from three of the workshops over the summer that were organized by the Center for Engineering Education and Outreach (CEEEO) at Tufts. These workshops, Arts & Engineering, Girls Week, and Co-Ed Robotics, were chosen for their historical gender make-up, which held true for this summer. Each workshop had around 25 students, with ages ranging from 2nd grade to 7th. As far as it is known, there were no gender neutral or gender non-conforming students. Arts & Engineering had a roughly even split of male and female students. Co-Ed Robotics had only three girls enrolled. Girls Week, as the name would suggest, was an all girls workshop. Of the potential 36 participants across all three workshops, 10 participants gave consent to be interviewed after their workshop was over. All three girls from Co-Ed Robotics were interviewed, two of ten from Arts & Engineering, and five of twenty-three from Girls Week. No participant was in more than one of the workshops studied. For the purposes of this research, all participants have been given pseudonyms, and identifying information has been removed.

Semi-structured, qualitative interviews were conducted after students had completed the workshop, sometimes directly after the last session on Friday, and no longer than 2 weeks after their completion of the workshop. Interviews were transcribed and coded using NVivo, with a coding schema generated by the student researcher and their faculty mentor.

Girls Week	Grade
Stana	5th
Penny	2nd
Noe	2nd
Florencia	3rd
Beth	4th

Arts & Engineering	Grade
Claire	7th
Caroline	7th

Co-Ed Robotics	Grade
Sheerah	3rd
Lilly	5th
Kaya	4th

Preliminary Findings

Preliminary results show that these young girls viewed these engineering workshops as a social setting in a multitude of ways. Primarily, many viewed engineering as something that is social. Not only was engineering social in that it required interacting with other people, but it engineering was situated in a social world. "Engineers help people" was a common sentiment among female students. For many, the perceived social aspect of engineering was what drew them to the discipline. There are, however, a few interesting exceptions and notes. There were many girls who *did not* want to be engineers when they grew up. Among these girls, there were a few who wanted to be teachers, one wanted to be an artist, and a few simply didn't know. Among those who wanted to be engineers, some reported specific types of engineering, such as robotics engineering, and others simply wanted to be inventors.

Additionally, all of the girls interviewed, to some extent or another, were reflective on their place as young girls in engineering. As the students got older, they were able to utilize deeper levels of analysis, bringing in gender, inequality in society, and historical oppression of women into their analysis.

Career Choices

Engineering or Science	Non Engineering
"Doctor that improves Medicine"	Professional Hockey Player
An Engineer	Writer
An Inventor	Doctor
A Robotics Engineer	Part Farmer, Part Librarian
Science Teacher	An Artist
	Teacher
	Dancer

Note, some students gave more than one answer

"No, I want to work at a job with other people. Not just like sitting at a desk all day and doing work on a computer or something. I feel like I do want to be an engineer or something like that, or someone that helps the world. Stuff like that solves problems..."

Claire (Arts & Engineering), when asked what she wanted to be when she grew up



Credit to Jack Moreh on Joorn

Objectives

Engineering is a very male-dominated field, and although the motivations of female student, persistence in an engineering major, and entrance into an engineering career have been well documented and studied on an undergraduate level in engineering education, little attention has been paid to elementary engineering education, and virtually none from a sociological perspective. If so few women enter into an engineering major, then there must be something happening before they enter college. Gender is socialized from the moment we are born, and we are held accountable to performing our gender identity from that moment through the rest of our lives, and the students in my study are no different.

Their experience with engineering at a young age *will* be gendered, as all our experiences in our lives are gendered. It is *how* these young girls experience their gender in this context that is of importance.

It is important to acknowledge that comparing these young girls to the young boys in the workshops was *not* an objective. With this research I am not seeking to distinguish differences in experience, prove causation or correlation, or run an experiment. Instead, I seek to foreground the experiences of the young girls without comparison and without making claims about similarities and differences in their experiences as compared to male students.



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Future Paths

All results are preliminary, and further analysis is still required. These preliminary pieces of data only raise more questions. Does the student's awareness of engineering as a field with few women in it change how they view their place in engineering, or their potential future in engineering? Do these workshops change the way that they think about engineering, or how they see themselves as engineers? How does a student's ability to analyze the world around them critically change the way they view themselves in an engineering field? These questions and points of inquiry will continue to guide my research as it progresses.

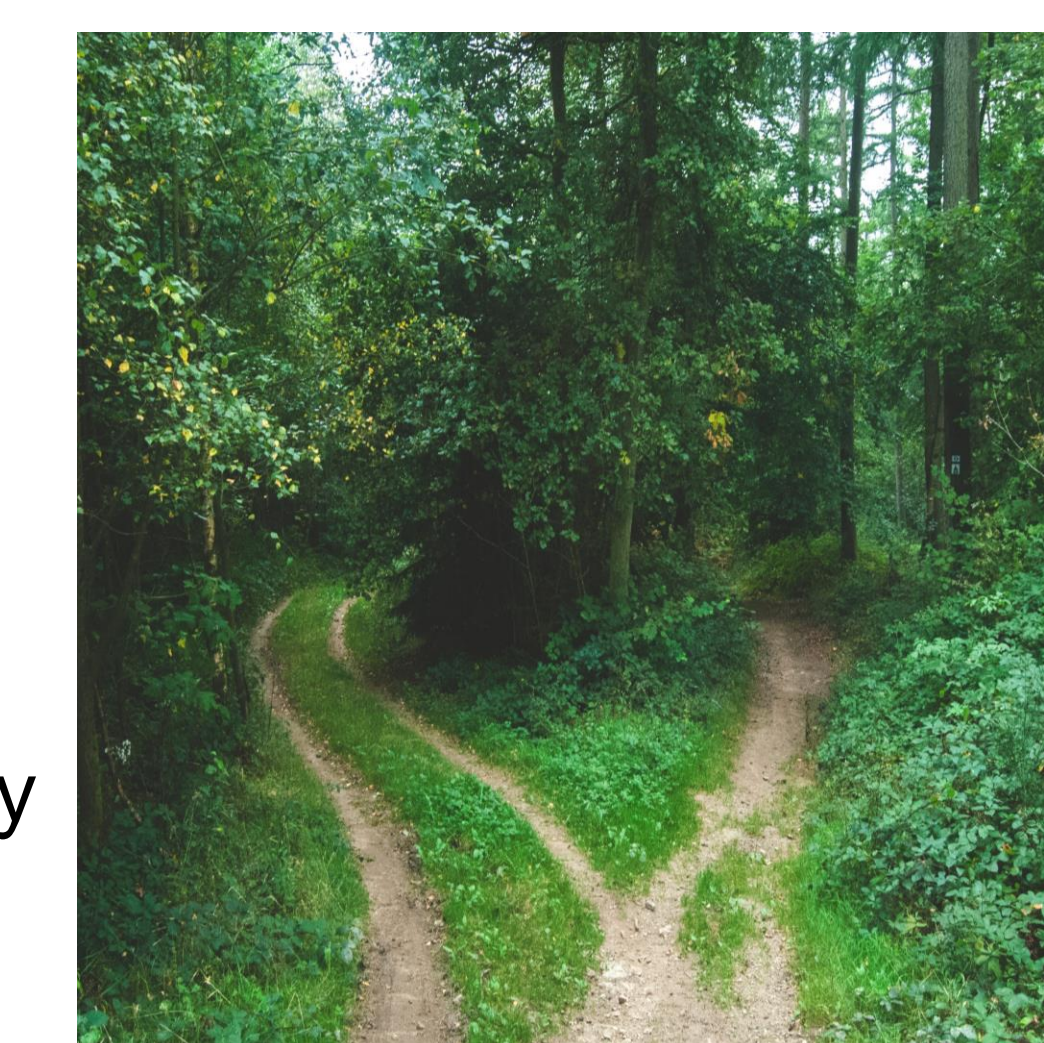


Photo by Jans Lelle

Acknowledgments: Dr. Kristen Wendell, Anne Moore, Summer Scholars, Dianne Brown, Lisa Moison

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