

Outsiders: Pathways and Perspectives from Engineering Education PhDs Outside Academia

Dr. Meagan C Pollock, Engineer Inclusion

As an engineer turned educator, through her company, Engineer Inclusion, Dr. Meagan Pollock focuses on helping others intentionally engineer inclusion™ in education and the workforce.

Dr. Hoda Ehsan, The Hill School

Hoda is Chair for Engineering and Computer Science Department and the Director of Quadrivium Design and Engineering at The Hill School. She holds a Ph.D in Engineering Education from Purdue University, M.S. in Childhood Education from City University of New York, and B.S. in Mechanical Engineering from Bahonar University in Iran.

Dr. Sreyoshi Bhaduri, ThatStatsGirl

Dr. Sreyoshi Bhaduri is an Engineering Educator and People Research Scientist. She employs innovative and ethical mixed-methods research approaches to uncover insights about the 21st century workforce. Sreyoshi has a doctorate in Engineering Education, and Masters degrees in Applied Statistics (M.A.) and Mechanical Engineering (M.S.), from Virginia Tech. She earned her Bachelors degree in Mechatronics Engineering from Manipal University in India. Sreyoshi has been recognized as a Graduate Academy for Teaching Excellence (VTGrATE) Fellow, a Global Perspectives Program (GPP) Fellow, a Diversity scholar, and was inducted in the Bouchet Honor Society in 2017. Sreyoshi is passionate about improving belonging among women in Engineering. She serves as Senator at SWE (Society of Women Engineers) - the world's largest advocate and catalyst for change for women in engineering and technology with over 42,000 global members. She also champions and serves as advisor at Sisters in STEM - a not-for-profit led by school students, aimed at increasing interest, engagement, and allyship in STEM. Learn more about her work at - www.ThatStatsGirl.com. This work was carried out independent of author's current employment at Amazon. Views expressed in this paper are the author's own and do not represent those of the organization she works at.

Dr. Lauren Thomas Quigley, IBM Research

Lauren Thomas Quigley, PhD is a Research Scientist focused on the development of responsible and inclusive technology. Specifically, she researches practical approaches for fairness and inclusion in AI, data representation, and projecting technology's impact on society and the environment, through a lens of social justice. Her secondary area of research is the use of critical theories in engineering education.

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Engineering education doctoral programs have been predominantly academia-centric, strongly emphasizing research and teaching within university settings. However, the workforce needs of a globalized economy and students empowered by their agency to venture outside the traditional academic sphere into industry, entrepreneurship, consulting, and pre-college leadership, for example, have led to the emergence of varied and non-traditional career paths. These paths challenge the conventional norms and expectations of what it means to be an engineering educator.

Despite the gradual recognition and tokenized celebration of these diverse career paths, a significant gap exists in understanding the experiences of those pursuing them. The narratives of Ph.D. graduates in Engineering Education who choose non-academic careers are often overshadowed by the predominant focus on traditional academic roles and biased against them because of the oft-perceived bold choice to pursue their chosen trajectories. This oversight not only limits our understanding of the full spectrum of engineering education but also inadvertently perpetuates a culture that undervalues the contributions of non-academic professionals.

The experiences of these professionals are crucial in understanding the broader implications of diversity in engineering education. They offer unique insights into how engineering concepts can be applied in real-world settings, how educational practices can be adapted for various environments, and how diversity of thought and experience can enrich the field as a whole. Furthermore, their journeys can provide valuable lessons for current and future PhD students in engineering education, illuminating the vast possibilities beyond the academic realm.

This article seeks to bridge this gap by presenting a collaborative auto-ethnographic exploration of the lived experiences of Ph.D. graduates in Engineering Education who have embraced non-academic career paths. Doing so aims to shed light on these professionals' diverse motivations, challenges, and successes, offering a more holistic view of what it means to be an engineering educator in today's rapidly evolving world.

In the following sections, we frame the paper like a panel conversation, detail the written responses, summarize key takeaways, and provide actionable recommendations for creating a more equitable and inclusive environment for all types of engineering educators. This work is not just an academic exercise but a call to action for institutions, organizations, and individuals to rethink and expand their perspectives on the roles and contributions of engineering educators in a diverse and global society

Methodology

Our study is grounded in a collaborative autoethnographic approach, blending qualitative elements of autobiography and ethnography with a focus on collective narrative. Creswell and

Creswell (2017) describe autoethnography as a research methodology that analyzes a phenomenon through the use of self-narratives, which would otherwise remain “private or buried.” By analyzing personal experiences within a cultural context, autoethnography offers a deeply introspective lens through which we can understand broader social phenomena. Inspired by the work of Guyotte & Sochacka (2016) and Blalock & Akehi (2017), we expand upon traditional autoethnography and emphasize the synergistic effects of our diverse backgrounds, academic and non-academic training, and worldviews. Collaborative autoethnography enhances the trustworthiness and transparency of our research, providing a comprehensive and inclusive perspective on the experiences of non-academic engineering educators.

Collaborative autoethnography is effective for three reasons: 1) Personal and Contextual Insights: This method enables authors, as research subjects, to draw upon their experiences, offering a nuanced understanding of the interplay between individual journeys and the broader engineering education landscape. 2) Empowering Marginalized Voices: Traditional methodologies often overlook the subtleties of non-academic paths. Our approach brings these narratives to the forefront, contributing to a richer understanding of engineering education careers. 3) Enhancing Empathy and Understanding: The shared narratives in our study challenge preconceived notions about non-academic career paths, fostering empathy and a more holistic view of the field. The primary strength of collaborative autoethnography is that it delves deeply into personal experiences, effectively capturing the nuances of non-traditional career paths in engineering education. Stories matter. People’s experiences matter. However, the introspective nature of our methodology introduces subjectivity and potential biases. While providing rich, personal insights, it may not capture broader statistical trends. Nonetheless, our stories are our own, and each story matters. We hope the readers activate empathy and seek to understand our experiences as representative of a broader group not captured in this paper.

In summary, our collaborative autoethnographic approach offers a unique lens through which to explore and understand the diverse experiences of PhD graduates in Engineering Education outside academia. By intertwining individual stories within a collective framework, we aim to illuminate the multifaceted nature of career paths in this field.

Author Team Formation & Paper Style

The team of authors was formed through a shared interest in exploring life as engineering educators outside academia. The call for collaboration was extended via LinkedIn, which yielded a diverse group of participants, though perhaps not uncoincidentally – all women. Our team, initially intended as a panel for the ASEE 2023 conference, evolved into this collaborative paper after the panel's rejection, emphasizing the importance and relevance of our stories in the broader discourse of engineering education.

Thus for the paper, each author was invited to respond to a set of six questions crafted by the lead author, reflecting on their individual journeys outside academia. This panel-style approach allowed for both personal reflection and collective synthesis of experiences. It provides a comprehensive overview of the diverse paths and challenges encountered by non-academic

engineering educators, contributing to a richer understanding of the field. Our synthesis aims to capture the essence of our collective experiences and insights, contributing significantly to the discourse on non-traditional career paths in engineering education.

Questions

1. Describe your journey to forging a career path outside academia. How did your degree prepare you for your path, why did you choose it, and, in general, what was it like to forge a nontraditional path? Consider sharing role models, supporters, and naysayers, too.
2. Why do you choose to be a member of ASEE, and describe how you've served the organization and engineering education community over the years?
3. What has your experience been like in ASEE as a non-academic? Where do you feel like you belong? When/where do you feel like you don't, or perhaps that others don't feel like you belong? What are some of the specific barriers you've faced that make you feel marginalized in a community that "built you?"
4. Why are non-academic engineering educators an asset to ASEE?
5. What might ASEE look and feel like if it were more inclusive of non-academic engineering educators?
6. How can we shift the normative expectations and co-create a culture and climate that stewards more professionals to consider a multitude of modalities for service to the field? What are your suggested actionable recommendations for providing equitable and inclusive educational and organizational environments for all types of engineering educators?

Positionality

As authors of this paper, we acknowledge the influence of our positionality (Secules, 2021), experiences, and expertise, including but not limited to our academic backgrounds, life experiences, non-academic and academic training, and worldviews, which influence the shared stories and the synthesis of this research. To enhance transparency of this collective effort, we summarize our race, gender, graduation year, and institution in the table in Appendix A and elaborate in the personal narratives in Appendix B.

Summary of Author Responses to Questions

In consideration of the constraints imposed by the conference paper page count (a limit of 10 pages for the division), we have relocated the comprehensive narratives of our contributing authors to the appendix. The ensuing section distills their responses, accentuated with select quotations that encapsulate the essence of their experiences. *For a deeper appreciation of their journeys, we invite you to explore their complete narratives in the appendix.*

QUESTION 1: Describe your journey to forging a career path outside academia. How did your degree prepare you for your path, why did you choose it, and, in general, what was it like to forge a nontraditional path? Consider sharing role models, supporters, and naysayers, too.

In this section, we explore the diverse journeys of five PhD graduates in Engineering Education who have forged nontraditional career paths as they respond to our first question. Their narratives collectively paint a vivid tapestry of challenges, innovations, and resilience. From Meagan Pollock's shift from the semiconductor industry to establishing a consultancy focused on inclusive engineering environments to Hoda Ehsan grappling with an identity crisis and societal expectations when diverging from academia. Sreyoshi Bhaduri's career as a Research Scientist in the tech industry underscores the versatile application of their academic skills, while Katie Nelson navigates a fulfilling role in corporate learning at Capital One. Lauren Quigley's transition to system-level STEM education, despite institutional barriers, highlights their dedication to effecting broad educational change. Each story is a unique testament to the dynamic, often complex journey of embracing non-academic roles, underscoring the importance of adaptability, mentorship, and the personal determination these educators embody. The full details of their inspiring stories are in the appendix, offering an in-depth look into their experiences and the profound insights they share.

Meagan Pollock: "I wanted to help create environments where everyone felt valued, included, affirmed, and able to reach their fullest potential. The freedom of consulting was intoxicating... I wanted to forge my path outside the traditional expectations."

Hoda Ehsan: "I went through an identity crisis, felt lost and had the fear of losing my community and network. Despite discouraging comments, my determination to carve a unique and appealing path in K-12 settings was unwavering."

Sreyoshi Bhaduri: "It is the 21st century and it is essential that we think beyond binaries, broadening the definitions of what constitutes typical or expected. My career in the tech industry is a testament to the versatile application of academic skills in real-world settings."

Katie Nelson: "Capital One's 'Tech College' represented a convergence of my expertise and the opportunity to impact learning in the corporate sector, illustrating the richness of paths available beyond academia."

Lauren Quigley: "Despite institutional barriers, my transition to system-level STEM education highlights the importance of resilience and adaptability. I remember my experiences and learnings... applying Black feminist and womanist theory held me through to graduation."

QUESTION 2: Why do you choose to be a member of ASEE, and describe how you've served the organization and engineering education community over the years?

In response to the question regarding their membership and contribution to the American Society for Engineering Education (ASEE), the Authors share a range of experiences and motivations. Meagan Pollock recounts joining ASEE as a natural step in their doctoral journey, eventually becoming deeply involved in leadership roles, including a significant position on the Commission for Diversity, Equity, and Inclusion. Their journey within ASEE illustrates a progression from membership to active contribution and leadership, despite feeling distanced from academia. Hoda Ehsan maintains their ASEE membership since their PhD days, highlighting their ongoing commitment and current aspirations for an executive board position. Sreyoshi Bhaduri describes their ASEE involvement as a homecoming experience, a platform for global collaboration and a bridge between academic research and industry applications. This engagement has evolved over the years, reflecting a shift from an observer to an active participant in engineering education scholarship. Katie Nelson emphasizes the networking and learning opportunities ASEE provided, particularly in establishing their identity within the engineering education community, leading divisions, and receiving recognition for their contributions. Lauren Quigley discusses their journey with ASEE as central to their professional identity, detailing active participation in student-led initiatives and ongoing contributions even after graduation. Collectively, their stories (in the appendix) highlight a shared belief in the value of ASEE for professional development, networking, and contributing to the broader field of engineering education while also acknowledging the challenges and changes in engagement as they navigated non-academic careers.

Meagan Pollock: "I've been an active member since [2009], involved in leadership and deeply engaged in the community. My journey from joining ASEE as a PhD student to leading a significant committee underscores the evolution of my engagement, reflecting a commitment to diversity, equity, and inclusion."

Hoda Ehsan: "Keeping my membership and involvement since my PhD days highlights my ongoing commitment. Running for an executive board position this year marks a milestone in my engagement with ASEE."

Sreyoshi Bhaduri: "Attending ASEE feels like homecoming. My service has evolved from being an observer to an active participant, contributing to the scholarship in the field and fostering global collaboration."

Katie Nelson: "Joining ASEE provided networking and learning opportunities that were crucial in establishing my identity within the engineering education community and leading divisions."

Lauren Quigley: "ASEE has been central to my professional identity, from student-led initiatives to ongoing contributions after graduation. My engagement in ASEE underscores the importance of maintaining connection and contributing to the field."

QUESTION 3: What has your experience been like in ASEE as a non-academic? Where do you feel like you belong? When/where do you feel like you don't, or perhaps that others don't feel like you belong? What are some of the specific barriers you've faced that make you feel marginalized in a community that "built you?"

In response to the third question about their experiences in ASEE as non-academic members, the Authors provide insights into the complexities and nuances of belonging within a predominantly academic community. Meagan Pollock articulates the challenge of feeling marginalized, emphasizing the need for structural belonging over forced adaptation. Their experience reflects a broader issue of non-academics striving for recognition and inclusion in a community that often appears to be tailored for traditional academic paths. Hoda Ehsan shares a sense of surprise and occasional discouragement encountered at ASEE meetings, highlighting a prevailing perception within the organization that values traditional research roles over others. Despite these challenges, Hoda Ehsan finds solace and support in the Pre-college Division.

Sreyoshi Bhaduri observes a gradual shift within the ASEE community towards more acceptance of non-traditional career paths, although noting an existing hierarchy that undervalues industry roles compared to academic positions. This Author feels that ASEE could better leverage the expertise of non-academic educators. Katie Nelson, who has been disengaged from ASEE since leaving academia, expresses a hope that participation in this article might reignite their involvement. Lauren Quigley discusses the challenges of engaging in ASEE as a non-faculty member, particularly in leadership roles, and describes a more selective involvement since moving to industry.

Collectively, their full responses (see appendix) paint a picture of a professional community that is slowly evolving but still often centers around traditional academic roles. The Authors' experiences underscore the importance of recognizing and valuing diverse career paths in engineering education and fostering a more inclusive environment within ASEE.

Meagan Pollock: "My work focuses on recognizing the difference between structural belonging and forced belonging... We aren't failed engineering educators because we didn't choose a path to faculty. It's time ASEE recognizes that in all its systems and structures."

Hoda Ehsan: "I was very surprised to see how curious ASEE members were to learn about my current role... Research is perceived as the most valuable practice/aspect of ASEE, and people who are not in research positions are often perceived as having a 'less important/valued' job."

Sreyoshi Bhaduri: "Increasingly, I have noticed the community becoming more receptive to non-tenure track, even non-academic career pathways... I think the community could do a much better job drawing from the expertise of non-academic engineering educators."

Katie Nelson: "I have not been involved in ASEE since I left academia. I am hoping that by serving on this panel I can get involved again."

Lauren Quigley: "While I was doing research related work in professional staff academic roles, my experience did not feel any different, but...if I wanted to do more...it would be an uphill battle as a non-faculty member."

QUESTION 4: Why are non-academic engineering educators an asset to ASEE?

In response to the question about the value of non-academic engineering educators in ASEE, the Authors offer insightful perspectives on the diverse contributions these professionals bring to the field. Meagan Pollock emphasizes the importance of including voices outside the standard mold of engineering educators, highlighting that many members, such as engineering communicators and social scientists, feel like outsiders despite their valuable contributions. This diversity enriches the community with a range of experiences and expertise, crucial for tackling the broad challenges of engineering education.

Hoda Ehsan points out the significance of diversity in roles, bringing different perspectives to the table. They underscore the importance of translating academic research into practice, especially in K-12 settings, and the unique insights non-academic roles provide in understanding and addressing real-world educational challenges.

Sreyoshi Bhaduri advocates for recognizing non-academic engineering educators as assets, particularly for their potential to bridge the gap between research and practice. They argue that engineering education does not stop at the classroom door and that learning continues in the workplace, a domain where non-academics can offer invaluable insights and contributions.

Katie Nelson suggests that showcasing the variety of non-academic paths in engineering education can inspire students and ASEE members to explore new opportunities and broaden their understanding of the field.

Finally, Lauren Quigley discusses their experience designing and implementing lifelong learning experiences, highlighting the limitations of traditional academic environments in keeping pace with technological advancements. They critique ASEE's focus on traditional academia, arguing for the need to value and integrate the contributions of those working outside of it, especially in today's fast-evolving educational landscape.

Together, the author responses (see appendix) underline the crucial role of non-academic engineering educators in enriching ASEE and the broader field. Their diverse experiences, innovative approaches to education, and ability to connect research with real-world applications are pivotal in expanding the scope and impact of engineering education.

Meagan Pollock: "We need all types of voices and ideas present to solve our challenges... trained engineering educators who pursue pathways alternative to faculty also add value to the community."

Hoda Ehsan: "Diversity of positions brings in different perspectives... I see roles like mine who can translate [research] into practice and have a broader impact on the communities."

Sreyoshi Bhaduri: "Non-academic engineering educators... can help close the research to practice cycle, but can also conduct their own research to help advance knowledge."

Katie Nelson: "Giving students and ASEE members alike the opportunity to see these paths will open the door for them to try something new."

Lauren Quigley: "Working outside of academia... I have designed and implemented the kinds of lifelong learning experiences... This inattention to scale by ASEE... is simply stunning."

QUESTION 5: What might ASEE look and feel like if it were more inclusive of non-academic engineering educators?

In envisioning a more inclusive American Society for Engineering Education (ASEE) that embraces non-academic engineering educators, the Authors offer diverse perspectives on how this could transform the organization.

Meagan Pollock emphasizes the importance of bridging the gap between research and practice, suggesting that ASEE should evolve into an organization where practitioners, who may also be researchers, use their knowledge to advance practical applications. They highlight the joy and value in turning research into practice, especially in areas of diversity, equity, and inclusion. An inclusive ASEE would mean feeling valued and affirmed for their contributions, fostering mutual learning between academics and non-academics.

Sreyoshi Bhaduri anticipates increased collaboration and research, potentially leading to more funding opportunities. They envision an ASEE that appeals to a broader range of professionals, such as behavioral economists or industrial-organizational psychologists, who could gain valuable insights into engineering education. This expansion of scope could enhance the understanding of how engineers learn, what motivates them, and why they persist in their fields.

Katie Nelson sees a more inclusive ASEE as fostering vibrant connections between academia and business. This inclusivity would make the organization more innovative, merging diverse expertise and perspectives to address emerging issues in engineering education effectively.

Lauren Quigley predicts that a more inclusive ASEE would lead to greater innovation and impact, reflecting the diversity of the US and global population. They envision conferences and events drawing wider engagement, including from non-engineering sectors. This approach would not only bring the broader impacts of research into reality but also enhance engagement from government, business, industry, and other sectors, contributing to the growth of engineering education as an interdisciplinary field and improving the organization's financial stability.

In summary, a more inclusive ASEE, as envisioned by the Authors, would be a dynamic, interdisciplinary community where the contributions of non-academic educators are not only recognized but also integral to the organization's evolution. This change would lead to more practical applications of research, greater diversity in perspectives and expertise, and a more profound impact on the engineering education landscape.

Meagan Pollock: "We should be an organization of practitioners who might also do other things like research... One of my greatest joys is turning research into practice... If ASEE were more inclusive... I would feel more valued, included, and affirmed for my contributions."

Sreyoshi Bhaduri: "I'd expect to see increased collaboration, more research, potentially more money/funding... behavioral economists or IO Psychologists... could benefit heavily from learning about the peculiarities of how engineers learn, what motivates them, how and why they persist."

Katie Nelson: "It would create a more vibrant connection between academia and business... It will look more innovative and create a space that can merge expertise and different points of view to continue to tackle emerging issues in engineering education."

Lauren Quigley: "If ASEE were more inclusive... the organization would be a space of greater innovation and impact... Conferences and events would be well attended and draw local engagement... The broader impacts of research would become reality, not just an aspirational statement for a grant."

QUESTION 6: How can we shift the normative expectations and co-create a culture and climate that stewards more professionals to consider a multitude of modalities for service to the field? What are your suggested actionable recommendations for providing equitable and inclusive educational and organizational environments for all types of engineering educators?

In addressing how to shift normative expectations and foster a culture that encourages a variety of career paths in engineering education, the Authors provide actionable recommendations for creating more inclusive and equitable environments within the American Society for Engineering Education (ASEE).

Meagan Pollock suggests reevaluating the fundamental questions of who gets to be an engineer, an educator, and specifically, an engineering educator. They emphasize the need for ASEE to be less elitist and more culturally responsive, advocating for a shift from gatekeeping to stewardship. This approach would involve valuing diverse ways of knowing and doing, ensuring all voices are heard, and adopting a more inclusive and affirmative policy-making approach. They propose introspective exercises for ASEE members to reflect on their roles in either upholding barriers or fostering a welcoming community.

Sreyoshi Bhaduri recommends increasing dialogue between non-academic and academic engineering educators. They suggest integrating "un-conferencing" sessions at ASEE conferences to highlight diverse career paths and facilitate networking opportunities. This approach aims to break down the binary perception of career trajectories, emphasizing the value of diverse professional experiences.

Katie Nelson focuses on initiating conversations and building networks that bridge the gap between academia and non-academic fields. They advocate for reducing the emphasis on traditional academic paths post-graduation and encourage student organizations and non-academics to engage more actively in various ASEE divisions. This approach is geared towards creating a broader understanding of the engineering education field and its potential career paths.

These recommendations collectively point towards a more inclusive and diverse ASEE, where different career paths are not only acknowledged but also celebrated. By fostering dialogue, breaking down elitist barriers, and encouraging diverse participation, ASEE can create a more equitable environment that reflects the varied ways individuals contribute to the field of engineering education.

Meagan Pollock: "One of the first classes...posed three questions: (1) who gets to be an engineer? (2) who gets to be an educator? and (3) who gets to be an engineering educator?... It requires humble accountability, openness to listen, and active effort to change... If ASEE were more inclusive... it would be less elitist... We would be more culturally responsive... We would adhere to an asset mindset... Ultimately, each person can ask themselves, 'am I being a gatekeeper or a steward?'"

Sreyoshi Bhaduri: "I'd recommend increased dialogue between engineering educators in non-academic careers and their academic counterparts... Un-conferencing sessions could also be intentionally woven into the conference, highlighting speakers from different backgrounds... making career trajectory options seem binary is an unnecessary and inaccurate practice that this community can help address."

Katie Nelson: "I think it starts with beginning the dialogue - and allowing natural collaborations and networks to build... It requires less of an emphasis in academia on academic paths for graduate students... Engaging student organizations early and often, as well as encouraging non-academics to join numerous ASEE divisions and share the message more broadly."

Takeaways & Recommendations

Based on the collective insights gathered from the Authors' responses to all six questions, the top takeaways and recommendations can be summarized as follows:

Valuing Diverse Career Paths: It is crucial to acknowledge and value the diverse career trajectories of PhD graduates in Engineering Education. Their experiences in non-academic roles—spanning industry, entrepreneurship, consulting, and pre-college leadership—offer invaluable perspectives that are often under-recognized in traditional academic settings (Guerin, 2020).

Bridging the Gap Between Research and Practice: Non-academic engineering educators play a vital role in translating research into practical applications. This bridging of the gap is essential

for the advancement of engineering education, making the field more relevant and responsive to real-world needs (Litzinger, 2015).

Encouraging Inclusive Community Engagement: Professional societies like ASEE should foster an environment that is inclusive of non-academic perspectives. This involves creating platforms for these educators to share their experiences, contribute to policy-making, and engage in leadership roles within the organization (WEPAN, 2020).

Promoting Equity and Inclusivity: Addressing the culture of elitism and hierarchical barriers in engineering education is necessary. ASEE and similar bodies should actively work to dismantle these barriers, promote diversity, equity, and inclusion, and create a culture where all forms of contribution are valued equally.

Facilitating Networking and Dialogue: Encouraging dialogue and networking opportunities between academic and non-academic educators can lead to a richer, more collaborative community. This can be achieved through innovative conference formats, mentorship programs, and panels that highlight diverse career trajectories.

Shifting Normative Expectations: ASEE should shift its focus from traditional academic roles to a broader spectrum of career possibilities. This involves redefining what it means to be an engineer and an educator, and recognizing the varied ways individuals can contribute to the field.

Implementing Actionable Strategies: The organization should adopt actionable strategies to support non-academic educators. These might include creating safe spaces for discussing career diversity, establishing stronger connections between students and diverse alums, and offering resources for professional development in non-traditional paths.

Expanding the Scope of Engineering Education: A more inclusive approach would involve recognizing and integrating the contributions of those in non-academic roles, particularly in relation to technology advancements and global learning trends.

Building a Supportive Community: There's a need for a supportive community that values the experiences and insights of non-academic educators. This community would actively engage these professionals in discussions about the future of engineering education.

Cultivating a Stewardship Mindset: Moving away from gatekeeping to stewardship, where the focus is on enriching the environment for all members, is essential (Pollock, 2022). This requires individual and collective efforts to reflect on behaviors, policies, and practices that either hinder or promote inclusivity.

In summary, the overarching goal is to cultivate an environment within ASEE and the wider field of engineering education that is welcoming, inclusive, and respectful of all forms of contribution. This approach not only enhances the field but also encourages a broader spectrum of career considerations among graduates and professionals, ultimately leading to a more dynamic and effective engineering education landscape.

Next steps

We wish to activate interest and forge a nascent community of engineering educators who have chosen, are curious, or dream of careers outside the academe. If you want to join us, please join our mailing list at <https://drmp.co/outsideers>. All are invited to join our mailing list as we aim to forge a nascent community of engineering educators who have chosen, are curious, or dream of careers outside the academe.

Conclusion

In conclusion, it is clear that the journey of PhD graduates in Engineering Education into non-academic careers is not just about individual paths but is emblematic of a larger narrative within the field. These stories, rich in diversity, challenges, and triumphs, offer not only a window into the lived experiences of these professionals but also provide a mirror for reflecting on the current state and future direction of engineering education.

The auto-ethnographic approach employed in this study reveals a landscape where the boundaries of engineering education are being expanded and redefined. The insights from our Authors highlight the critical importance of valuing non-traditional career paths. Their journeys underscore the need for academic institutions and professional societies like ASEE to recognize and embrace the broad spectrum of roles that engineering educators can occupy.

This paper calls for a paradigm shift in how we view the engineering education community. A shift from a monolithic view of career success defined by academia alone to a more inclusive vision that values diverse contributions across a multitude of sectors. It is a call to action for fostering a culture of inclusivity, where non-academic paths are not merely acknowledged but celebrated for their unique contributions to the field.

Key recommendations from this study urge ASEE and similar organizations to engage in introspective practices, reassessing policies, and norms that may inadvertently perpetuate a culture of exclusion. By promoting dialogue, facilitating networking opportunities, and highlighting diverse career trajectories, these bodies can foster a more collaborative and inclusive community.

As we look ahead, it is evident that the field of engineering education is at a critical juncture. The stories of our Authors not only add richly to the tapestry of this field but also serve as a catalyst for change. By embracing the full diversity of career paths in engineering education, we can cultivate a more dynamic, innovative, and impactful community. This inclusivity is not just beneficial—it is essential for the growth and evolution of engineering education in a rapidly changing global landscape.

In conclusion, "Outsiders" is more than just a collection of narratives; it is a testament to the resilience and ingenuity of PhD graduates who have ventured beyond the conventional paths. Their experiences serve as a beacon, guiding the way toward a more inclusive, equitable, and vibrant future in engineering education.

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Appendix A - Author Key

A note about the author team formation: Authors Meagan Pollock and Hoda Ehsan shared many conversations about life as an engineering educator outside the academe. Hoda originally offered the idea of collaborating on something for ASEE related to our career trajectories, and the lead author posted an invitation to others on LinkedIn. The post read: “*I’m looking for people with PhDs in Engineering Education who have chosen non-academic career pathways to co-author an ASEE paper (or otherwise) and serve on a panel for the 2023 annual conference. Who might be interested? So far, it’s Hoda Ehsan and me. It would be great to expand outside the Purdue ENE bubble.*” The post had over 5000 impressions, 48 likes, 5 shares, and 26 comments. An email chain was created with those expressing interest, and the panel formed from there. It is perhaps not a coincidence that all of the panelists are women.

	Author	Gender/Race	PhD Engineering Education Graduation Year and Institution
1	Meagan Pollock	White cisgender woman	2014, Purdue University
2	Hoda Ehsan	Middle Eastern cisgender woman	2020, Purdue University
3	Sreyoshi Bhaduri	Southeast Asian cisgender woman	2017, Virginia Tech
4	Katie Nelson	White cisgender woman	2014, Arizona State University
5	Lauren Quigley	Black, cisgender woman	2013, Virginia Tech

Appendix B - Complete Author Narratives

Question 1: Describe your journey to forging a career path outside academia. How did your degree prepare you for your path, why did you choose it, and, in general, what was it like to forge a nontraditional path? Consider sharing role models, supporters, and naysayers, too.

Meagan Pollock

When I left the semiconductor industry in 2009 and began my doctoral program, my mission was to change the culture of engineering. I wanted to help create environments where everyone felt valued, included, affirmed, and able to reach their fullest potential. During my doctoral studies, I

consulted for a nonprofit, extending the work I began previously as a volunteer. They hired me to develop an educational equity curriculum specifically for STEM and Career and Technical Education (CTE) educators, and I also traveled the US teaching the curriculum. The freedom of consulting was intoxicating compared to the rigid schedule of industry and much preferred to the overworked and overwhelmed demeanor I noticed in many of my early career professors. The work I was creating and teaching complimented my studies and research and gave me significant personal and professional satisfaction and meaning.

Most of my PhD classmates focused on an academic career trajectory. I wasn't sure what I would be doing, but I was confident I wanted to forge my path outside the traditional expectations for which I felt my program was preparing me. The pioneer mindset was not new to me. During my undergraduate and master's degrees, my approach was similar. I believed that I owned my education and that it was my responsibility to craft it to be what would serve me and my future best. Often to the dismay of many administrators discouraged by my "rebellious" ways, I always ensured I was in the driver's seat regarding my degrees, meaning I didn't just do what I was told or prescribed. While I always met the core requirements, I took liberties to construct exciting opportunities that would allow me to learn and grow.

To do so, I had to change advisors to find the right person to support my path, write essays to validate my efforts, and meet with administrators to get approval for unconventional approaches and opportunities. Most of my PhD professors approved requests to modify projects targeted toward faculty preparation to be more entrepreneurial. For example, for the anchor course, Content Assessment and Pedagogy, instead of developing a detailed course syllabus (which was the assignment), I pitched an idea to my client to write new curricula that would go on to be my first product in a ~million-dollar portfolio for them. That's right! I got paid to do a class assignment.

Though I applied for a few faculty positions out of obligation (and was offered a position), I chose to continue working with my primary client, hired as a director of the national-level nonprofit. Admittedly, I wanted to continue consulting full-time but didn't feel ready to take on all the risks that come with life as a small business owner. I didn't have many role models of people who'd done so, and in turn, I believed that the director position would teach me many things, expand my network, and allow me time to grow my professional expertise. Taking this role was a great decision.

Fast forward nine years, and I now run my own full-time consulting firm, Engineer Inclusion. It's fun, challenging, and rewarding to be a business owner! So even though I am not in academia, I do speak at many universities, work with colleges and universities to address issues of diversity, equity, and inclusion, partner on large NSF grants, and even taught a summer micro-credential course for a top-tier R1 university called Inclusive Engineering Fundamentals. I think it's the best of both worlds, maintaining my freedom and flexibility and working to change systems that continue to marginalize and exclude.

Hoda Ehsan

Before doing my PhD, I always envisioned myself becoming a leader, who can provide educational services to children. My dream job was to direct a science center of some sort. As I started my PhD, this dream of mine started fading, mainly because I knew only a couple of graduates of my program, doing something different than being a university professor. I came to believe that being a professor or a researcher in non-university organizations are the only “valuable” careers I could have as someone with a PhD in Engineering Education.

When this opportunity came my way, I was prepared to take this role, since it was very aligned with the expertise I had gained during my PhD. My main focus in my Phd studies was pre-college engineering education, and I had become a qualitative researcher with many publications in that area. Thus, I did have the expertise to take this position. However, mentally and emotionally, I was not ready for taking a job outside of academia. I went through an identity crisis, felt lost and had the fear of losing my community and network.

When I shared my decision with my mentors and colleagues, their reactions were not very supportive. Many of them tried to “convince” me that I am making a wrong decision, and I am “wasting my talents.” I had a colleague write to me, that they know so many people who left academia and “none of them are happy and successful”. (it still hurts when I think about their comment.” I had a colleague who connected my decision to “being burnt out”, and suggested that I take a break for a few days, and then get back to, “work!”. They assured me that I would feel better, and won’t let the opportunity (i.e. academic offer I had) go!

Even after almost two years of leaving academia, I still get the question if I am going to look for TT job! Among all the people I spoke with or shared the news with, I had just a few who supported me, and encouraged me for my “courage” to take a nontraditional path.

I chose this job, because it simply was very appealing to me and seemed very unique and interesting! It is a very creative job! I have been designing engineering and computer science programs for a department that I direct in a high school. I have to train teachers and support students in different ways. It was very difficult to make this decision, but I am glad I did.

Sreyoshi Bhaduri

I have always been deeply interested in research at the intersection of people, products, and AI and other emerging technologies. I currently work as a Research Scientist at a Tech company, and have previously headed Global People Research for a learning sciences company. I am a strong advocate for increasing belonging among women in STEM and engineering, and currently serve as a senator for the Society of Women Engineers, which is the worlds largest not for profit advocating for advancement of those who identify as women in engineering.

As a twenty-something year-old, who graduated as a Mechanical Engineer, I was used to finding myself as the only woman in the engineering classrooms in India. Post undergrad, I traveled

7000 miles away from home in pursuit of higher education, after a scholarship brought me to the United States of America. Here in the U.S., I learned about intersectionality - now, not only did I see fewer women in the engineering classrooms, as I had before, I saw an even fewer number of women of color - fewer women like me. I was introduced to the challenge of lack of representation of women in engineering and was determined to understand and DO SOMETHING ABOUT THIS: I enrolled in a PhD in Engineering Education, to learn more about why there were so few under-represented minorities in engineering, and what could be changed or done differently.

As a doctoral student in engineering education, I explored the intersection of people, products (particularly, understanding sentiment and behaviors), and emerging technology to augment engineering education research and classrooms, and today, I work on understanding engineers and technologists in the workforce. I know that skills are transferable and my training as an engineering educator helps me bring foundational understanding, such as those on inclusion, learning, motivation, or career choices to those who choose to pursue an engineering profession in industry.

In complete transparency, I don't view my career trajectory as one of forging a non-traditional path. It is the 21st century and it is essential that we think beyond binaries, broadening the definitions of what constitutes typical or expected. As a researcher in industry, I see several academics work closely on research grants through industry partnerships. Similarly, several of us engineering educators consult on academic projects, teach part-time, mentor graduate students, and even serve on advisory committees.

I don't have one role-model. While in graduate school, I was quick to realize that finding a role model or someone to aspire towards AND who looks like me was going to be a struggle. I adopted an approach I have called the Franken-mentee – where I piece together a model career trajectory, based on reflections on choices made by and input from multiple mentees, some of whom had shared attributes such as gender or race or country of origin or research interests with me.

Katie Nelson

I joined Capital One after I had spent a few years applying for faculty positions. I had offers in hand, but all required my husband to leave his current role and few options existed to help his transition to a new location. Capital One was launching a 'Tech College' to help their software, data, and cyber engineering associates continue to learn. One of the people launching it was aware of engineering education and was a part of my personal network. He referred me to the learning-based role based on my expertise and the rest is history.

Lauren Quigley

Going into the PhD, I was not completely committed to an academic career as my only option. I was open to it, but in my desire to be a changemaker, I saw multiple avenues to do that, enough that I took on coursework in nonprofit leadership and policy to supplement my engineering education requirements. Throughout my time as a PhD student there did not seem to be as many opportunities to pursue engineering education research in the way that I wanted to in a traditional tenure track position. This realization, along with the experiences I was having toward the end of my PhD program forced my attention to other options. In my last position in the department as a Teaching Assistant for introduction to engineering lab, I ran into operational friction, clear favoritism for some TAs over others, overreliance on poorly designed student evaluations as evidence of quality teaching, and no space for individual innovation in the classroom. I knew that teaching in an infrastructure like the one I was in was not something I wanted to do, but sometime that semester I put in a half-hearted faculty position application in a college of education's curriculum and instruction department. The group sought a STEM education research specialist and I landed a first round interview, but the department ultimately hired a tenured professor for the role.

After one challenging semester of being a teaching assistant, I was fortunate to switch to a graduate assistantship essentially off campus, working on a large government STEM education consortium. This first step into system level STEM education research, programmatic leadership, policy making, evaluation, and stewardship was a breath of fresh air for me. The national, engineering education systems-level work I wanted to do was my new 20-hour a week task. My supervisor in the assistantship was all but dissertation herself and made me swear to finish my PhD since I had done half of the research already. After tough advisor meetings or disappointing updates with my committee, my boss persistently told me not to let the committee challenges stop me. More than anyone at that time, she convinced me that the work I was doing and could do in the future would benefit from me doing it and doing so with a PhD behind my name. My work in the assistantship, across organizations and partners, including our funding agency, led to a much-needed full-time professional position before I graduated. The plan I mapped out and was working toward from the beginning of my program was delayed, my mental health in a non-diverse rural college town was deteriorating, and according to my student debt holders, I was out of deferment time and should be able to afford a few hundred dollars a month in payments. Surprise! My under \$20,000 for a 12 month assistantship, supplemented by random side hustles I was not supposed to have, could not cover rent, utilities, a modest car note on my used car, insurance, and food. So I took the jump. A modest salary, but at least a comma in my paycheck, in an affordable, diverse city within a 3-hour drive to campus, still doing the systems level work I was enjoying, plus a support system of friends who were also PhD students living in the same area helped me make the decision. I'm sure that folks thought I was dropping out, although no one had the courage to say it to me directly. I may have been out of sight of my department in a neighboring state, but I was working a flex schedule to have every other Friday to write, meeting a few nights a week with friends forcing each other to write into the late night

after work, and a huge cheerleading section at my workplace. Despite what was a healthy turn for my life and even my research, my email updates and drafts seemed unengaged. A day trip to campus for a progress meeting with my committee was poorly attended. All I really remember from that meeting was being told there was no way I should expect to graduate that semester and crying uncontrollably on my 3-hour drive back home along the mountainside in the rain. I considered quitting grad school and at that moment, making a slight turn down a steep mountainside. The people who I took the responsibility to train me didn't seem to care at all about my research or me. Before I arrived home, I closed the door on any remaining idea of a faculty position. I wouldn't put myself in this position again and I certainly would not be a part of someone else having this kind of experience. The upcoming months were not without stress, pain, doubt, and lots of drama, but I finished – just a summer and semester behind my schedule. Making sense of my own experience from that moment forward was its own act of scholarship and resistance. I remembered my experiences and learnings in the two HBCUs that I attended prior. Recalling the racialized and gendered sociological history of the US and higher education, and applying Black feminist and womanist theory held me through to graduation¹. I continued doing systems-level work and research in STEM education in government, academia as a professional staff member, nonprofits, and the tech industry. I taught here and there, but built learning communities instead of sticking to someone else's script. I still publish, mostly when I feel like it, because old habits die hard. I am still an engineering education researcher. A few years of healing, but the lots of commitment to nurture my own engineering education identity didn't evaporate because I left the tower.

QUESTION 2: Why do you choose to be a member of ASEE, and describe how you've served the organization and engineering education community over the years?

Meagan Pollock

When I asked professors why I should join ASEE, they basically just said, "it's what you do!" Surely, they rattled off other benefits, but I recall there was an assumption of tacit knowledge, or social capital, that, of course, I would join the professional organization most closely affiliated with my doctoral studies. The necessity of a professional organization affiliation was new to me. Nevertheless, I joined ASEE the summer before I began my PhD (2009) and attended the conference for the first time. I've been an active member since, missing only one annual conference because of an unavoidable conflict.

In my second year as a member, I got involved in the pre-college division. Thanks to some amazing women leaders who brought me into the fold, I was able to volunteer leading committees and was eventually elected to the division's executive leadership. That group of passionate engineering educators was instrumental in my professional development, plus I have

¹ Thomas, L. D., Watt, D. L., Cross, K. J., Magruder, J. A., Easley, C. R., Monereau, Y. A. J., ... & Benjamin, A. M. (2016, June). As purple is to lavender: Exploring womanism as a theoretical framework in engineering education. In *2016 ASEE Annual Conference & Exposition*.

made tons of what I am sure will be lifelong friends! So in hindsight, I understand why getting involved was a 'no-brainer,' but now I take the time to explain that to others.

In 2018, my pre-college colleagues nominated me for a President-appointed position on the Commission for Diversity, Equity, and Inclusion. The CDEI chairs, one of which had been on my PhD committee, asked if I would be willing to lead a new, unformed team. I said yes, followed by four productive years leading the professional development committee before being selected by my colleagues as the incoming chair. I also led the development of the CDEI's new strategic plan that was board approved in 2022.

Over the years, I've also written or contributed to many papers and posters, reviewed for multiple divisions, built division websites, managed newsletters, led committees, and moderated sessions. The community I have found within ASEE is wonderful. However, I've also faced many opinions to the contrary as I've pushed further from academia and deeper into leadership within ASEE.

Hoda Ehsan

I have been a member of ASEE since I started my PhD, so I kept my membership and involvement. I have served on different divisions' committees multiple times, and this year, I am running for a position on the executive board for the Pre-College Division.

Sreyoshi Bhaduri

I explained to someone last year at the conference how attending ASEE feels like homecoming, in some ways. I have been a part of ASEE for about 8 years now. I joined as a first-year graduate student. My department funded travel grants to attend the conference and it was a staple for many. Through the conference, I have been able to meet and collaborate with engineering educators across the globe.

My service to the ASEE community has metamorphized over the past years – I started out as an engineer awed by academics presenting insightful education-heavy research, I found my deep fascination for research methods and learned to critique and review and contribute to the scholarship in the field, and now, I return each year to keep in touch with academia – primarily because to understand tech employees, it is imperative to ground oneself in research on learning and motivation in engineering. I also continue collaborating on research projects with folks from academia, and ASEE is often the conference of choice to present such findings.

Katie Nelson

I joined ASEE to network, learn about emerging research, and to establish myself in the community. At the time most Engineering Education students were found in localized programs, whereas my degree was in the College of Education. I wanted to tap into the Engineering side of my degree more. I lead the student division and was Active in the ERM division - and even was awarded the Apprentice Faculty Grant Award through ERM.

Lauren Quigley

My professional socialization as a graduate student was centered in ASEE. After graduating the logical place to write and share the research I was doing was always my disciplinary professional organization. At the very least, keeping up with my field and many friends from graduate school who are now leading in the field was important. ASEE is where I chose and continue to choose my affiliation identity² as an engineering education researcher. As an analogy from an FIE workshop long ago³, I am definitely a part of the engineering education menagerie—at least a zebra of some kind. As a student I was active with the group that established the Student Division and led the Graduate Engineering Education Consortium for Students (GEECS)⁴ that brought together graduate students across the country interested in engineering education research to network and benefit from training and mentorship from faculty. Through the years I've served as an ASEE reviewer, published papers, coached and mentored students who individually reached out, as well as participated in panels discussing career pathways. While I may not be traditionally engaged today, I am still part of the community.

QUESTION 3: What has your experience been like in ASEE as a non-academic? Where do you feel like you belong? When/where do you feel like you don't, or perhaps that others don't feel like you belong? What are some of the specific barriers you've faced that make you feel marginalized in a community that "built you?"

Meagan Pollock

The point of this paper/panel was to bring visibility to the experiences of non-academic PhD holding engineering educators within ASEE. When I shared my experiences with others like me, they concurred. This paper/panel was my idea, and I drafted the questions, yet, in writing my responses, this one, the most important, is the hardest. I've saved it for last.

Reflecting on why I've done that, I realize all the other questions are constructively positive. They allowed me to remember the good ASEE has done for me, imagine the possibilities, and dance a little bit on a cloud of hope.

One of the challenges we face in the work of DEI is asking people who've experienced trauma to relive it in the narrative for others to understand it, so we can hopefully take action to improve. Simply expressing that we experience a culture and climate that make us feel like we don't belong isn't acceptable. For example, one of the well-meaning reviewers of our abstract in 2023

² Gee, J. P. (2000). Chapter 3: Identity as an Analytic Lens for Research in Education. *Review of Research in Education*, 25(1), 99–125. <https://doi.org/10.3102/0091732X025001099>

³ Lindsay, E. D., & Paterson, K. (2010). Special session — It's a Safari out there: An allegory for learning to navigate academia. *2010 IEEE Frontiers in Education Conference (FIE)*, T4J-1-T4J-2. <https://doi.org/10.1109/FIE.2010.5673512>

⁴ Thomas, L. D., Sattler, B., & Carberry, A. R. (2011, October). Work in progress—Developing a graduate consortium in engineering education. In *2011 Frontiers in Education Conference (FIE)* (pp. T2J-1). IEEE.

asked, "I would encourage explaining why you believe there is a culture that "you don't belong" in engineering education if you do not pursue a faculty position." It seems, on the surface, like a fair suggestion. But to me, it reads, "prove it."

We listed five authors at the time of our abstract submission: five people who co-signed that we all experienced this culture of exclusion. Sure, we submitted an abstract to an academic conference, but instead of genuine empathy and sorrow that five colleagues experienced exclusion in our shared professional organization, we are challenged to prove why we "believe" we don't belong.

After receiving that comment, I challenged my co-authors to help me curate a list of comments people have said to us to help people to see how pervasive the academic culture is and how it manifests in our interactions. But now, I don't want to sit here and stew in the negativity thrown at me over the years so that well-meaning others learn what not to say. Maybe later I can, but not today.

Moreover, words aren't enough. My work focuses on helping people and organizations recognize the difference between structural belonging and forced belonging. Forced belonging is when we adjust, adapt and assimilate to help ourselves morph and fit into an environment not designed for us. The onus is on the individual to do the work to find belonging. Structural belonging changes the institution, culture, and climate so people can be authentic in an asset-driven environment. We must create structural belonging for all intersections of identity within engineering, and we can also create structural belonging within ASEE.

We aren't failed engineering educators because we didn't choose a path to faculty. We are creative and collaborative innovators who've forged unique paths that expand what it means to be an engineering educator. It's time ASEE recognizes that in all its systems and structures.

Hoda Ehsan

Last year was my first year attending ASEE, without having a university affiliation. I was very surprised to see how curious ASEE members were to learn about my current role. I still got so many surprised faces. I was introduced to a very established professor, and their immediate question was, "did you have this job before getting a PhD?", and they were very surprised to learn that I have been in my role only for a year like my PhD. They followed by, "Interesting. What made you want a job in K-12 settings? Can you do research there?"

I did get a few discouraging comments like, "you had an important research focus, and you seemed very passionate about it. What would happen to that research?", "Are you going to look for a TT job? I always thought that's what you would end up doing." I have learned how to react to those comments, and simply smile and ignore them. Often these comments come from colleagues who primarily have a research role like professors in R1 institutes. All these comments confirm that research is perceived as the most valuable practice/aspect of ASEE, and people who are not in research positions are often perceived as having a "less important/valued" job.

Overall, I found my people in the Pre-college Division, who were all very supportive and encouraging, and looked for ways that we could possibly collaborate. At the same time, I have to say, I had many meetings request with graduate students who would like to know about different options they may have. Many of them said that they do not have access to such information in their graduate programs, and their mentors are often either unfamiliar or opposed to different career pathways.

Sreyoshi Bhaduri

Increasingly, I have noticed the community becoming more receptive to non-tenure track, even non-academic career pathways. I don't think this has always been the case, based on my interaction with individuals who graduated years before I did, including comments I recall from my interaction with engineering educators while I was in grad school. I see a lot of interest among recent engineering education graduates in pursuing roles in industry. Often, there seems to be a perception that a role in industry may be a back-up if one does not land a tenure-track position. It is an unfortunate and unnecessary hierarchy that is assigned to career possibilities, probably as a result of casual conversations that herald academic positions as more coveted. These perceived hierarchies have neither perturbed nor dissuaded me from pursuing a career that makes most sense to me at this time.

With respect to ASEE, I don't particularly feel excluded, but I think the community could do a much better job drawing from the expertise of non-academic engineering educators. I am grateful to this group which came together to form a panel and address some of the challenges that we've faced.

Katie Nelson

I have not been involved in ASEE since I left academia. I am hoping that by serving on this panel I can get involved again.

Lauren Quigley

While I was doing research related work in professional staff academic roles, my experience did not feel any different, but I was well aware that if I wanted to do more, engage in certain divisions, or participate as a leader in ASEE it would be an uphill battle as a non-faculty member. When I began working in industry, I just became more selective about where I participated in ASEE and in what capacity. The ECSJ division has been a good place to re-engage with ASEE in part because of the leaders as well as the focus. As a graduate student, I remember overhearing an established well-respected researcher in ASEE leadership specifically say that leadership in a certain division was not for someone who was not a tenure-track faculty member – that they would detract from the main purpose of the division's work.

QUESTION 4: Why do you believe non-academic engineering educators are an asset to ASEE?

Meagan Pollock

Many ASEE members aren't engineers but researchers of engineering education. You know this because they often tell you with a quick qualifier of "well, I'm not an engineer, but..." Years ago, I asked someone why they always said that when they were a valuable contributor to the engineering education community. What they explained were feelings of being an outsider. They felt they needed to let others know they weren't an engineer first, branding themselves defensively as an outsider looking in as if to explain some social scientist's oddity, if there were such a thing. I believe many of the brilliant social scientists find their homes in a variety of ASEE divisions, but if we were to analyze the data, I bet we could find a concentration of them in one division in particular.

In addition, ASEE has a new division for engineering communicators, many of which work for colleges of engineering directing marketing and communication efforts. This group shares best practices for improving the public understanding of engineering and engineering technology. In speaking with the founder of this group in passing a few years ago, I recall her expressing a similar desire to find community with other practitioners who shared similar interests within ASEE.

I'm sure there are many more pockets of professionals within ASEE who don't fit the standard engineering educator mold, that is, someone who actively teaches engineering. All of these people add to the value of the community with their diverse experiences and expertise.

In the same way, trained engineering educators who pursue pathways alternative to faculty also add value to the community. The challenge of engineering education is big and broad. We need all types of voices and ideas present to solve our challenges, and we must actively change policies and norms that work against the inclusion of all types of engineering educators.

Hoda Ehsan

I believe diversity of positions brings in different perspectives on the table. Until I was in academia, I saw everything through a researcher's lens. However, now that I am out of that bubble, I see other ways I can contribute to our community and society that doesn't necessarily need to come from research. We have done so much research that haven't been yet translated into practice, and I see roles like mine who can translate them into practice and have a broader impact on the communities who can't have access to the research findings. Through my role, I also see aspects of K-12 education that I would not see when I was working in a university setting. I am experiencing first-hand the challenges and struggles of making policies in schools, and these problems are often not recognized when doing engineering education research in schools. Roles like mine are needed to conduct informed research, and the understanding I am gaining by being an admin in a school, can contribute to reports and guidelines ASEE creates for pre-college engineering education.

Sreyoshi Bhaduri

Non-academic engineering educators should be viewed as assets to engineering educators in academia. There is an unfortunate missed opportunity for engineering education research in industry, outside of academia. For instance, engineers and technologists do not stop learning outside the classrooms. Engineering educators can not only help close the research to practice cycle, but can also conduct their own research to help advance knowledge of growth, learning, and belonging part of the engineering employee's lifecycle within an organization. A community that encourages lifelong learning should be motivated to prepare graduates to tackle engineering education challenges in the workplace, not just in the classrooms.

Katie Nelson

There are numerous paths in and around engineering education that are non-academic in nature. I think giving students and ASEE members alike the opportunity to see these paths will open the door for them to try something new, and also ensure that those outside of academic institutions are aware of the field.

Lauren Quigley

Working outside of academia, in prior roles I have designed and implemented the kinds of lifelong learning experiences for thousands of employees globally that the ABET learning outcome alludes to. I've had the opportunity to design, develop and distribute learning content that has been accessed by millions of people around the world and translated into multiple languages. Realizing lifelong learning opportunities and expanding access to STEM knowledge, especially at the rate of technology development, cannot exist only in academic institutions. Professionals typically do not have the time, capacity or interest to leave their career to return to traditional learning environments that are simply not up to speed with current technology. Accessing a university is still a privilege for a small population in the global landscape. Excellent engineering education is taking place online and outside of traditional institutions, often enabled by educational technology. This inattention to scale by ASEE and engineering education by prioritizing attention, resources, and commitment to academia at the expense of everything else is simply stunning. Those of us who left, under whatever terms, are often bringing the best of engineering education research outcomes, knowledge and strategy to the world that will never step foot into a traditional university classroom. The small game of ASEE is about power retention and self-reproduction.

QUESTION 5: What might ASEE look and feel like if it were more inclusive of non-academic engineering educators?

Meagan Pollock

There seems to be a widening trench within our field between researchers and practitioners. In reality, we should be an organization of practitioners who might also do other things like research that help us advance in our practice.

One of my greatest joys is turning research into practice, taking the literature, and shaping it into easy-to-use resources that advance diversity, equity, and inclusion. If ASEE were more inclusive of non-academic engineering educators, I would feel more valued, included, and affirmed for my contributions to the organization and the field. Others would likely feel the same. Academics might learn something from us, just as we learn from them! We needn't be dismissed or excluded because our paths and contributions differ.

Hoda Ehsan

No response

Sreyoshi Bhaduri

I'd expect to see increased collaboration, more research, potentially more money/funding. I would also anticipate the conference to then appeal to non-engineering educators to attend and learn about the discipline. For instance, behavioral economists or IO Psychologists working on understanding engineers in the workforce could benefit heavily from learning about the peculiarities of how engineers learn, what motivates them, how and why they persist, etc.

Katie Nelson

It would create a more vibrant connection between academia and business. Additionally, It will look more innovative and create a space that can merge expertise and different points of view to continue to tackle emerging issues in engineering education.

Lauren Quigley

If ASEE were more inclusive of non-academic engineering educators, the organization would be a space of greater innovation and impact while being representative of the US and world population. Conferences and events would be well attended and draw local engagement as well as interest from people who are not in engineering. The broader impacts of research would become reality, not just an aspirational statement for a grant. This would result in greater engagement from other sectors, such as government (excluding National Science Foundation program officers), engagement of businesses and industry beyond classroom product sales, and growing the inter-discipline of engineering education. Expanding ASEE in these ways would also improve the organization's financial stability.

QUESTION 6: How can we shift the normative expectations and co-create a culture and climate that stewards more professionals to consider a multitude of modalities for service to the field? What are your suggested actionable recommendations for providing equitable and inclusive educational and organizational environments for all types of engineering educators?

Meagan Pollock

One of the first classes I took in my PhD for Engineering Education, (History and Philosophy of Engineering Education) posed three questions: (1) who gets to be an engineer? (2) who gets to be an educator? and (3) who gets to be an engineering educator? Somewhere, my papers on these questions hide in a long lost file drive, yet I'm positive my views have shifted and morphed since. As my social consciousness and awareness have expanded, so has my perspective on where the borders and boundaries should lie within the fields.

Many of us with ASEE preach diversity, equity, and inclusion, and learning to practice it is an ongoing effort as we learn new ways of knowing, doing, and being. It requires humble accountability, openness to listen, and active effort to change. I wonder what would happen if ASEE members did an exercise like the one we did in my class. Would we find ourselves upholding systems and barriers that keep people out? Or would we be reminded of our goal to be an expansive and welcoming community?

If ASEE were more inclusive of non-academic engineering educators, it would be less elitist in its standards of who gets to be a leader, who gets to be called a distinguished speaker, who gets to be a Fellow, who gets to be published, etc. We would be more culturally responsive to multiple operating modalities within the field. We would adhere to an asset mindset, valuing the beautiful ways of knowing and doing that every contributor, member, and volunteer offer. We would find ourselves in conversations where all stakeholder voices are present and heard. We would be expansive in our views, taking a "yes, and" approach to engaging and establishing policies.

Ultimately, each person can ask themselves, "am I being a gatekeeper or a steward?" Stewardship, the opposite of gatekeeping, creates an enriching environment where people can grow and improve while enhancing their well-being. I've created a downloaded resource, a set of prompts organized by four themes to guide us in reflecting on our individual and collective behaviors. (Learn more <https://engineerinclusion.com/stewarding/>)

Hoda Ehsan

No response

Sreyoshi Bhaduri

I'd recommend increased dialogue between engineering educators in non-academic careers and their academic counterparts. Sessions at ASEE seem to focus primarily on presenting findings and disseminating research. Un-conferencing sessions could also be intentionally woven into the

conference, highlighting speakers from different backgrounds, so that attendees can network. Similarly, panels on career trajectories outside academia could be a consideration. I tend to have these talks with students during the career fair, where they stop by a departmental booth, and are excited to learn that I am an alumni of the program but am pursuing a non-academic path. In summary, making career trajectory options seem binary is an unnecessary and inaccurate practice that this community can help address.

Katie Nelson

I think it starts with beginning the dialogue - and allowing natural collaborations and networks to build. I also think it requires less of an emphasis in academia on academic paths for graduate students upon the completion of their degree. Engaging student organizations early and often, as well as encouraging non-academics to join numerous ASEE divisions and share the message more broadly.

Lauren Quigley

No response