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Work-in-Progress: Identity Negotiation among LGBTQIA+ Youth Experiencing Housing Insecurity through a Localized Engineering Program

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WIP: Refiguring Engineering through Identity Negotiation among LGBTQ+ Youth in a Localized Engineering in Displacement (LED) Program

Abstract

This work-in-progress paper explores how queer youth experiencing housing insecurity navigate identity and agency through participation in an alternative engineering education program called Localized Engineering in Displacement (LED). This study stems from a three-year Design-Based Research (DBR) initiative that developed the LED curriculum, integrating community-driven problem-solving, digital tools, and microelectronics to empower LGBTQIA+ youth experiencing housing insecurity. Drawing on Holland et al.'s [1] theory of figured worlds, we investigate how the LED program creates a space where queer identities are not only welcomed but also inform engineering engagement. Using semi-structured interviews and narrative analysis with two students and one student-facilitator, we present preliminary findings on how identity negotiation and belonging unfolded before and after engagement in this reimagined learning environment. Our initial analysis highlights the potential of alternative engineering figured worlds to support the development of engineering identity, community connection, and agency among youth historically marginalized in STEM.

Introduction

Engineering education has long been shaped by dominant cultural norms, meritocracy, masculinity, and neutrality, that often exclude queer individuals and other marginalized groups [2], [3], [4]. For queer youth experiencing housing insecurity, these challenges are compounded by systemic exclusion in both educational and social institutions [5]. This paper shares early insights from one iteration of the Localized Engineering in Displacement (LED) program [6], a community-based, informal STEM learning initiative that centers queer youth in both design and participation. In this qualitative study, we explore how LED refigures engineering as a space of creativity, collaboration, identity affirmation, and communal care.

The need for this inquiry is underscored by how participants' understandings of engineering transformed during their engagement in LED. Before joining the program, all three participants described engineering using terms aligned with dominant cultural discourses: technical, abstract, and inaccessible. Nova explained engineering as:

> *"... someone whose job it is to make something... a lot of that feels very like you're in a lab doing your little tests rather than going out to locations, understanding the problem personally."*

Quinn similarly shared:

> *"...[engineering] as something to do with science and technology, more like math... but I don't think I would have had a clear answer on what they [engineers] do."*

Kai reflected on their own assumptions:

> *"I think I would have been a lot more flippant... I would have said, 'Oh, numbers,'... logistics and specifications... I would have spoken with authority, but I would have been tepid."*

These perspectives frame engineering as distant, detached, and inaccessible. As an external, elite pursuit, divorced from their personal lives and identities. But through their involvement in LED, participants articulated a striking redefinition of engineering. Nova later described engineering as "anybody who sits down to solve a problem," citing acts of everyday improvisation:

> *"Whoever invented the door wedge, that was engineering... or even just using my cane to pull something closer, that's problem-solving that feels like engineering to me nowadays."*

Quinn offered a redefinition rooted in logic and agency:

> *"A way of coming up with a solution that meets certain criteria... a way of understanding how to solve a problem."*

And Kai centered the creativity and co-construction involved in engineering: *"It felt like putting my hands in the soil... moving in co-creation with an idea."*

In these reframed definitions, engineering shifts from a rigid, external discipline to one embedded in lived experience, critical thinking, and care. Importantly, participants no longer saw engineering as something that excludes them, but rather something they already practice, through artistry, adaptation, and problem-solving. Their revised conceptions foreground a refigured world where their identities, as queer, disabled, neurodivergent, artistic, are not only relevant but integral to how they understand and enact engineering. This transformation motivates our central inquiry: *How do queer youth experiencing housing insecurity negotiate their identities before and during a reimagined engineering space like LED?*

Background and Theoretical Framework

Research in engineering education consistently shows that its dominant culture privileges white, cisgender, heterosexual masculinity [3], [7], [8]. Queer students frequently experience invisibility, heteronormativity, stereotype management [9], and intersectional marginalization [10]. As a result, their full identities often remain unrecognized or suppressed in traditional STEM settings.

Holland et al.'s [1] concept of figured worlds frames identity as socially and culturally produced through ongoing participation in particular activities, discourses, and relationships. In these "figured worlds," certain characters are recognized, some acts are assigned meaning, and certain outcomes are valued over others. Within this framework, agency refers to the ways individuals negotiate, resist, and re-author their positions within these social contexts. Using figured worlds as our framework, we examine how queer youth experiencing housing insecurity negotiate identity and reimagine engineering through personal, cultural, and communal practices.

Context and Methods

The version of the LED program examined in this study was co-developed by DeBoer Lab at Purdue University and Trinity Haven, a transitional living program for LGBTQ+ youth facing housing insecurity in Indiana. Adapted from our decade-long international work, this U.S.-based implementation centered on technical skill development and social-emotional learning (SEL), guided by a reciprocal innovation model linking experiences across sites. Prior to curriculum launch, we conducted two asset-mapping assessments, a Recognition of Prior Knowledge (RPK) survey and a SEL (Social and Emotional Learning) focused focus group, to identify learner strengths, engineering perceptions, and long-term goals. These data informed a curriculum focused on community relevance and learner-directed design, where participants identified moisture control in a community garden as a central challenge. Over eight months, two youth participants (Nova and Quinn), supported by a student-facilitator (Kai) and university researchers, engaged in an iterative engineering process that integrated a microelectronics learning kit (EngStarter) [11], and contextualized SEL learning content informed through the CASEL framework [12]. Two students (Nova and Quinn) participated in an 8-month curriculum along with a student-facilitator (Kai) and supported by university researchers.

Our data draws from three semi-structured interviews each with Nova, Quinn, and Kai (pseudonyms) conducted post-completion of the LED curriculum. In total, we collected 240 minutes of interview data. For this work-in-progress paper, we analyzed approximately 45 minutes of data, selected for their richness in describing identity negotiation and program experience. Interviews were designed to allow participants to describe themselves in their own words before reflecting on their experience with engineering. Data was analyzed through a narrative analysis [13] approach and guided by figured worlds theory, with emphasis on themes of recognition, meaning-making, and valued outcomes.

Findings

In presenting our findings, we draw from a narrative analysis approach grounded in figured worlds theory to understand how participants negotiated their identities in relation to engineering. We organize the findings in two parts. First, we explore how each participant navigated their personal "self" worlds, marked by intersecting identities shaped by broader societal discourses and lived experience. Second, we analyze how their engineering engagement within the LED program offered a new world of engineering learning, one that allowed for fuller, more authentic participation. This layered structure allows us to trace the interplay between identity, context, and meaning-making.

Theme 1: Figured Worlds of the Self: Negotiating Identity Before Engineering

Before engaging in engineering through the LED program, Nova, Quinn, and Kai had each been immersed in broader cultural, familial, and institutional figured worlds that shaped their sense of self in powerful ways. These were spaces where queerness, neurodivergence, fatness, disability, and other marginalized identities were often misunderstood, silenced, or erased. In this section, we examine how each participant navigated those worlds, sometimes through rejection, sometimes through adaptation, and often through creative refiguring, and how that work of identity negotiation prefigured or paralleled their evolving conception of engineering itself. Drawing from Holland et al.'s theory, we interpret these moments as instances of resisting

dominant narratives, re-authoring meaning, and imagining new identities that set the stage for participation in the reimagined figured world of LED.

In reflecting on their gender and identity, Nova challenges the assumption that gender expression determines identity. They shared:

> *"I do a lot of feminine things… like painting my nails, wanting long hair, occasionally wearing a dress. But I'm not a woman though… I believe in femininity… But that's not me… just because I wear work boots once doesn't make me a construction worker."*

Nova's comments resist dominant scripts that equate outward expression with fixed identity categories. Drawing from their personal relationship to femininity and their rejection of womanhood, they construct a figured world in which identity is self-authored, and expression is not confined by normative associations. By asserting their own meanings for actions traditionally coded as "feminine," Nova assigns new significance to those acts, expands the roles available within gendered discourse, and reclaims agency in defining who they are.

Quinn's identity negotiation is deeply intertwined with their experiences of mental health, class, and disability. They shared:

> *"I mean, I've struggled with [mental health] a lot… but yeah, I don't think it'll ever go away. So it's something that I prioritize… I think I'm constantly doing it—figuring out how I'm feeling, even if it's just for a little while."*

For Quinn, self-understanding is not static but ongoing. It is a continuous re-evaluation shaped by fluctuating internal states and external limitations. Their reflection foregrounds a figured world of self that is both constrained by systemic narratives of incapability and shaped by active introspection and resilience. They expressed a tension between being *"laid back"* and *"tired all the time,"* and yet trying to *"get things done."* Within this negotiation lies an assertion of agency, of trying to remain true to themselves despite others' difficulty in understanding. Quinn noted, *"I think it's something that most people just can't really understand."*

Kai's identity negotiation emerges in response to social structures that attempted to invalidate their queerness, Blackness, fatness, and neurodivergence. Reflecting on their upbringing, Kai described internalizing the religious belief that queerness severs one's connection to spirituality:

> *"I heard that queer people's connection to God was severed… and I thought, 'Oh, well, that must mean I'm not queer.'"*

This early acceptance of a dominant narrative reveals a moment where Kai initially deferred to external authority to define their identity. Over time, however, they critically re-examined these messages and reasserted a spiritual framework inclusive of queerness:

> *"I came back to the truth that I knew… I am queer. I am here. And you can't take sanctity from me."*

Kai's discourse reveals a powerful refiguring of the world they inhabit, rejecting systems of judgment and reclaiming connection to the sacred. They move from imposed labels to intentional self-definition, naming themselves as "unabashed, compassionate, contemplative, queer, and patient." This naming is not abstract, it is rooted in lived experience, pedagogy, and care. As they put it, *"There's more power in you claiming an identity than an identity being imposed on you."*

Together, these narratives illustrate the complex, layered processes through which queer individuals rewrite their place in the world, where they are not conforming to dominant identities but by disrupting, negotiating, and re-signifying what those identities can mean.

Theme 2: Refiguring Engineering Through Lived Experience

This theme explores how participants reimagined their identities within the context of an engineering world. They engaged in a learning experience that encouraged them to draw on their lived experiences and personal identities. Nova, Quinn, and Kai's original expectation of what makes an engineer: someone who has earned a degree, defined by a logical thinking pattern, and capable of high-level mathematics, were changed as they observed what behaviors were expected within an engineering context. They discovered that their creativity, care, resilience, and improvisation was a strength within an engineering environment. By altering these expectations, participants not only found personal relevance in engineering but also a possibility of imagining themselves as an agent within the larger engineering world.

Nova's engagement in the engineering program led them to a significant reimagining of what is expected of an engineer, particularly as it intersected with their sense of self and lived experience. This transformation is seen most clearly in the ways they recognized the value of their everyday life behaviors through the lens of an engineering world. Reflecting on what surprised them most about engineering, Nova shared:

> *"How unclinical it is compared to how my brain decided it was... you have to think about, like, the people you are serving with the thing you were doing... even if the audience is just like you trying to optimize something small in your life, like that's you. You are the audience."*

Nova originally identified themself as *"fun", "eclectic"*, and an *"artist"*, qualities that contrast their original clinical impression of engineering. In observing, learning, and performing engineering concepts, Nova formed new expectations of what behaviors are valued within the field of engineering. Nova found a place for their own personal values and identification with care for others, in applying themselves in an engineering design problem.

This shift also empowered Nova to view their resourceful, improvisational behaviors in everyday life, as legitimate forms of engineering:

> *"I think I've always had that streak of solving problems in a very Jerry-rigged way, because when we couldn't really afford to solve them in a proper way. And so just having to transfer that to thinking about solving a problem... that was very correct."*

Such acts of everyday tinkering, originally dismissed, became validated as Nova entering a world of engineering that values lived experience. This expanded view of expertise allowed Nova to see themselves as already practicing key aspects of engineering. Nova also identified their artistic identity as integral to their engineering work*:*

> *"I think being an artist or like being artistic in general really helped for sketching diagrams and having a good mental visualization."*

These reflections illuminate how Nova's creative and problem-solving instincts, which were shaped by resource constraints and artistic practice, provided essential tools for engineering engagement. They integrated their emotional, practical, and aesthetic dimensions into their new understanding of engineering.

Quinn also described their discovery of their own agency within engineering as they confronted and overcame internal doubts related to competence and criticism. Reflecting on their early expectations, they shared:

> *"I guess just mostly that like anyone can do it really... it seemed like something that you need like a lot of training to do... but like something that entry level wouldn't be possible like come up with a solution like we did."*

This recognition disrupted a previously narrow figured world of engineering as exclusive and inaccessible to Quinn due to their other identities. The experience of presenting their project successfully further refigured their self-perception: *"I was able to like actually perform... I'm pretty good under stress, just in general."* Engineering became an environment through which Quinn could reassess their own capacity and resilience. This shift was deeply connected to their broader identity narrative, especially as they navigated the long-term impacts of mental health challenges and abandonment by caretakers. Quinn explained:

> *"By the time I was 17... I thought I was going to lose everything... But I passed them [high school exams] all so they let me go... Maybe luck but also just like, knowing like that like, I can usually pull things off even if they look really horrible."*

Through the program, Quinn came to see their persistence as central to both surviving adversity and succeeding in engineering. This capacity to endure and adapt resulted in a renegotiation of personal identity and Quinn's ability to visualize themselves as an agent within an engineering world:

> *"Well, it's something that I would like consider if I could do like college definitely... It's something that I would like keep in mind in future jobs."*

For Kai, the discovery of their engineering identity was rooted in the unexpected parallels they drew between engineering and artistry:

> *"The non-linear nature surprised me... It takes a lot of creativity to be able to generate a response... To me, that is entering the territory of what it means to be an artist."*

Rather than the expected fixed sequence of procedures, engineering emerged as an imaginative and interpretive practice. This recognition challenged Kai's earlier assumptions and invited them to claim space in a field they had initially viewed as intimidating. As they noted:

> *"I absolutely feel like I'm leaving this with a much better sense of if I apply myself, I can understand complicated things, and I can do difficult tasks... It really built my self-confidence."*

Kai further reflected on how their established traits, such as compassion, patience, and contemplativeness gained new relevance through engineering:

> *"I strengthened my compassion and patience through this process... Being an engineer is inherently contemplative... it really deepened my contemplation."*

Their narrative underscores how the figured world of engineering can evolve to affirm a wide range of identities and values. Kai's hesitance to claim the title of "engineer" outright, pending the material realization of their design, also speaks to how recognition and identity remain contingent and situated*:*

> *"I would like to think I am on the way to becoming an engineer... But since it hasn't been made manifest... I have trouble applying that title."*

Across all three cases, the refigured expectations of engineering from requiring elite technical mastery, to where personal histories, everyday problem-solving, and community care could be considered a strength. This process illustrates how identity negotiation in engineering is not just about acquiring new skills, but about continuously reimaging the value of ones own identity within engineering expectations.

Discussion

Holland et al. conceptualize figured worlds as socially and culturally constructed spaces in which identities are produced, negotiated, and recognized through meaningful activity. Across this study, Nova, Quinn, and Kai each engaged in identity negotiation within and against dominant societal figured worlds, particularly ones that often invalidate or marginalize queerness, neurodivergence, mental illness, fatness, and other non-normative ways of being. These dominant worlds, particularly within engineering, typically emphasize linearity, objectivity, and disembodied technical expertise.

Through the LED program, however, participants engaged in the co-construction of an alternative figured world, one where engineering was not pre-defined by elite knowledge or disciplinary boundaries but was open to reinterpretation through lived experience. Rather than requiring participants to assimilate into existing engineering norms, the program made room for identities, practices, and knowledge systems typically excluded from engineering spaces. Engineering became something that could be learned through making do, visualizing, caring, listening, failing, and re-trying.

In this refigured world, personal insight, emotional resilience, and improvisational knowledge, like solving problems with tape, recalling a parent's electrician work, or navigating mental health barriers, were not outside the scope of engineering but part of what made it intelligible and meaningful. This aligns with calls from critical engineering education scholars (e.g., [14], [15], [16]) to interrogate engineering's hegemonic culture and expand its boundaries.

Our findings suggest that identity negotiation is not simply a background process for LGBTQ+ youth in engineering; it is central to how they redefine both who they are and what engineering can be. The LED program functioned as an emergent figured world where queer and multiply marginalized youth could practice engineering in ways that affirmed their full selves. This does not mean engineering was easy or universally inclusive, but it became more negotiable, more plural, and more responsive to the people doing it.

Next Steps

Our analysis is ongoing. While this paper draws from approximately 45 minutes of interview data per participant, we have over 240 minutes of interview and observational data still to be explored. While we acknowledge that identity is a socially and culturally process occurring through ongoing participation in particular activities, discourses, and relationships. The present analysis focuses specifically on the discursive dimensions of identity negotiation, examining how participants articulate and reframe their identities in relation to engineering. Future stages of analysis will extend this work in several critical directions.

First, we plan to conduct a deeper examination of the LED curriculum itself, including its design logic, its embedded pedagogical features, and how these were intentionally structured to disrupt dominant engineering norms. We will expand the data sources to also include facilitator notes, lesson structures, and moments of interaction to better understand how the LED program functioned as a reimagined figured world of engineering.

Second, we will explore more explicitly the relationship between the LED program's structure and the trajectories of the youth. Rather than treating identity negotiation as solely internal or personal, we are interested in how it is actively shaped by relational, material, and pedagogical conditions. This includes studying how specific tools, exercises, and facilitation strategies in LED supported or constrained youth agency.

Third, upcoming phases will include more collaborative analysis sessions with Nova, Quinn, and Kai. These engagements will help us refine interpretations and ensure that participant voices remain central in the construction of knowledge.

As we continue efforts to diversify, broaden, and make engineering more inclusive, it is essential to attend to populations who are systematically kept out, such as queer youth experiencing housing insecurity. For many, structural conditions compound in ways that make traditional pathways into engineering inaccessible or unimaginable. Unless we bring engineering to them, into the spaces where they already live, learn, and survive, these exclusions will persist.

Through this work, we investigate and design an inclusive, accessible, and justice-oriented entry point into engineering that honors the lived experiences and knowledge systems of marginalized youth. We view this not as a one-time intervention but as part of a broader reimagining of who gets to participate in engineering, and on what terms.

This study also unfolds during a time of intensifying scrutiny and rollback of DEI and queer-centered educational work. We believe this only heightens the urgency of our efforts. As such, we invite readers to reflect alongside us: *How can we create engineering spaces that honor rather than flatten difference? What does it look like to center identity as a form of knowledge in*

STEM? How might we carry forward research that challenges normative structures while remaining attentive to ethics, safety, and care?

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