Latino/a/x Engineering Students and Nepantla: A Multi-Case Study within the US Southwest

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Abstract

This paper draws from Gloria Anzaldúa's concept of *Nepantla* to analyze how Latino/a/x engineering students negotiate complex social dynamics while navigating engineering spaces and trajectories. This paper, which is part of a larger longitudinal study, describes a multi-case study exploring the experiences of seven Latino/a/x engineering students at a Hispanic Serving Institutions (HSI) as they navigate the convergence of diverse cultures, languages, and their reconciliation with often disparate and conflicting identities, as well as the instances of racialization they constantly encounter in engineering. The data collected and analyzed underscore the profound impact of sociopolitical factors with historical ties to racialized discourse of Latino/a/x students. Challenges encountered by these students encompass issues such as reconciling ethnic and engineering identities, negotiating language subtraction, and navigating perceptions of race and gender, all while harnessing the ability navigate spaces where they are constantly seen as transgressors. Using the theoretical concepts of *Nepantla* and *la facultad*, this study demonstrates that efforts to operationalize servingness at HSIs requires a critical analysis of how deficit and racialized ideologies are developed and may exist in perpetuity if unquestioned, but also the importance of students' voices to confront deficit thinking in engineering spaces.

Introduction

Within the historical narrative of education in the United States, marginalized groups – particularly Latinos/as/xs – have been perceived as disruptive elements of the Americanization project [1]. Latinos/as/xs have been framed as individuals that are unable to succeed in academic spaces because of inherent deficits and thus unable to accommodate to the demands of American exceptionalism [2]. Engineering is no exception to this deficit framing of Latinos/as/xs. In fact, engineering has a long history of discrimination toward minoritized groups that is still present today in engineering programs [3]. For instance, Latino/a/x engineering students still contend with the enduring repercussions of deficit ideologies, racialization, and a process of assimilation through subtractive schooling [4, 5]. Engineering has, too, embraced an educational approach that aims to strip away language and ostensibly undesirable cultural elements from the students. Engineering instructors also learned methods to Americanize Mexican students, transforming the classroom into a space where students are expected to emulate "desirable behaviors" while disparaging those who adhered to their own traditions, racialized identities, and culture [6-8]. An illustrative instance of this Americanization process in engineering is observed in how engineering is presented to Latino/a/x students through Western-oriented, value-neutral ideologies, emphasizing capitalism, objectivism, and meritocracy as the values all engineers should adopt [9, 10].

In response to the inaction to provide equitable engineering education to Latinos/as/xs, researchers have drawn upon studies conducted by and for Latinos/as/xs to challenge the prevailing White narrative of American exceptionalism in engineering education [11, 12]. Borderlands scholarship, exemplified by the works of Gloria Anzaldúa [13-16], encourages researchers to explore how sociopolitical forces serve as the backdrop to current issues where oppression is still present. Employing a Borderlands theoretical lens, engineering education research has the potential to expose the origins of sociopolitical forces and analyze their

impact on students' lived realities, revealing the interconnectedness of the political, personal, and educational spheres they inhabit.

In this paper, the concept of *Nepantla*, a stage within Anzaldúa's Borderlands theory [14], is employed to explain how Latino/a/x engineering students navigate social forces while existing in two distinct spaces in response to institutional prejudice. *Nepantla* suggests that individuals inhabit liminal spaces where conflicts arise, new meanings emerge, and identities take shape. Moreover, *Nepantla* is also the space where individuals gain *la facultad* – a higher sense of perception, intuition, and spiritual insight [14]. Drawing from these theoretical concepts, I sought to answer the question: how and in what ways do Latino/a/x engineering students use *la facultad* to navigate dominant discourses as they move through the liminal spaces created through their engineering pathways? Through a series of *pláticas* [17, 18], I analyzed the sociopolitical factors that influence Latino/a/x engineering students' entry, persistence, or departure from their engineering journeys while shedding light on how "surface actions" have enduring impacts on engineering students. The study's implications underscore the importance of recognizing and creating awareness about these actions, as this may assist engineering educators in identifying how sociopolitical forces are (re)enacted, perpetuated, and challenged in classrooms, common spaces, and research.

Theoretical Framework

To conceptualize the liminal spaces that Latino/a/x engineering students navigate, I draw from the concept of *Nepantla*, a stage developed within Anzaldúa's Borderlands theory of *conocimiento* [14], to describe how Latino/a/x engineering students negotiate complex social dynamics while inhabiting engineering spaces and how they respond to these situations. *Nepantla* exemplifies the liminal realms where intersections give rise to new meanings and where multifaceted identities emerge. Through the lens of *Nepantla*, I explore in this paper the experiences of Latino/a/x engineering students at a Hispanic Serving Institution (HSI) in South Texas as they navigate the convergence of diverse cultures, languages, and their reconciliation with often disparate and conflicting identities.

Nepantla, as described by Anzaldúa [16], is a space – whether physical or metaphorical – where two dissimilar worlds collide. *Nepantla* is not just culture dependent, it is also related to language, politics, social constructions and hierarchies, historical background, and socioeconomic status among other social constructs. As Anzaldúa explored her own upbringing and lived reality, she deconstructed those spaces she inhabited where she faced discrimination and ambiguity to imagine and (re)shape a third space where new realities could exist [16]. Through a process of self-reflexivity, Anzaldúa explains, *Nepantla* becomes a (re)imagined space rather than a dichotomy of worlds [16]. Anzaldúa claims that *Nepantlas* often emerge through writing – the writing that comes from deep and critical reflection that eventually leads to a process that catalyzes transformation.

Nepantla is also a way to explore the world through lived experience and engage in decolonial thinking. Anzaldúa [16] argue that challenging traditional and normative notions of reality becomes a way to challenge traditional methodologies – a process of decolonization. For engineering education research, this process of decolonization is particularly important because counternarratives are necessary to more critically assess the cultures of engineering [6, 19, 20]. *Nepantla* offers a framework for examining how sociopolitical forces—intersections of ideologies, behaviors, beliefs, values, and dominant policies—have shaped the educational journey of Latino/a/x engineering students,

challenging established notions of what constitutes reality and for whom [21]. It provides a particular framework that breaks from the traditional white methods [22] used in engineering education because *Nepantla* questions how social practices and power dynamics generate spaces where "the only 'legitimate' inhabitants are those in power, the Whites and those who align themselves with Whites" [14].

Nepantla serves as the crucible where cultural and personal codes collide, birthing new identities [14, 16]. It is where constant tension reigns, offering the potential for reconciliation and transformation of the self. *Nepantla* allows us to embrace such contradictions no matter how logical or illogical, realistic or unrealistic, they may be. "In *nepantla*, contradictory states or meanings don't just coexist, they energetically mingle and converse" [21]. *Nepantla* compels us to confront daily routines, expose our deepest fears, and challenge the contradictions within authoritative figures and groups. It embraces diverse forms of cognition, perspectives, worldviews, and belief systems while serving as a liberatory space for understanding our multifaceted realities [23]. *Nepantla* is not merely a framework for exploring conflicting lived experiences, sociopolitical influences, and liberatory journeys but also a tool for theorizing identity transformation amidst adversity [21].

Within *Nepantla*, we attain *la facultad*—the ability to perceive beyond surface appearances, delving into the hidden layers of existence [16]. *La facultad* represents heightened awareness cultivated through the tumultuous vortex where realities collide. According to Anzaldúa's writings [21], *la facultad* represents "a kind of survival tactic people caught between the worlds unknowingly cultivate," and is "deeply embodied" (p. 132). It serves as an interpretative tool for individuals to reclaim their cultural identity [23], challenging imposed realities and providing an epistemological bridge to unveil deeper truths. *La facultad* leads to resistance by enabling individuals to embrace divergent identities while questioning the sociopolitical realities of their world. *La facultad* is a quick, almost instinctive perception that doesn't rely on conscious thinking, and those who have this sensitivity are very aware of the world around them [14]. Those who feel different or unsafe are more likely to develop this sense as a way to protect themselves.

In this paper, I leverage the concepts of *Nepantla* and *la facultad* to illuminate how Latino/a/x engineering students navigate their sociopolitical experiences and grapple with their lived realities, straddling distinct worlds: their personal experiences and the realm of engineering. I use these concepts to demonstrate the inner agency of these students and the ways in which they reject dominant discourses as they move through their engineering programs.

Researcher Positionality

I am a first-generation, bilingual (Spanish L1 and English L2), Mexican American engineer from a low-socioeconomic background. As a *transfronterizo*, I also experienced living in the borderlands – both geographically and metaphorically speaking – similarly to the experiences described by the participants in this paper. It is this closeness to similar lived realities that I was able to build the *confianza* to conduct the research. Driven by my own experiences in the United States and Mexico, my teaching and scholarly work seek to promote and incorporate social justice issues in the engineering curricula, primarily the development of critical consciousness in engineering to nurture engineers' ability to meaningfully engage with these social justice issues. It was through my own self-reflexivity as a materials engineer working on different projects around the world and asking "what is engineering for and who does it benefit?" that I started to become more critical of the world around me and work toward

developing my own critical consciousness or *conocimiento* [24]. I began my engineering education career by studying the ways in which different ways of knowing, doing and being impact engineering narratives and practices, with a particular focus on dismantling dominant discourses that (re)produce deficit models.

As a critical scholar invested in racial equity, my broad aim is to elevate these students' voices, epistemologies, and help (re)frame Latino/a/x engineering students as holders and creators of knowledge [25-27] that should be acknowledged in our pursuit of educational equity in engineering. My research opposes the notion that students possess inherent deficits that must be "fixed." Instead, I argue that these deficit ideologies further marginalize students and perpetuate false models of meritocracy in engineering. I believe that research in engineering education must honor the lived experiences of those who have been left at the margins historically, and honor the work of those critical scholars from our communities to decolonize the methodologies employed in engineering education research. It is through these actions and epistemology that I conduct this research with Latino/a/x engineering students.

Methodology

Research context and participants

The data presented in this paper stem from a subsection of a larger longitudinal research study conducted across multiple research sites in the U.S. Southwest [28]. This paper focuses on the data collected from 6 participants attending a Hispanic-Serving Institution (HSI) located in South Texas. This HSI was selected as the focus of the current analysis because of its relevance to the study's overarching objectives to explore how sociopolitical and historical contexts impact the trajectories of Latino/a/x engineering students at HSIs and emerging HSIs. In addition, given that Texas is one of the states that has seen recent legislation impacting diversity, equity and inclusion initiatives while negating the historical and existing educational inequities in the state [29], it is imperative that engineering education researchers critically engage in conversations concerning the intersections of policy, sociopolitical contexts, and lived experiences of minoritized populations.

While the larger study encompassed a total of 22 Latino/a/x engineering students across multiple institutions, this paper specifically examines a multi-case study involving seven participants from the same institution in Texas. These participants were recruited using consistent methods, including direct contact, snowball sampling, and recruitment at events hosted by the student chapter of the Society of Hispanic Professional Engineers (SHPE) and other student-led groups. The seven participants described in this paper were all first-generation college students hailing from low-socioeconomic backgrounds, with four self-identifying as Mexican or Mexican Americans, two self-identifying as Hispanic or Latino, and one as Honduran American. Eva, the only participant identifying as Honduran American, also identified as being Garifuna Afrodescendant or Afro-Latina. During the data collection, participants mentioned that their decision to participate in the study stemmed from a desire to share their experiences as minoritized students and contribute to a more equitable education for future Latino/a/x engineering students.

Despite their diverse backgrounds, all participants faced similar challenges related to economic disparities and academic opportunity gaps that persisted from their K-12 education into their engineering programs. These ongoing challenges highlight the importance of addressing systemic inequalities within higher education to ensure equitable opportunities for

all students, regardless of their background or circumstances. Table 1 shows the demographic information of the seven participants as well as their majors and first-generation status.

Table 1. *Students' Demographic Information*

Pseudonym	Gender	Ethnic Identification	Generation	Engineering Major	Institution Type
Alberto	Male	Hispanic/Latino	First Gen	Mechanical	HSI
Eva	Female	Honduran American / Garifuna	First Gen	Biomedical	HSI
Lety	Female	Mexican	First Gen	Civil	HSI
Leo	Male	Mexican American	First Gen	Mechanical	HSI
Luz	Female	Mexican American	First Gen	Biomedical	HSI
Mauricio	Male	Hispanic	First Gen	Biomedical	HSI
Sole	Female	Mexican	First Gen	Chemical	HSI

Data collection and analysis

Although the larger study involved the collection of ethnographic data in the form of one-on-one *pláticas*, focus groups, and document analysis, as approved by IRB (FY21-22-33), for this analysis only one-on-one *pláticas* were considered. In total, about 100 hours of *pláticas* were collected over a period of three years. *Pláticas* are informal dialogues or conversations that serve as a key methodology in educational research, particularly within critical and culturally responsive frameworks [18, 30]. They encompass a range of interactions, including check-ins, catch-ups, *regañadas* (reprimands), *consejos* (advice), storytelling, *chisme* (gossip), *dichos* (sayings), *cuentos* (stories), and more [30]. *Pláticas* are deeply embedded in Latino/a/x and Indigenous cultural traditions, representing a familiar relational approach characterized by warmth, empathy, and community-building [17].

In educational research, *pláticas* are utilized to gather qualitative data and insights from participants in a manner that challenges Eurocentric ways of knowing, doing, and being. By embracing informal and culturally resonant communication styles, *pláticas* offer an alternative to traditional academic discourse, which may marginalize or exclude diverse voices and perspectives [18, 31]. *Pláticas* in this study provided a space for participants to share their lived experiences, perspectives, and challenges in educational contexts, allowing the researcher to uncover nuanced understandings of complex issues within sociopolitical and historical contexts to further contextualize their trajectories through engineering spaces.

One of the key features of *pláticas* is the emphasis on vulnerability [18, 30]. Participants were encouraged to share openly and authentically, creating an environment of *confianza* (mutual and reciprocal trust) and mutual respect between researcher and participants. As an engineer conducting this research, I also shared my own experiences of discrimination within the field of engineering, establishing a sense of solidarity and understanding with the participants. This reciprocity of trust and vulnerability helped foster a supportive environment where participants felt comfortable discussing their experiences of marginalization and discrimination. Over the course of three years, the *pláticas* provided a safe space for participants to unpack their experiences and shed light on systemic issues that often go unaddressed by institutions and engineering programs.

Each *plática* was transcribed verbatim and analyzed using a systematic coding process, drawing on both inductive and deductive coding methods [32, 33]. The coding process relied on what Dolores Delgado Bernal describes as "cultural intuition" [27], which highlights the unique knowledge that Chicano/a scholars bring to their research. Cultural intuition refers to the understanding, awareness, and sensitivity researchers must possess regarding the cultural contexts of the communities they study [27]. In this case, being part of the Latino/a/x community in engineering, raised under similar sociopolitical contexts in the U.S.-Mexico borderlands, allowed me to recognize the cultural norms, values, beliefs, and practices that shape the lives of the participants in this study, and provided the guidance necessary to critically analyze the data from a culturally situated perspective. Thus, cultural intuition was essential for conducting research that accurately represented the experiences and perspectives of the participants, as well as ensuring that research questions, methodologies, and data collection strategies were culturally relevant and sensitive.

The themes that emerged from the data analysis were further examined through the theoretical lenses of *Nepantla* and *la facultad*, as described by Gloria Anzaldúa through her work [21, 34]. These frameworks helped contextualize the participants' experiences within broader sociocultural and institutional dynamics and historical framings of Latinos/as/xs in the borderlands, highlighting the complexities of identity, power, and resilience within engineering education.

Results

Data analysis showed that sociopolitical factors rooted in historically racialized discourse created different challenges that negatively impacted students in their engineering journeys. It is important to note that the topic of racialization was at the front and center of almost every *plática;* thus, showing that the racialization of Latinos/as/xs is well and alive [35-37]. Findings suggest that issues like (1) racialization in engineering spaces, (2) language subtraction, and (3) gender stereotypes and expectations constantly placed students in *Nepantla*. It is in these scenarios that students often develop la *facultad* and the ability to see in surface actions the deeper meaning of their surroundings. Below, I describe these three themes that emerged from the data using representative excerpts from the participants.

Racialization in engineering spaces

As described previously in results emerging from the larger study [28], the portrayal of engineering as a rigorous and male-dominated field contributed to the perception among participants that engineering is not a suitable path for them. Nonetheless, in the context of this study and taking into consideration the HSI status of the institution, it is noteworthy to

highlight the ways in which racialization was constantly present and often ignored. Some of these mechanisms of racialization included the use of racial categories in official documents (e.g., scholarship applications, demographic forms), stereotypes (e.g., portraying Latinos as lazy, uneducated, unable to perform academically [5, 38, 39]), and discriminatory policies, particularly for Deferred Action for Childhood Arrivals (DACA) students. Racialization in engineering spaces was often enacted through actions that portrayed Latinos/as/xs as incapable of performing academically while questioning their abilities. This involved being seen by fellow students, professors, and administrators as lacking the necessary qualities to be successful engineers. They encountered messages communicated through symbols, language, and practices that labeled them as outsiders in those spaces, creating an unwelcoming environment and feeling out of place. For instance, participants mentioned instances of racialization when they were questioned about their "origin" by others and racial signifiers were assigned to them based on phenotypical characteristics or even their language. Lety – a first-generation Mexican chemical engineering student with DACA status – mentioned how she was *otherized* in engineering spaces not only for the way she looks but also opened the door for others to question her citizenship status and her inability to do certain things as the rest of her engineering classmates:

> They [classmates] are like, "oh, but you don't look Mexican. Oh, but you don't look like you speak Spanish." I've been told I look Asian, I look white, I look different than what people would consider a *stereotypical* (emphasis added) Latino I guess…[but] that's just the look that they equate it to [when they question citizenship]. It's just the, the stereotype that they immediately are drawn to. Yeah. It's not just – it's not just Mexicans. It's a lot of Europeans [that have DACA status]… If I tell them, "oh, I'm a DACA recipient," their response is "oh, what is that? Explain that." Or, "what do you mean you can't do that," you know? So, I think it's just having to constantly explain it because that gets tiring, and you have this script in your head [to answer their questions]. That's the frustrating part.

It is important to note here that racialization itself was initiated because only those "unmarked" are considered white. That is, individuals who are perceived as not belonging to the "master category" [40] or the default category within the U.S. society (i.e., white) are the targets of questioning because they possess *visible* markers of race or ethnicity that deviate from this norm. This excerpt shows how racialization was a way for others to "question" Lety's citizenship (i.e., DACA status) while white-presenting individuals (i.e., European) that may also have DACA status are never questioned about it. In fact, Lety noted that being racialized and having DACA status "is multilayered, it's multifaceted," because she has to constantly explain to others not only why she identifies as Mexican but also why she does not have access to financial aid. Racialization, as conceptualized by Omi and Winant, involves the imposition of racial meanings onto individuals or groups based on perceived physical characteristics, cultural traits, or social attributes [40]. In this case, Lety's experiences demonstrate how her racial identity as a Mexican is constructed and interpreted by others in a way that influences their attitudes and behaviors towards her, as well as the ways in which she navigates those interactions (i.e., *Nepantla*).

As a result of the constant racialization and existing in a *Nepantla* state where participants tried to make sense of their lived realities, participants demonstrated that they gained *la facultad* as they tried to (re)define their identity. Participants noted how throughout their engineering pathways they became more aware of how they were represented or forced to identify based on how their bodies and language were racialized. They often found ways to

reject this racialization on their own. For example, Luz – a first-generation Mexican American biomedical engineering student – rejected the monolithic ways in which she felt she was forced to identify [41] herself after she took a Mexican American Studies course:

> Over the summer I took a Mexican American Studies class, and it was really interesting. So, I've always felt weird saying that – well, not weird, but I feel like people assume, or make a lot of assumptions straight up about you [based on how you look]. They're like, "okay, you said Mexican, not Mexican American" or, "um, so were you born in Mexico? You're saying you're Mexican." And I guess I learned a little bit about the different experiences being either raised Texan, and Mexican, and Mexican American. And because of that I would just say I'm Mexican American. And so, being born here and being raised here my whole life is a different experience.

As indicated by Luz, a sense of "awakening" was provided by *la facultad* to see beneath those lived experiences as a person of color born and raised in the United States. She also reclaimed her identity as she developed *la facultad* while straddling different and conflicting narratives about how she should identify herself. Moreover, she also resisted the labeling she was given by others by emphasizing that lived experiences are unique to identity formation.

Although resistance toward their racialization was evident in the data, it was racialization itself a factor that made participants feel alienated in engineering. Participants noted being "ignored" or "diminished" by professors when asking questions in class while white students were not reprimanded for now knowing the answers. For instance, Eva – a first generation, Afro-Latina Honduran American biomedical engineering student – described how during a Chemistry class she and some of her friends were insulted by a white-presenting professor, which eventually deterred Eva from getting a minor in Chemistry:

> Yeah, she was like, "Are you guys stupid?" I think after our first exam, the average was like a 40. And I remember that because I was so proud of my folks. I got like a 50 and I was like, okay, it's a little above the average. But she was like, "Are you guys stupid or what? Because that test wasn't even hard." And she would, like, ask us questions during lectures, and if you said the wrong answer, she'd be like, "Nope, wrong. Next." Like, she never was like, "okay, what are you doing that you're getting the wrong answer?"… I don't know. I just don't think she should have been a teacher… I wanted to get a minor, and in talking to my advisor he was like, "Oh, Chemistry and a Physics would fit really good into your credits." And I was like, definitely not going to do Chemistry. I could not do that again.

Eva's experience of being insulted by a white-presenting professor and feeling deterred from pursuing a minor in Chemistry due to this experience can be understood as a form of racialization. The professor's derogatory remarks and dismissive behavior towards Eva and her classmates – all non-white-presenting students – may stem from racial biases or stereotypes about the academic capabilities of students of color – something that has been noted elsewhere (e.g., [38, 39]). This incident highlights how racialization can manifest in educational settings through discriminatory treatment and the perpetuation of harmful stereotypes based on race or ethnicity. The professor's actions imply assumptions about the academic abilities and intelligence of Latino/a/x students, reinforcing racial stereotypes and hierarchies.

It was actions like these that prompted students to question their own identity and how they presented themselves in engineering spaces. That is, participants navigated the racialization they encountered throughout their engineering trajectories while navigating their own racial and ethnic identity. The impacts of racialization extended beyond microaggressive behaviors, influencing the beliefs of others who associated minoritized students with lowered academic standards. Often, these beliefs led others in positions of power, such as Ph.D. students acting as mentors in research labs, to take actions that signified that the participants were not worthy of their time, their mentoring, or their spaces in the lab. Although often subtle, participants gained *la facultad* to see when preferential treatment was given to white students over students of color in engineering spaces. Often these events made participants question whether or not they belonged in the spaces they occupied because they were frequently removed from those spaces automatically. For instance, Luz described her experience in the biomedical engineering laboratory as she was doing research over the summer as detrimental to her decision to continue in engineering for graduate school. She was under the supervision of a white Ph.D. student, and worked in the lab with another Latina student and one white student. She described the preferential treatment from the Ph.D. student toward his white mentee as follows:

> You could just tell, like, if we asked [the Ph.D. student] a question, he was just very much like, annoyed, like, "why are you bothering me?" kind-of-way. But if his mentee asked him a question, it was like immediate attention, immediate help. Like. Like it was more urgent.

Eventually, Luz's Latina lab mate left the research laboratory after one month and she was under the expectation that she would be able to continue to sit at the same lab bench they both shared. However, one day after coming back from lunch, she found out that she had been removed from her work bench without notification from anyone:

> So, me and this girl had been sharing a desk for like the month…And I was under the impression that when she left, I would keep sitting there. Uh, and the week that she leaves, I come back and there's a note on the desk from [the Ph.D. student's mentee]. A note with the name of one of the guys in the lab. He's like, "I'm claiming this spot." And so, I was like, okay. And I guess while I've been gone [for lunch], he had moved all of the papers and stuff… and I was like, wow, nice. So, that was also not great. So. I was obviously upset but I felt like kind of dumb for being upset because I was like, wow. Like, can I even say I'm not? You took my spot, but it also felt really childish of him to do that… Then after that, I was kind of like, it's definitely not something I want to pursue [the Ph.D.].

This excerpt describes how racialized ideologies shape the dynamics in engineering research labs, impacting Latino/a/x engineering students by excluding them and defining who brings knowledge, or who is worthy of mentoring (often along racial and ethnicity lines). Scholars have highlighted how racialization has contributed to portraying Mexican American students in the U.S. Southwest as culturally deprived and disadvantaged, affecting their educational opportunities [39, 42]. These examples of experiences in research laboratories are of extreme importance to recognize, particularly because there has been a big push for more research experiences for undergraduate minoritized populations. Nonetheless, the lack of awareness of how undergraduate students notice and internalize racialized ideologies encountered in engineering research laboratories can be detrimental to those research experiences in general because they may contribute to distorted assumptions about academic ability. Participants

later reflected on the negative connotations associated with being a non-white individual in predominantly white spaces [43], emphasizing the significance of not being seen as capable individuals in engineering.

Language Subtraction

A recurrent theme in the data was the impact of language subtraction on the education of Latino/a/x students and their experiences within the field of engineering. Participants expressed frustration with the language subtraction they encountered throughout their educational journey and discussed how it affected their relationships with family and community members. Furthermore, they highlighted the perception of engineering spaces as environments where English is expected to be the dominant language. Participants also pointed out the harmful effects and discriminatory implications of teachers instructing against the use of languages spoken at home, and even the impacts of going to college and the lack of opportunities to speak their mother tongues. For instance, Mauricio – a first generation Mexican American biomedical engineering student – shared how moving to college created a complete shift in his linguistic practices despite being at an HSI:

> It is just like the way of life. Like in [the U.S.-Mexico Border], I'd always, I was speaking Spanish consistently, consistently with everyone and their grandparents, with people who would speak Spanish. Only up here, I don't really have the opportunity to speak as much Spanish because all my peers speak English … It's not necessary for me to speak Spanish as much.

During this *plática*, Mauricio also mentioned that after receiving bilingual education services in K-12, none of that support was present at his current institution despite being a Hispanic Serving Institution. After reviewing the catalog of courses offered at the institution, it was noted that there are several courses that are offered either fully in Spanish or in a bilingual modality but none of the courses were STEM-related. This demonstrates that the lack of consideration to bilingual support or bilingual STEM classes in higher education, perhaps because of the perception that people must be English proficient before engaging in any STEM activity – an indicator of language subtractive ideologies [44].

It is also important to note that Spanish was not the only primary language spoken at home. Participants had parents who spoke indigenous languages such as Garifuna, Mixteco, and Otomí. For instance, Eva indicated that her parents spoke Garifuna, a minority language of the Garifuna people in Honduras, but it was never taught to her because it was discouraged at home for being perceived as "unnecessary":

> My dad is from Honduras. He's like from the, I don't know if you would call it the [Caribbean] side, but like it's like the beach side and they speak Garifuna. I don't know how to speak it or understand it or write it because my dad never taught it to me. But when my dad is on the phone with my grandma, his mom, like, he'll speak it sometimes… I mean, I want to learn it. I for sure I want to learn it. But since I didn't grow up hearing it now or speaking, like, it's going to be hard.

Eva recounted instances where teachers or school staff advised her parents to stop mixing languages, citing concerns about confusion and adverse effects on her education. In this excerpt, Eva raises a thought-provoking situation indicating that languages spoken at home (other than English) are seen as unnecessary, eventually leading to the loss of the language

and further impacting the social and cultural connections with their community. These conversations about language subtraction also highlight participants gaining *la facultad*, which allows them to question whose linguistic practices are valued while simultaneously questioning how and why languages other than English are placed in a lower hierarchical status.

It has been well documented that language subtraction has been happening in the U.S. Southwest for a long time [42, 45, 46]. This historical language subtraction has also had a generational impact on participants. Alberto – a first-generation Hispanic/Latino mechanical engineering student – alluded to this language subtraction and how it impacted his learning of Spanish saying,

> Growing up my mom was very fluent with Spanish and English, but she only talked to us in English, which was a bummer because now I struggle and I don't speak Spanish. I think it was more of a choice she made, and, especially, I know a lot of people that have that same background where their parents are very fluent in Spanish and they just wanted their kids to learn English, you know?

Then, he talked about the reasons why his mother decided not to encourage him to speak Spanish:

> I know back in the early or within the 1950s, the mid 1900s, that it was still in school, like, you couldn't speak Spanish, a lot of the students, they really – I mean, of course, white students and teachers really pushed for students not to speak Spanish in school. And I know even some people got picked on for it, you know, one of my aunts, two of my aunts actually got picked on for it. So, they stopped speaking Spanish altogether at school.

Alberto reflected on how the school lived experiences of his parents influenced the loss of language, and how as a result parents decided not to speak a language other than English to their children. The historical sociopolitical landscape of the region had an impact on the way the participants were able to celebrate their linguistic practices. It is important to note that although the participants did not mention any instances where their linguistic practices were challenged at their campuses, they lamented the institutions not giving them credit for being heritage Spanish speakers even though they claim to be HSIs and serving Latino/a/x students. The participants also mentioned the long-term impacts of not dominating the language that their parents and family members speak at home, and the generational trauma that it can cause.

Gender Stereotypes and Expectations

The third prominent theme arising from the data revolves around challenging gender stereotypes and expectations within engineering spaces. This theme encompasses instances where participants encountered actions that conveyed the normativity of male and masculine behaviors, effectively rendering other gender identities invisible. These incidents shed light on the prevalent hypermasculine culture in engineering [47-49]. For instance, Leo – a first-generation Mexican American mechanical engineering student – observed a lack of visibility of LGBTQIA+ students in engineering:

> In engineering I feel like I don't know that many [LGBTQIA+ students]. Yeah, not many people are open. Actually, just my roommate. Because he's an electrical engineer. And then I know an upperclassman. Well, he already graduated, but I only talked to them like on a few instances… Well, yeah, there's not too many of them, I guess, because everyone just. Yeah. The norm. Just straight. Yeah. Just straight people. We're just like, yeah, straight people. Straight engineers.

Leo mentioned limited interactions with LGBTQIA+ peers due to the normative expectation of straightness within the engineering community. Leo had *la facultad* to see the invisibleness of LGBTQIA+ engineering students rendered by norming engineering as a masculine profession. Leo's reflection also highlights the discomfort in discussing issues of visibility on campus, emphasizing that despite the presence of LGBTQIA+ support organizations, the norm in engineering remains predominantly "straight." He mentioned offering support from the sidelines, as the prevailing messages (i.e., surface actions) within engineering did not foster a supportive environment for LGBTQIA+ students.

In addition, participants also revealed the toxic environments fostered by various surface actions in classrooms, initiated by both professors and peers. Latinas, particularly, mentioned often facing the challenge of not being taken seriously in engineering spaces. For example, Sole – a first-generation Mexican students in chemical engineering – recounted an incident where a professor made a dismissive comment about female students' knowledge regarding a car-related problem:

> I kind of just remember that it was [a problem] about a car. We were talking about, like, the angles and the whole gist of it of the class. And [the professor] is like, “oh, females don't know this.” And then he's like, “Oh, who knows about this part (while showing a tool)? This tool.” And so, I raised my hand and some females did too. He's like, “Oh my gosh, women know this! Oh, this is the first time.” And then he said, “Oh, your dad taught you, right? Or it was your boyfriend? They told you about it.”

The professor insinuated that women wouldn't have knowledge in this area, attributing Sole's understanding to her father or boyfriend, undermining her expertise. This example illustrates the common occurrence of Latinas not being taken seriously in engineering classrooms and how surface actions, even from professors, contribute to this issue. Sole's experience also underscores the sociopolitical landscape in which certain individuals, particularly males, are deemed knowledge holders, perpetuating hierarchical structures where only a select few can bestow knowledge onto others.

Participants also noted that the expectations for being a woman in engineering are exacerbated when coming from a Latino upbringing. Being in this state of *Nepantla* – navigating family responsibilities and their own schooling – gave participants *la facultad* to understand the world through multiple perspectives, especially those shaped by cultural insights. Female participants, in particular, demonstrated an acute awareness of the cultural expectations and familial obligations that influenced their decisions and actions. Luz, for example, articulated a deep sense of connection to her family and acknowledged the importance of considering their needs and aspirations in her choices. She indicated that “making such big life decisions” like going to college to study engineering impacted her whole family. When asked about how she has experienced life differently from someone who does not identify as her, Luz replied:

> I feel like I take my family into account for everything that I do. And just even comparing it to my boyfriend, like, he's pretty much, like, just white, and he doesn't have to do that. He's like, “Oh, I'm going to move out. I'm just going to get an apartment by myself.” And, you know, I'm like, Oh, I don't want to take summer classes because I don't want to potentially have to ask my family for money… So, I feel like everything I do is just kind of like about my family. Because that's how you're raised like, you know, you're so tight knit and you're doing this for your family. You're doing this to give everybody a better life, hopefully. And I feel like other people just are so, like, free to just worry about themselves.

This awareness reflects an understanding of the cultural and familial influences that shaped her worldview, suggesting a level of insight into her own experiences and those of her community. Additionally, Luz contrasts her own experiences with those of her boyfriend, a white male, highlighting the differences in the freedoms they perceive in making decisions about their lives. By recognizing and articulating these disparities, Luz demonstrates an awareness of the intersectional dynamics of gender, ethnicity, and cultural expectations. In gaining *la facultad*, participants showed a heightened sensitivity to the complexities of their identities and the social structures that shape their experiences.

Discussion

The results indicate that Latino/a/x engineering students are constantly thrown into a space of *Nepantla* as they move through their engineering journeys. Values, behaviors, practices, and ideologies encountered in this liminal space [21] originate from a longstanding process of racialization affecting the education of Latinos/as/xs [35, 50]. Harmful policies, including the prohibition of bilingual education and reduced support for low-income, first-generation students, continue to have repercussions for Latino/a/x students in the U.S. Southwest [5, 51]. Deficit ideologies are also present in engineering classrooms and laboratories where racialization has led to the framing of Latino/a/x engineering students as deficient or inadequate [38, 39, 52]. For instance, the comments from Lety's classmates, such as "oh, but you don't look Mexican" or "oh, but you don't look like you speak Spanish," reflect the ways in which racial stereotypes and expectations shape perceptions of ability and identity [16, 40, 53]. These remarks suggest that even engineering classmates have preconceived notions about what a "stereotypical" Latino or Mexican person should look like, and when individuals do not fit these stereotypes, they express surprise or disbelief. Also, the questioning of Lety's citizenship, particularly in relation to her DACA status, is just one example that further illustrates how racialization operates as a mechanism of exclusion. Despite being racially categorized, Latino/a/x engineering students face additional scrutiny and interrogation about their bodies, language, and legal status. This scrutiny reflects broader societal narratives and attitudes towards immigration, citizenship, and belonging, wherein individuals perceived as racially or ethnically "other" are subjected to suspicion, while those who are white-presenting may not face similar scrutiny [35, 40, 50].

The findings also indicate that Latino/a/x engineering students consistently navigate their presence in liminal spaces, embodying the state of *Nepantla* [13, 14]. Additionally, participants develop and possess *la facultad*, enabling them to perceive deeper meanings in their experiences [14, 16] as they traverse their engineering journeys. It is crucial to acknowledge that being in a state of *Nepantla*, as emphasized by Anzaldúa [14], compels participants to continually question their realities and challenge their perceptions of the spaces they inhabit. The data suggests that students are (re)imagining the space of

engineering by rejecting the notion of a strict dichotomy between different worlds or identities. Instead, they navigate a space of complexity and fluidity, embodying their own *Nepantlas*. By embracing *Nepantla* and developing *la facultad*, participants questioned the realities that have been presented to them (i.e., engineering is meritocratic, people of color do not belong in engineering, etc.), and demonstrated their inner agency and rejection of dominant discourses within engineering programs. This rejection of binaries and embracing of complexity signifies a (re)imagination and (re)positioning of engineering as a space where multiple identities, perspectives, and experiences intersect and coexist. The field of engineering is predominantly characterized by ideals such as meritocracy [9], objectivity [9, 54], competitiveness [54], and hypermasculinity [48], as observed by the participants straddling the realms of engineering and their familial/cultural world. Rather than viewing engineering as a rigid domain separate from other aspects of their lives, participants engaged with it in a way that acknowledges and integrates their diverse lived experiences and identities.

The use of *Nepantla* in this context also challenges the perceived notion that engineering spaces at Hispanic Serving Institutions are intended to serve Latino/a/x students, while the concept of *la facultad* highlights the agency and resilience of Latino/a/x students. It is this agency and resilience that empowers them to reclaim their cultural identities and develop engineering identities that are not dissonant with their backgrounds. While the context of the institution (i.e., HSI) in this study is supposed to offer cultural affirmation to Latino/a/x students, it still upholds the traditional cultural landscape of engineering [6]. The participants' perspective reveals that the social practices and power dynamics within engineering remain unchallenged and unchanged. The universalized narratives and boundaries of engineering persist [8, 55], shaping not only the sociopolitical realities of the students but also contributing to the racialization of students within engineering spaces at an HSI.

Finally, this research serves as a call to action for institutions of higher education and educators to become more aware of the surface phenomena and actions that are often unseen or ignored that create negative environments for Latino/a/x engineering students. By centering their voices and experiences, this research contributes to a more nuanced understanding of the challenges faced by Latino/a/x engineering students and underscores the importance of inclusive and supportive practices within engineering education.

Conclusion and Implications

As Latino/a/x engineering students face these challenges in engineering, it is important to note that they are constantly trying to (re)construct their identities as engineers. Despite their seemingly innocuous nature, the actions of those inside engineering spaces frequently derive from the historical racialization of Latinos/as/xs, resulting in lasting impacts. For instance, advocating for English-only education to prevent students from "getting confused with their home language" may appear as a simple suggestion (i.e., a surface action) but, in reality, perpetuates the removal of language and cultural identity from students in the name of Americanization.

It is important to mention that the research presented here is not meant to propagate *el pobrecito* syndrome [56], or the misguided belief that students from low-income, minoritized backgrounds have several challenges and we cannot expect much from them. On the contrary, this research highlights the agency that exists among Latino/a/x engineering students and the resilience that allows them to continue on their engineering journey despite

the challenges and constant racialization faced. This research is instead a call to institutions of higher education and educators in general to become more aware of the surface phenomena and actions that create negative environments for students – all of which we are active participants – particularly at Hispanic Serving Institutions. Latino/a/x engineering students have the ability to cultivate *la facultad* to reclaim their own cultural identity and develop an engineering identity in ways that are not dissonant. Engineering programs can also provide the space for students to develop their own engineering identity in healthy ways by ensuring that their ways of knowing, doing and being are valued and acknowledged. For instance, HSIs can begin to recognize heritage Spanish speakers as valuable contributors to engineering knowledge creation without constantly challenging their intellect or their linguistic practices. Engineering programs can also ensure that bilingual STEM courses are offered for engineering credit to promote the idea of bilingualism, and recognize that engineering knowledge is not just created in English-only contexts. Also, this research provides an overview of the types of deficit ideologies currently existing in engineering contexts, including the idea that English proficiency is necessary before engaging in STEM activities. Thus, challenging these deficit perceptions is important for the development of Latino/a/x engineers in the U.S. Southwest. Additionally, institutions of higher education can find alternative ways to give Spanish heritage speakers credit for speaking a second language rather than continuing to emphasize the use of standardized tests to prove language proficiency. Developing *la facultad* is also an act of resistance to ensure HSIs and emerging HSIs become accountable for what they promise to Latino/a/x engineering students.

Institutions, especially those designated as HSIs, need to uphold their promises to serve Latino/a/x students by actively addressing the social practices and power dynamics within engineering education that perpetuate racialization and marginalization. This requires a commitment to accountability and ongoing efforts to dismantle systemic barriers and create more equitable opportunities for all students. Engineering programs could also prioritize professional development programs for faculty to identify how racialized and deficit ideologies may be enacted in the classroom and directly address them. There is a need for engineering programs to actively address deficit ideologies to challenge stereotypes and misconceptions about Latino/a/x students' academic abilities and identities.

This research provides a description of how “surface actions” create long-lasting impacts on engineering students. Implications of this study suggest that recognizing these actions and creating awareness may serve to help engineering educators identify the ways in which sociopolitical forces are (re)enacted, perpetuated, but also challenged in the classroom, in common spaces, and in research. Future research should explore how developing *la facultad* allows students to help others in nepantla to circumvent the obstacles of engineering pathways, and how faculty can also develop *la facultad* to see beneath the actions, behaviors, attitudes, or norms they may perpetuate in their classrooms.

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References

[1] C. K. Blanton, "From intellectual deficiency to cultural deficiency: Mexican Americans, testing, and public school policy in the American Southwest, 1920–1940," *Pacific Historical Review,* vol. 72, no. 1, pp. 39-62, 2003.

[2] R. R. Valencia, "Conceptualizing the notion of deficit thinking," *The evolution of deficit thinking: Educational thought and practice,* vol. 19, no. 1, pp. 1-12, 1997.

[3] A. E. Slaton, *Race, rigor, and selectivity in US engineering: The history of an occupational color line*. Harvard University Press, 2010.

[4] R. R. Valencia, *Chicano students and the courts: The Mexican American legal struggle for educational equality*. New York: New York University Press, 2008.

[5] A. Valenzuela, *Subtractive schooling: US-Mexican youth and the politics of caring*. Albany, NY: State University of New York Press, 2010.

[6] E. Godfrey and L. Parker, "Mapping the cultural landscape in engineering education," *Journal of Engineering Education,* vol. 99, no. 1, pp. 5-22, 2010.

[7] J. A. Mejia, R. A. Revelo, and A. L. Pawley, "Thinking about racism in engineering education in new ways [Commentary]," *IEEE Technology and Society Magazine,* vol. 39, no. 4, pp. 18-27, 2020.

[8] A. L. Pawley, "Engineering faculty drawing the line: A taxonomy of boundary work in academic engineering," *Engineering Studies,* vol. 4, no. 2, pp. 145-169, 2012.

[9] E. A. Cech, "The (mis)framing of social justice: Why ideologies of depoliticization and meritocracy hinder engineers' ability to think about social injustices," in *Engineering Education for Social Justice*, J. Lucena Ed. Dordrecht: Springer, 2013, pp. 67-84.

[10] A. E. Slaton, "Meritocracy, technocracy, democracy: Understandings of racial and gender equity in American engineering education," in *International perspectives on engineering education*, A. E. Slaton Ed. Cham, Switzerland: Springer, 2015, pp. 171-189.

[11] J. Mejia, R. Revelo, I. Villanueva, and J. Mejia, "Critical Theoretical Frameworks in Engineering Education: An Anti-Deficit and Liberative Approach," *Education Sciences*, vol. 8, no. 4, 2018, doi: 10.3390/educsci8040158.

[12] I. Villanueva Alarcón, J. A. Mejia, J. Mejia, and R. Revelo, "Latiné, Latinx, Latina, Latino, or Hispanic: Problematizing terms often used in engineering education," *Journal of Engineering Education,* 2022.

[13] G. Anzaldúa, "Now let us shift," in *This bridge we call home: Radical visions for transformation,* G. Anzaldua and A. Keating Eds. New York: Routledge, 2003, pp. 540-578.

[14] G. Anzaldúa, *Borderlands: la frontera*. San Francisco: Aunt Lute, 1987.

[15] G. Anzaldúa, *Making face, making soul: Haciendo Caras*. San Francisco, CA: Aunt Lute Books, 1990.

[16] G. Anzaldúa, *Light in the dark/Luz en lo oscuro: Rewriting identity, spirituality, reality*. Durham: Duke University Press, 2015.

[17] F. Guajardo and M. Guajardo, "The power of plática," *Reflections,* vol. 13, no. 1, pp. 159-164, 2013.

[18] C. O. Fierros and D. D. Bernal, "Vamos a platicar: The contours of pláticas as Chicana/Latina feminist methodology," *Chicana/Latina Studies,* pp. 98-121, 2016.

[19] S. Secules and J. A. Mejia, "Contextualizing the past to guide the future: Situating three critical theoretical frameworks for educational culture," *Studies in Engineering Education,* vol. 1, no. 2, 2021.

[20] A. E. Slaton and A. L. Pawley, "The power and politics of engineering education research design: Saving the 'Small N'," *Engineering Studies*, vol. 10, no. 2-3, pp. 133-157, 2018.
[21] A. Keating, *The Anzaldúan theory handbook*. Durham: Duke University Press, 2022.
[22] T. Zuberi and E. Bonilla-Silva, *White logic, white methods: Racism and methodology*. Rowman & Littlefield Publishers, 2008.
[23] E. Pérez, "Gloria Anzaldúa: La Gran Nueva Mestiza Theorist, Writer, Activist-Scholar," *NWSA Journal*, vol. 17, no. 2, pp. 1-10, 2005. [Online]. Available: http://www.jstor.org/stable/4317122.
[24] J. A. Mejia, I. Villanueva Alarcón, J. Mejia, and R. A. Revelo, "Legitimized tongues: Breaking the traditions of silence in mainstream engineering education and research," *Journal of Women and Minorities in Science and Engineering*, vol. 28, no. 2, pp. 53-77, 2022, doi: 10.1615/JWomenMinorScienEng.2022036603.
[25] D. G. Solorzano and D. Delgado Bernal, "Examining transformational resistance through a critical race and LatCrit theory framework: Chicana and Chicano students in an urban context," *Urban education*, vol. 36, no. 3, pp. 308-342, 2001.
[26] D. Delgado Bernal, "Learning and living pedagogies of the home: The mestiza consciousness of Chicana students," *International Journal of Qualitative Studies in Education*, vol. 14, no. 5, pp. 623-639, 2001.
[27] D. Delgado Bernal, "Using a Chicana Feminist Epistemology in Educational Research," *Harvard Educational Review*, vol. 68, no. 4, pp. 555-583, 1998, doi: 10.17763/haer.68.4.5wv1034973g22q48.
[28] J. A. Mejia, C. Fallas Escobar, and T. Perez, "Latino/a/x Engineering Undergraduate Students' Experiences with Racialized Ideologies: The Case of One Hispanic Serving Institution (HSI) and Three Emerging HSIs," *Journal of Latinos and Education*, pp. 1-15, 2024, doi: 10.1080/15348431.2024.2343840.
[29] E. Gretzinger and M. Hicks, "The chaos of compliance: How public colleges in two states are actually responding to DEI bans," in *The Chronicle of Higher Education* ed, 2024.
[30] A. I. Flores and S. Morales, "A Chicana/Latina Feminist Methodology: Examining Pláticas in Educational Research," in *Handbook of Latinos and Education: Theory, Research, and Practice*, E. G. Murillo Jr. *et al.* Eds., 2nd ed. New York, NY: Routledge, 2022, ch. 4, pp. 35-45.
[31] C. M. Saavedra and J. J. Esquierdo, "Pláticas on disrupting language ideologies in the borderlands," in *Disrupting and countering deficits in early childhood education*, F. Nxumalo and C. P. Brown Eds. New York: Routledge, 2020, pp. 37-52.
[32] J. Saldaña, *The coding manual for qualitative researchers*, 2nd ed. Thousand Oaks, CA: SAGE, 2015.
[33] M. B. Miles, A. M. Huberman, and J. Saldaña, *Qualitative data analysis : a methods sourcebook*, Fourth edition. ed. Los Angeles: SAGE, 2020.
[34] G. Anzaldúa and A. Keating, *This bridge we call home: Radical visions for transformation*. Routledge, 2013.
[35] B. Gonzalez-Sobrino and D. R. Goss, "Exploring the mechanisms of racialization beyond the black–white binary," *Ethnic and Racial Studies*, vol. 42, no. 4, pp. 505-510, 2019.
[36] J. San Miguel, Guadalupe, "The impact of Brown on Mexican American desegregation litigation, 1950s to 1980s," *Journal of Latinos and Education*, vol. 4, no. 4, pp. 221-236, 2005.

[37] R. Donato and J. Hanson, "Legally white, socially “Mexican”: The politics of de jure and de facto school segregation in the American Southwest," *Harvard Educational Review,* vol. 82, no. 2, pp. 202-225, 2012.
[38] R. R. Valencia, *Dismantling contemporary deficit thinking: Educational thought and practice*. Routledge, 2010.
[39] M. Menchaca, "Early racist discourses: Roots of deficit thinking," in *The evolution of deficit thinking: Educational thought and practice*, R. R. Valencia Ed., (The Stanford Series on Education and Public Policy. London: Falmer, 1997, pp. 13-40.
[40] M. Omi and H. Winant, *Racial formation in the United States*. Routledge, 2014.
[41] R. A. Revelo, J. A. Mejia, and I. Villanueva, "Who are we? Beyond monolithic perspectives of latinxs in engineering," in *American Society for Engineering Education Annual Conference and Exposition*, Columbus, OH, 2017, vol. 2017.
[42] G. J. San Miguel, "The schooling of Mexicanos in the Southwest 1848-1891," in *The elusive quest for equality : 150 years of Chicano/Chicana education*, J. F. Moreno Ed. Cambridge, MA: Harvard Educational Review, 1999, pp. 31-45.
[43] S. Ahmed, "A phenomenology of whiteness," *Feminist theory,* vol. 8, no. 2, pp. 149-168, 2007.
[44] National Academies of Sciences, Engineering, and Medicine, *English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives*. Washington, DC: The National Academies Press (in English), 2018, p. 342.
[45] G. G. Gonzalez, *Chicano education in the era of segregation*. University of North Texas Press, 2013.
[46] V.-M. a. MacDonald, *Latino education in the United States : a narrated history from 1513-2000*, 1st ed. New York: Palgrave Macmillan, 2004.
[47] W. Faulkner, "Nuts and Bolts and People' Gender-Troubled Engineering Identities," *Social studies of science,* vol. 37, no. 3, pp. 331-356, 2007.
[48] S. Hacker, *Pleasure, power and technology: Some tales of gender, engineering, and the cooperative workplace*. London: Routledge, 2017.
[49] D. Riley, "Rigor/Us: Building boundaries and disciplining diversity with standards of merit," *Engineering Studies,* vol. 9, no. 3, pp. 249-265, 2017.
[50] N. L. Cabrera, *White guys on campus: Racism, White immunity, and the myth of" post-racial" higher education*. Rutgers University Press, 2019.
[51] A. Valenzuela, "The struggle to decolonize official knowledge in Texas’ state curriculum: Side-stepping the colonial matrix of power," *Equity & Excellence in Education,* vol. 52, no. 2-3, pp. 197-215, 2019.
[52] R. R. Valencia and D. G. Solórzano, Eds. *Contemporary deficit thinking* (The evolution of deficit thinking: Educational thought and practice. New York: Falmer, 1997, pp. 160-210.
[53] H. Macias, "Language as a marker of cultural identity and commodification: The language socialization practices of multilingual, Latina/Mexican American mothers," *Critical Inquiry in Language Studies,* pp. 1-28, 2022.
[54] D. Riley, *Engineering and social justice: Synthesis Lectures on Engineers, Technology, and Society*. San Rafael, CA: Morgan and Claypool, 2008, pp. 1-152.
[55] A. L. Pawley, "Universalized narratives: Patterns in how faculty members define “engineering”," *Journal of Engineering Education,* vol. 98, no. 4, pp. 309-319, 2009.
[56] P. A. Noguera, *The trouble with black boys:... And other reflections on race, equity, and the future of public education*. John Wiley & Sons, 2009.