”But something’s off”: Belonging Experiences with Peers for Transgender & Gender Non-Conforming (TGNC) Undergraduate Engineering Students

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Introduction

This empirical research brief describes a study examining belonging from an identity perspective for Transgender and Gender Non-Conforming (TGNC) undergraduate engineering students. This work is part of a multi-methods study of the factors and experiences that impact belonging and identity congruence for LGBTQIA+ engineering students. TGNC students are an underrepresented and understudied population in engineering education despite the potential insights into the remaining rigidity of gender in engineering within student experiences.

Prior research on LGBTQIA+ students in engineering has examined the role of heteronormativity in influencing who can feel like an engineer. LGBTQIA+ engineering students face more marginalization and devaluation from their peers as well as increased issues with their physical and mental health [1]. Sexual minority status is also a significant predictor in the retention of students in engineering with queer students leaving at higher rates [2]. Therefore, LGBTQIA+ students develop techniques for protecting themselves from this treatment such as hiding their sexuality and overworking themselves in their education [3]. However, research that focuses on the experiences of TGNC students in engineering is sparse.

Existing research for TGNC students primarily addresses the separation students feel between their transgender and engineering identities [4]. Navigating these multiple identities, students also struggle with the politicized nature of trans and queer identities in the depoliticized engineering culture to create dissonant belonging experiences. The expansive nature of transgender, genderqueer, and gender non-conforming identities challenges the rigidity of gender sustained through the hegemonic masculine culture of engineering.

The extent of group work found in most engineering curriculums makes peer interactions a primary aspect of engineering education experiences, but peer endorsement of hegemonic masculinity can create a problematic situation for TGNC students as they navigate this culture [5]. Therefore, TGNC students are at risk of experiencing discrimination and invalidation from their peers, particularly the peers who endorse hegemonic masculinity, because TGNC students do not fit the gender norms expected by these peers.

The present work examines the peer experiences of TGNC engineering students and the effects on identity and belonging through the following research questions:

> RQ1: How is identity congruence negated by peer interactions in engineering for TGNC students?
>
> RQ2: How to TGNC students negotiate their understanding and development of their gender identity because of peer interactions?

Methods

At a large Public Midwestern, Predominantly White Institution (PWI), we conducted a 40-minute ecological belonging intervention (for more information about the intervention refer to [6]). Three TGNC students participated in the optional interviews that followed. Their

information and demographics are shown in Table 1. All procedures were approved by all participating institution's IRBs.

Table 1. Participant Information

Pseudonym	Gender	Sexuality	Race	Major	D/I	Intervention
Alex	TGNC	Queer	White	Biology (Left Engineering)	Domestic	Yes
Jamie	TGNC	Pansexual	White	Biomedical Engineering	Domestic	No
Sage	TGNC	Lesbian	White	Aerospace Engineering	Domestic	Yes

We conducted two coding passes of transcribed interviews: 1) descriptive codes and 2) pattern coding based on the inductive first-pass codes and the theoretical frameworks: Identity Negotiation Theory (INT) and LGBTQIA+ Identity Development Models (IDM).

Frameworks

Identity Negotiation Theory (INT) concerns the negotiation of personal and membership identity [7]. Identity negotiation has been cited as a strategy for identity construction for women in engineering [8]. Research on professional identity negotiation for undergraduate engineering students has conceptualized different orientations through which the individual negotiates with the system – self-oriented, learner-oriented, and career-oriented [9]. The self-oriented aspect involves "inverting the definition" of the discipline to include the individual's characteristics. The learner-oriented aspect refers to the student negotiating academic relevance, and the career-oriented aspect describes the expansion of the student's understanding of the profession. For TGNC students, who experience a hostile climate in engineering because of their genderqueerness, the negotiation specific to the self-orientation is likely challenged by the rigidity of gender within engineering.

LGBTQ+ Identity Development Models (IDM) are used to explain developmental differences for gender and sexuality as queer and trans people often experience "normative" development on a different timeline. The inclusion of these models acknowledges that college brings a new level of freedom and exploration for LGBTQ+ students that can also increase their cognitive load as they explore who they are as people and as engineers. One model examines the development of TGNC individuals as they enter college and includes steps such as "Repressing or hiding their identity in the face of hostility and/or isolation" and "Changing their outward appearance in order to look more like their self-image" [10]. These steps and other IDM provide important guidelines for how students develop as whole people in addition to their development as engineers.

Positionality

The first author and primary analyst, Katharine Getz, is a white lesbian who believes in the expansiveness of self, gender, and sexuality. Her motivation to research the experiences of belonging and identity for LGBTQ+ undergraduate engineering students comes from her own experiences and observations of her peers. Her academic background is in chemical engineering, sexuality and gender studies, and engineering education, so she has a unique position to connect with student participants through their stories and contextualize their experiences in existing

literature and queer theory. This is her first research project with purely qualitative analysis, which impacted the methodological choices. The remaining authorship team includes heterosexual and queer-identified research team members who bring cisgender and TGNC experiences to investigate gendered engineering education experiences. As researchers, we hold experience in qualitative research, which is supported the first author's exploration of this topic and qualitative interviews.

A Note on Terminology

Throughout the results, participants use a variety of language to differentiate their gender identity, their gender expression, and their peer's perception of their gender identity. We acknowledge that. However, the language to describe their experiences is always evolving, as are the identities of these students across these interviews, as they continue to come into themselves as people during their college education. As a result, we have categorized these students as TGNC but use the identifiers students use whenever possible.

Results

TGNC students struggle to be recognized as engineers by their peers on account of their gender presentation. Sage, for example, describes themselves as someone who has a "funky" fashion sense. Their gender expression is different from their peers, and their peers do not take them seriously as a result:

> But also, I feel like maybe they look at me and they see [color] hair. And sometimes I have this hat that has a frog on it and they're probably like, "Sheesh." And I wear funky outfits. Maybe they're seeing that and they're like, "Really? Is she smart?" I feel like I haven't proven myself.

Their queerness was noticed by their peers and consequently a detriment to their recognition as an engineer. Additionally, each of the TGNC students struggled to be affirmed in their gender identity by their peers. Sage, Jamie, and Alex were selectively out; they did not share their gender identity and pronouns with their peers unless they felt safe to do so and felt it was necessary for the project they were working on. Alex, the student who left engineering, describes their experience in navigating discomfort with their engineering peers, "Whoever I was working with on project, I would always just be like whatever pronouns they use for me, I just left it because I was too... That environment, I just didn't feel comfortable." They described feeling more accepted and welcomed in their biology courses based on higher representations of queer presenting people compared to their engineering classes.

This knowledge of difference affected students beyond the initial interaction. Jamie described an experience during their second semester in which the girl they were grouped with stared at them with "disgust" and the boys ignored them. This experience was mentioned in most subsequent interviews, highlighting the long-lasting effects and internalization of othering: "They'll see me as a woman, but they'll still be like, but something's off." In the face of hostility, TGNC people are likely to hide or repress their identity unless they have other avenues of support [10]. Therefore, the resistance from peers creates a constraint of congruence for TGNC students who do not necessarily have supportive experiences or futures in addition to that barrier.

Peer reactions to the joint identities of gender minority queer students create additional barriers to belonging for these students. Students overwhelmingly do not feel they can be accepted for their genderqueer identities and as engineers by their peers. As explained by Sage, "I can't just be

an engineer who is a woman, it's like pick one or the other." While Sage did not identity as a woman, their peers ascribed that identity to them, so they were constrained in their identity as a TGNC individual and their treatment as a woman by their peers. Regarding peer interactions, TGNC students are constrained in the expression of their gender because of the lack of acceptance they feel from their peers.

Conclusion

TGNC students struggle to feel respected as a person in two ways: their genderqueerness and their status as an engineer. Their peers treated genderqueerness and engineering as incompatible facets of identity. Therefore, TGNC students not only face discrimination from their peers because of their gender queerness but also experience an increased cognitive load as they negotiation their identity as an engineer and a genderqueer person. These effects can cause TGNC students, such as Alex, to leave engineering because they feel an immediate lack of acceptance from their peers upon entering an engineering classroom.

Studying reactions to and understandings of queerness in engineering sustains an examination into the hegemonic masculine culture and the resistance to change within the field. The embodiment of queerness, not explicitly confined to gender or sexuality, can offer expansive reimagining to traditional methods of education in engineering. The present work is a part of a multi-methods study of belonging from an identity perspective for all LGBTQIA+ students to examine the impact of a belonging intervention on the performance, persistence, and feelings of belonging for students.

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