Excellence, Belonging, and the American Dream: An Auto-ethnography on Being International in Engineering

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Excellence, Belonging, and the American Dream: An Auto-ethnographic Reflection on Being International Women Engineers in the United States

Abstract

This research paper uses an auto-ethnographic approach to highlight experiences of women of color who are international in U.S. engineering workforce and classrooms. Three preliminary themes are highlighted in this paper. The first is the theme related to the notion of Excellence, and how the definitions of success for immigrating or international engineers may be tied to maintaining visa status. The second theme centers around the lack of Sense of Belonging expressed by participant-authors. The final theme was around Chasing the American Dream and the resultant sacrifices. We hope this paper not only provides an overview of some of the unique challenges faced by international women of color, but also drives more interest in better understanding this oft-overlooked group in engineering.

Introduction

> *"Intersectionality is a lens through which you can see where power comes and collides, where it interlocks and intersects. It's not simply that there's a race problem here, a gender problem here, and a class or LBGTQ problem there. Many times that framework erases what happens to people who are subject to all of these things"* - Kimberley Crenshaw [1]

Bi-directional ignorance of and lack of intentional training on working with people of different backgrounds, gross unfamiliarity of the historical contexts [2] and social hierarchy in the U.S. (e.g., one that uses racism and colorism to assign respectability), a hidden curriculum for women of color in engineering [3,4], coupled with the identity of being international, are compounding complexities international women of color in engineering deal with beyond the intense rigor of the field itself.

According to the American Immigration Council, non-US citizens made up 17% of the US workforce in 2019, a number consistently growing. In engineering, this percentage is much higher, with the number of non-U.S. citizens making up the workforce in 2020 being closer to 40%. Scholars posit that international STEM graduate students (particularly Asian) and their subsequent contributions to the U.S. workforce are vital to the growth of the U.S. economy and to our advancement in the sciences [5,6]. As our classrooms and workforce become more global, it is not enough to merely be accepting of individuals from diverse countries and backgrounds, but also important to educate oneself of their experiences, and prepare for a future work-force that may comprise more international engineers. Engineering educators are in a unique position to not only train the next generation of the engineering workforce in allyship, but also use research and data-informed insights to advocate for and recommend legislative reforms that may currently be holding back highly skilled individuals from contributing to the U.S. engineering economy.

Understanding the experiences of immigrating individuals in engineering is becoming increasingly relevant as scientists forecast a potential increase in migrants to the U.S. due to factors such as climate change resulting in global political instability and a substantial increase in number of refugees [7]. Downey et al. define global competency as the ability to work effectively with people who define problems differently than they do. This criterion is supported by three learning outcomes for students: 1) working with engineers and non-engineers from different countries, 2) understanding how cultural differences influence others' decision making, and 3) developing an ability to treat people from different cultural backgrounds with dignity and respect particularly relating to their intellectualism [8]. While sound on-paper, these objectives are often not implemented in practice.

Our auto-ethnographic research relies on grounded theory to unpack the experiences of six women of color, including, five international women engineering industry professionals in the United States and one domestic woman and ally in the engineering professoriate. In this paper we report

three broad and exploratory preliminary themes (related to Excellence, Sense of Belonging, and Chasing the American Dream) that have emerged from the initial phase of our study.

International Women of Color and the Workforce

Despite several calls to increase gender representation in the workforce, gender gaps, a lack of sense of belonging and disproportionality remain broad in the 21st century workforce [9]. A study in the Harvard Business Review traced experiences of 6500 business school alumni and found that inefficient workplace practices, cloaked as challenges faced by women in balancing work and family, may in fact be perpetuating gender disparities, ultimately leading to an inevitable stall in women's advancement at work [10]. These discrepancies are deepening the notion among women that they aren't welcome in the workforce nor belong.

Within engineering, Tonso highlighted the negative impacts on sense of belonging among women in the discipline that included, among others, a 'tacit tolerance of sexist behavior" [11]. In another study on engineers [12], Silbey, reported women describing the negative experiences faced within their teams where they were excluded from 'real' engineering tasks and relegated to menial tasks in projects. Added to this unwelcoming climate for women, are the additional barriers faced by individuals marginalized as a result of their migrant status and racial and national background. Despite increasing numbers of women born and raised outside the United States joining STEMM, there is relatively little known about how they are faring and the barriers they are facing in these fields [13,14].

Additionally, there was a gap identified in literature through a lack of auto-ethnographical investigations on the experiences of international women in engineering. In this work we wanted to help position participants to co-own the research process, identifying themes and connections, as well as draft the narrative to highlight the unique experiences of individuals who are international and practicing or studying engineering in the United States.

A Grounded Theory Approach to Auto-Ethnography

Auto-ethnography was found to be an appropriate strategy to use in this study because it provides the primary authors the opportunity to shift from being an outsider to an insider in the research, which further enables their voices to be better heard within the community, thus promoting convergence and inclusion [15],[16]). Creswell and Creswell describe autoethnography as a research methodology that analyzes a phenomenon through the use of self-narratives, which would otherwise remain "private or buried." [17] All authors, except the second author who is not an international woman engineer herself, used these prompts to reflect on their experiences, and over a few weeks generated several pages of documents individually.

The following prompts were collectively formulated by the group:

1. What led you to pursue engineering? Did you grow up with exposure to engineering in your family?

2. What led you to the United States? What were some of your preconceived notions about the country and being international in the U.S.? Were these true?

3. What was your perception of engineering as a career before you embarked on pursuing education and career opportunities in the United States? How have these perceptions changed over time? Have the changes been a result of your exposure to the United States?

4. What are some of the challenges of pursuing engineering education in engineering in the United States, as an international woman?

5. What are some of the challenges of pursuing a career as a professional engineer in the United States, as an international woman?

6. What recommendations do you have for engineering classrooms?

7. What recommendations do you have for engineering teams in industry?

8. What recommendations do you have for fellow international women engineers looking to pursue education or a career in the United States?

A grounded theory methodology [18,19] was applied to draw themes from the completed narratives thus allowing insights to be grounded in the experiences of the participants (e.g.,[20]). It was important for the researcher-participants to find a way to insert themselves and their emotions in this reflection.

Charmaz describes Grounded Theory as a constructive process for building theory about a phenomenon by systematically gathering and analyzing relevant theory [21]. Building theory was out of scope for this publication, and the preliminary results below only provide an overview of themes uncovered during analysis.

Preliminary Results

In our research we wanted to leverage the inductive research method afforded by grounded theory methodology to iteratively identify themes in the data beginning with open and theoretical coding and through using a constant comparative method.

Three main themes emerged from our research : (1) Excellence, (2)Belonging, and (3) The American Dream, that are elaborated upon below.

Excellence.

> *"As an international woman engineer, excellence is not an aspiration, it is the norm, and yet, often, not adequate to sustain oneself in the profession.* A *big challenge is the higher standards women have to live up to for the same job, same role as their male counterparts. If you are not exceptional there is no room for you, this message has been consistent throughout my career. Alas, doing more work doesn't necessarily mean that it is valued. Taking on more ends up being perceived as "secretarial" for women and "leader-like" for men."*

The first theme identified across the responses highlighted the notion of excellence. The author-participants expressed that the notion of mere excellence was not an option for them, and that there was a need to consistently prove oneself to be better than their peers. In addition, while classrooms emphasized excellence to be a function of grades and encouraged them to take on projects of interest, the job viability of those domains were seldom discussed. Thus, we found that there was a lack of clarity around excellence being insufficient to prepare one for a career in the engineering industry, especially if one wanted to pursue roles of their choice. For example, a co-author explained how her passion for the space industry needed to take a back-seat, until she attained her permanent residency, since most positions in the domain required at the very minimum, this extremely competitive bar for entry, which very few faculty had brought up during her classes. This reflection affords an opportunity for academia to bring up real-world examples of diversity and inclusion often sought by students (e.g.,[22, 23]), highlighting challenges faced by non-US citizens, in discussions in the engineering classrooms.

> *"I always wanted to work in the space industry however that wasn't a possibility for me straight out of graduate school. Something I found out the hard way and not in my engineering classrooms. For graduating international students, we need sponsorship for our work visas beyond the initial Optional Practical Training (OPT). OPT is renewable for up to 2 years, during which time the organization of employment has to apply for the work visa and only few companies qualify or are willing to sponsor. The process itself discourages potential employers, the alternative for graduating international students like myself was to have the highest levels of grades, publications, and other skills. My employer Intel supported by greencard application under the EB1 category which is reserved for only for individuals with "Extraordinary Ability". The bar is extremely high for the same position for an immigrant."*

Belonging

This second theme highlighted across reflections was around the concept of belonging. As mentioned in Sense of Belonging: A Vital Mental Health Concept, sense of belonging is "the experience of personal involvement in a system or environment so that individuals feel themselves to be an integral part of that system or environment" [24].

"I have heard at least most if not all my engineering female friends share that they feel they don't belong in engineering. This is more universal amongst women from all backgrounds. In fact I had a boss, a woman, who suggested I leave engineering and consider other careers. This is after I already had received my PhD and had a string of accomplishments, patents, and scientific publications to my name. Unwrapping all these challenges is a lot of mental energy too as one soon realizes. It is a struggle to drown those negative influences and continue to persist and pursue an engineering career for most women, especially international women thousands of miles away from home."

Author-participants also expressed frustration with stereotypes, experienced isolation due to their unique challenges, battled confusion at having to figure out cultural norms and expectations, and noticed a lack of visible role models with shared experiences, to draw inspiration from, especially in the formative years of their education. These frustrations and feelings of isolation led to a lack of sense of belonging, that they had to work harder to overcome.

"There are just a million stereotypes, and fitting in is an uphill battle to educate others on my background, and yet be unique enough to be my own person."

The American Dream

The third theme that emerged from a comparative analysis across responses was the ideal around the American Dream. Author-participants reflected how most of their thoughts, actions, and choices over the past years has been defined by finding success in the American. Dream, that the construct has become an integral part of their identities. For example, an author-participant reflected how losing her job due to lay-offs in the tech industry leaving her with only 60 days to find a new role or go back to her country made her anxious about starting afresh, even if it meant going back to the country she addressed as home.

"I have often felt my sense of self, my happiness, my self-worth, and my successes in my personal life, all tie back to whether or not I can keep up this American dream"

A sense of sacrifice while working towards realizing the American Dream was observed across all responses. While one of the author-participants who had to give up her career to accompany her partner, also an engineer, to the United States, reflects on sacrifices made to her career trajectory, another participant elaborated on missing out on home while in pursuit of a new identity.

"..dealing with visa restrictions is indeed one of the biggest challenges for immigrant women engineers like me, who come to this land as dependents. After getting married, I decided to join my husband here in the US and start my new phase in life. However, I wasn't prepared for the challenges that this decision might bring along. Despite having worked as a software engineer for a reputed company in India for a little over 6 years, I was bound to take a back seat in my career and pursue other prospects that life had to offer. As women, we often find ourselves juggling multiple responsibilities while making ends meet. Most often we find ourselves wearing various hats as managers, daughters,

wife, mother, friend and many more. I am at a place where now I am completely aware about the visa restrictions and how my career has been impacted by the governing rules. But I am still trying to make peace with this and find new ways to give meaning to my life. As a woman with ambitions, it took a toll on my emotional and mental health to give up my hard-earned established career and wait for things to eventually fall in place. I sometimes still find myself taking one day at a time and working forward."

"A huge physical, financial and emotional burden is one of uprooting from our country of origin to build a life in a country where we may not know anyone at all or understand the culture, and doing it all while being away from all our family, friends, and everything familiar. It is a huge shift for anyone to move halfway across the globe with two suitcases and begin a life, adjust culturally, emotionally, food wise while maintaining the highest bar of excellence in academics. In order to succeed, we must also miss on everything back home, including important milestones for the family members or the flexibility to reach your aging parents in their times of need."

Concluding Thoughts

This paper begins to uncover challenges, address biases, myths, and stereotypes, and advocate for intentional allyship working backwards from the experiences and needs of immigrating (and non-immigrating) foreign engineering students and professionals in the United States. . Research finds that foreign-born individuals of African descent who face the challenges of being both racially marginalized as well as international, are rarely emphasized [e.g.,14]. This research is limited to exploring experiences of upper-caste cis-women of south-east Asian (Indian) descent in engineering. Although the experiences captured here are important, it affords only a partial glimpse at experiences of women from the region, since it does not capture voices from communities marginalized in the Asian subcontinent. It is necessary to expand our understanding of women from other regions across the globe as well as study the disproportionate effects of the pandemic on international women students and immigrating engineers.

Through this paper we wish to urge engineers and engineering educators to show up as advocates for an important group of engineers in the United States contributing to innovations towards a global economy. Finally, we hope to spark dialog at the conference on this important topic, and spur advocacy and action towards bettering experiences of this underserved and oft-overlooked community.

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