LEGITIMIZED TONGUES: BREAKING THE TRADITIONS OF SILENCE IN MAINSTREAM ENGINEERING EDUCATION AND RESEARCH

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The dominant discourse in engineering education has legitimized certain forms of knowledge while highlighting the perceived "inadequacies" of students of color through deficit theorizing, positioning them as needing to be "fixed" in order to be functional in that system. Unfortunately, these discourses have silenced the voices of those who are the most affected, including Latinxs. While there is a broad range of research that addresses Latinx students in engineering, the current approaches are devoid of the insider perspectives and methodologies needed to (re)frame and (re)define the ways of doing research about and with Latinxs. This theory paper presents the Anzaldúa's framework of conocimiento as a tool to provide a more holistic view of the lived realities and experiences of Latinx engineering students. We provide personal testimonios to illustrate how the seven stages of conocimiento can be used to challenge epistemological injustice in engineering education in an effort to break the tradition of silence and legitimize the experiences of those who have been at the margins of engineering.

KEY WORDS: *conocimiento, testimonio, Latinx, nepantla*

1. INTRODUCTION

"Wild tongues can't be tamed, they can only be cut out" (Anzaldúa, 1987, p. 34).

Engineering is one of the STEM fields that has sought to increase the number of Latinxs and other minoritized populations (Yoder, 2012). In this paper we use the term Latinx/xs as a gender-inclusive identifier that not only recognizes and addresses the historical oppression and invisibility of LGBTQ+ individuals with Latin American roots, but also as a form of liberation praxis that rejects imposed colonial, male-centric, linguistic practices (Scharrón-del Río and Aja, 2020). In the United States, the number of engineering bachelor's degrees awarded to Latinxs increased from 7.3% to 12.8% from 2000 to 2015, yet the number of Latinxs employed in science and engineering occupations accounted for only 6% in 2015 (National Science Board, 2018). Although more Latinxs are attending college, they continue to face many barriers, including a historical racial wealth divide, first-generation status, part-time enrollment status, and remedial placement (Campaign for College Opportunity, 2018). In engineering, research suggests that these barriers and subsequent departure are due to different factors, including systematic bias (Ohland et al., 2011), exclusionary cultures (Camacho and Lord, 2013; Godfrey and Parker, 2010; Marra et al., 2012; Villanueva et al., 2020), and the potential lack of satisfaction in terms of interests and expectations (Flores et al., 2014) among others. However, the analyses of the trajectories of Latinxs continue to be "based on the behavior of the majority, specifically the White, male population" (Ohland et al., 2011, p. 255). This epistemological perspective presumes that there is only one way to understand the world and that it is the best way of interpreting reality (Delgado Bernal and Villalpando, 2002).

In order to better analyze why the number of Latinxs in engineering continues to be stagnant even after many years of work in diversity and inclusion, it is necessary to understand the sociopolitical forces that impact Latinxs' lives and everyday experiences. For many years Latinxs have suffered the dispossession of their land and their language, particularly in the Southwest, after the Treaty of Guadalupe-Hidalgo came into effect in the 1840s (San Miguel and Valencia, 1998). Latinxs in the Southwest United States (predominantly Mexican Americans) have constituted a large minority group for several decades. They have also experienced years of inequity as a result of historical subjugation from colonizers who enforced their Americanization. Whites used different policies to maintain the segregation of schools. For many years, inferior schooling was offered to most Latinx students, including the lack of bilingual education, tracking, and reduced school financing (Fernández, 2002). In the 1960s, for example, social constructions such as *culturally deprived* or *culturally disadvantaged* were used to create the myth that Mexican American children and their households were inadequate to provide and reach the same academic achievement as Whites (Valencia, 1997, 2010; Valencia and Solórzano, 1997). Latinxs continued to be stripped from their cultural heritage and became the targets of subtractive schooling (Chavarria, 2017; Kolluri, 2020; Valenzuela, 1999, 2010). In other words, Latinxs became perpetually "otherized" in schools by the enactment of policies and the persistence of deficit ideologies.

Latinxs in engineering education have not been exempted from this sociopolitical context. Latinxs are actors within a larger system of oppression, which includes its manifestation in engineering. It is this sociopolitical analysis that contributes to a broader understanding of their identities, consciousness, meaning-making process, and

opportunities for decision-making in spaces where power dynamics that oppress Latinxs cannot be ignored.

Gloria Anzaldúa's (1987) work on borderlands theory offers the foundation for an analysis of the sociopolitical aspects that impact the lives of those who live in the borderlands (i.e., living in between spaces—both physical and symbolic). Through a combination of history, poetry, and language blending, Anzaldúa addresses the conflicts emerging from living in different cultures, belief systems, values and other aspects of everyday life. Anzaldúa described herself as a "Chicana Tejana feminist-dyke-patlache poet, fiction writer, and cultural theorist" (Keating and Anzaldúa, 1993, p. 105) and played an important role in the Chicana Feminist movement. Her own heritage and experiences provided her with the tools to theorize about the lives of Latinxs in the U.S., and to help make these "borders" visible by deconstructing hegemonic structures through *conocimiento*.

Anzaldúa's *conocimiento* framework (1987) offers an opportunity to dismantle the dominant White narrative and has the potential to center the complexities of experiences and lived realities of Latinx engineers. The purpose of Anzaldúa's seven-stage framework is to describe the stages of experiencing conflicting identities that, although distressful, contribute to the generation of new understanding, elevated consciousness, and agency. The seven stages are (1) el arrebato, (2) nepantla, (3) Coatlicue, (4) el compromiso, (5) Coyolxauhqui, (6) a clash of realities, and (7) transformation/spiritual activism (Anzaldúa, 1987, 2003; Moraga and Anzaldúa, 2015; Vallone, 2014), and are explained further in the text. The *conocimiento* framework positions Latinxs as those who not only live between worlds but as individuals who have the capacity to help others who are caught *between worlds* and help them create their own bridges for wholeness and agency. There have been some studies in engineering and STEM education that draw from some aspects of borderlands theory (Aguilar-Valdez et al., 2013; Gámez et al., 2021; Gutiérrez 2012, 2013, 2015; Mejia et al., 2017), as well as several studies in higher education (Acevedo-Gil, 2017; Conchas and Acevedo, 2020; Garcia and Mireles-Rios, 2020; Gaxiola Serrano et al., 2019). The intent of this paper is to take a deep dive on the stages of *conocimiento* as it relates specifically to engineering education research.

The feminist aspect of this theory, which reclaims agency in the rewriting of one's narrative, makes Anzaldúa's theory a helpful analytical tool in unveiling how Latinx engineers, and other marginalized populations, navigate through an academic culture that has been systemically designed to erase a person's narratives, instill oppression, and diminish their knowledge and skills in the name of acculturation. In this paper we describe acculturation as the process by which entering the world of engineering creates both *choques* (clashes) and *arrebatos* (fragmentations) that shake up the foundation of one's worldview, causing a type of cognitive and emotional dissonance where individuals are faced with the challenge of dissecting their own identity and breaking it down to create a new identity (Bobel et al., 2006). This breaking down and rebuilding of identities contributes to the labor of codeswitching for the appeasement of others (Downey and Lucena, 2004) and puts into question people's own identities as a result of the dissonances experienced.

The tradition of silence in engineering education and research (e.g., staying quiet about multiple injustices faced by minoritized individuals while highlighting perceived inadequacies) has created the assumption that groups like Latinx engineers are a mono-lithic group (Revelo et al., 2017) and that their stories should be told in aggregate form and from a deficit perspective (Mejia, et al., 2018). These oppressive structures create a culture of silence that excludes the "cultural resources that are based on the epistemolo-gies" (Delgado Bernal and Villalpando, 2002, p. 172) that Latinx individuals bring to engineering. Thus, research in engineering education that seeks to advance the partici-pation of Latinxs in the field must explore and problematize the experiences, strategies, and more importantly, *narratives* of Latinx engineers who have faced adversity in their paths toward becoming engineers told from their own tongues and *authentically* inter-preted according to their lived realities. It is through these narratives, and the ethical care of such stories, that the tongues and experiences of Latinx engineers can be legitimized, thus breaking the tradition of silence and silencing in engineering. These narratives must be told by insiders and in our own voice, using approaches from our own culture and up-bringing (Conchas and Acevedo, 2020). By leveraging our worldviews into all aspects of life, our legitimized tongues create spaces where solutions for and by our communi-ties are leveraged to dismantle oppressive structures.

This theory paper describes Anzaldúa's seven-stage framework of *conocimiento* (Anzaldúa, 1987, 2003; Moraga and Anzaldúa, 2015) as a lens to explore the narratives of Latinx engineers and to demonstrate through our own stories how our voices can be legitimized in this "engineering + education" space (a coined term by the second author of this paper). In this framework, Anzaldúa (1987) draws upon the idea of choques and arrebatos to reclaim Latinxs' power through the reconstructing of their self-narratives. Through our paper we also encourage the reader to think about the following question: "How are you contributing to liberatory praxis and the genuine interpretation of *cono-cimiento*?" We hope that our explanations and *testimonios* (testimonies) offered will help you introspectively answer this question.

2. *CONOCIMIENTO* AS A FRAMEWORK

Conocimiento is presented as an interpretive framework to help scholars situate their "insider/outsider" status in qualitative research and unveil the intersectional stories of Latinxs. *Conocimiento* involves a change in mindset and rationale through a recursive process (Elenes, 2013). It explores how everything is connected, including but not lim-ited to the dimensions of imaginal, spiritual, and political (Conchas and Acevedo, 2020; Elenes, 2013). Moreover, *conocimiento* as a framework can be used to help people re-flect upon and learn about how the identity struggles of marginalized peoples and the process of legitimizing their tongues can serve as a form of decolonization (Ohmer, 2010).

As a framework guided by decolonization, *conocimiento* is grounded on a unique approach to examine how both coloniality and oppression have impacted the histories of minoritized groups. Anzaldúa describes the framework of *conocimiento* using seven dif-

ferent stages: (1) el arrebato, (2) nepantla, (3) Coatlicue, (4) el compromiso, (5) Coyolxauhqui, (6) a clash of realities, and (7) transformation/spiritual activism (Anzaldúa, 1987, 2003; Moraga and Anzaldúa, 2015; Vallone, 2014). These stages are not linear or sequential but may occur arbitrarily and in erratic ways. It is important to mention that the erratic behavior of these stages as a brokenness of identity is not a clean, linear process, although, for the purpose of this manuscript, we will present them in this way. This characteristic of the framework is especially important for scholars to understand, since intertwined with the stories of marginalized groups there may be more than one stage at play. Trying to tease out or qualitatively code for narratives through individual stages could serve to depict a dominant narrative that hierarchically colonizes and deauthenticates the stories and identities of marginalized populations. As such, *conocimiento* acknowledges that there are intersectional stories accumulated from a life of contradictions and that researching such narratives merits similar considerations.

The first stage of *conocimiento*, *el arrebato,* involves the unique experiences that make individuals question their own identity. These events are described as fragmentations triggered by different life events, which can be mild, strong, external, internal, and life-changing. Arrebatos cause a fracture in one's belief systems, values, feelings, forms of expression, and ways of being, thinking, and doing. In the book *This Bridge Called my Back* (Moraga and Anzaldúa, 2015), various self-identified third-world feminist writers described arrebatos (the plural for arrebato) as the moment or accumulation of moments in their lives when their intersectionalities were fractured. Some of these arrebatos ranged from being rejected by people inside and outside of their various identity groups to seeing the struggles of others that identify similarly or that were pressured by older generations to lose a part of themselves. Thus, el arrebato is produced by a *choque* (clash) that is unique to each individual but based on the systems of coloniality and oppression existing in different sociopolitical, historical, and cultural contexts. Both arrebatos and choques open one's eyes about these fragmentations and teach them to deal with the rupturing of one or more identities. As a result, individuals are catapulted into a space called *nepantla*.

Nepantla, the second stage of *conocimiento*, is the liminal space where individuals straddle between different worlds. Anzaldúa's (1987) definition of nepantla suggests that this liminality is not only where clashes occur but it is also the space(s) where individuals seek to make meaning of those conflicting realities and worlds. Anzaldúa (1987) argued that for people living in the borderlands, nepantla represented this liminal space: navigating two or more different cultures, languages, and coming to terms with these separate and contradictory identities. Experiencing nepantla also gives individuals *la facultad*, or the ability to see beneath the surface (Anzaldúa, 1987). For example, living in nepantla allows for the materialization of hybridity (in its many forms) that includes the mixing of cultures, languages, or identities. This materialization helps individuals understand and recognize their relationship with their surroundings but at the same time challenge instances of oppression (the truths that may be hidden) beneath the surface. Individuals in nepantla sometimes hold beliefs, ways of knowing, and ideas that are in tension with one another (Mejia et al., 2017; Moraga and Anzaldúa, 2015). These ten-

sions allow them to see multiple realities while making them holistically aware of their surroundings (Mejia et al., 2017).

Nonetheless, living within nepantla can be painful and scary. For example, existing in nepantla may give an individual la facultad to uncover the systems of oppression that have been used to prevent that individual from receiving equitable access to education (Conchas and Acevedo, 2020). Moraga and Anzaldúa (2015) described how oppression of identity(ies) hurts and reinforces feelings of inadequacy. Once the hurt and feelings are recognized, many people tend to experience excruciating thoughts, get scared, and run away from their own pathways toward *conocimiento*. On the other hand, one can confront suffering and work through the pain through a critical introspection of the multiple perspectives and root causes that fragmented their identity(ies) (Moraga and Anzaldúa, 2015). The pain and sorrow that comes with digging deep through one's innermost insecurities and most traumatic experiences is fundamental to move on to the *Coatlicue* stage, the third stage of *conocimiento*.

Coatlicue is a state of meta-awareness where an individual sees themselves as both the subject and an object; where they are seen and are being seen through by others (Elenes, 2013; Galván, 2014; Moraga and Anzaldúa, 2015; Vallone, 2014). It involves a disruption in who they are and who they want to be. It is painful and requires that the individual puts together their experiences, begins to visualize new identity(ies), and brings this meta-awareness into a state of consciousness that becomes the impetus for a revolutionary change in the person (Elenes, 2013; Moraga and Anzaldúa, 2015). However, to be able to bring this meta-awareness into consciousness, the individual must clear their mind and spirit from distractions and psychologically travel internally to find the trauma. The pain and disravelling that comes with finding the sources of trauma is a necessary component to reconstructing a new mindset that brings about comfort and an evolved way of thinking (Elenes, 2013). Only then can a new, liberated identity(ies) be created and sustained. For many Latinxs and other minoritized groups, a Coatlicue pain is often caused when there is an acknowledgment that one has aligned and agreed to living within the colonial narrative too long and that they need to walk away from Western ideals instilled since birth. This difficult realization may cause a complete fragmentation of one's identity(ies) and will inherently lead to an inner self-exploration and ultimately, rebirth (Hurtado, 2003).

El compromiso, the fourth stage of *conocimiento*, is the beginning of that rebirth (with some call to action) that provides a pathway to the possibility of reconstructing all fragmentations into a new self that will ignite self-healing. Moraga and Anzaldúa (2015) described how individuals explore their paths to healing by coming to terms with who they are and their different intersectionalities. One of the salient themes from these paths to healing is the rebirthing and rejection of the -ism (e.g., racism, sexism, classism) complexes imposed on all of us. Whether we may like it or not, the remnants of colonialism are still present in many Latinxs and other minoritized groups' lives and continue to have a negative impact on them. These -ism complexes come in many forms and are enacted in many spaces. For example, communities of color are constantly being oppressed and hurt by racism in schooling, and while they have tried to run away from it or

challenge it, the way they are perceived and treated by majority groups has not changed much. For Latinx groups, having a primary language that is not English or being born in a land foreign to the U.S. will always cause many majority groups to see them as inferior and from a deficit perspective (Flores, 2005; Johnson and Zentella, 2017; Leeman and Serafini, 2020; Zentella, 2007). Race, ethnicity, and culture will always follow individuals wherever they go, and -isms will also follow as a result. Rather than dealing with the feeling of separateness, the healing process necessitates that the individual appreciate who they are, their life histories, and acknowledge those oppressive forces, because that is the only way to deal with outside forces. Anzaldúa (1987) describes her compromiso by discussing how throughout her life she lost her language and identity through American institutional systems. However, writing gave her an outlet to speak through her tongue to tell her truth. Her call to action was based on using her talent of writing to stop the oppressors from preventing her growth. Writing became her way to face the demons of her past, confronting racism and sexism, and to take a step forward to heal by discovering herself and her truth.

Healing from trauma and pain takes place by deconstruction and reconstruction. Anzaldúa (1987) describes this process as *Coyolxauhqui,* the fifth stage, where one is self-reinvented, restructures their reality, and creates a collective spiritual vision for social justice. In this stage one is able to shift from feeling victimized to reclaiming one's space and enacting empowerment (Anzaldúa and Keating, 2009). This process—rewriting of one's personal script, or narrative—allows for healing to take a central role in one's evolved identity(ies) through the "suturing" of previously dismembered identity(ies) (Hurtado, 2003; Vallone, 2014) and serves to create and reinforce the evolved identity(ies). This reinforcement can take place by an individual identifying a support system of other minoritized identity(ies) that share via trust their brokenness. Thus, Coyolxauhqui is a call to create a new narrative by and for minoritized groups to challenge dominant discourses that seek to frame our stories and narrate a story of limited deservingness (Conchas and Acevedo, 2020).

After individuals begin to find themselves, or even during their reformation, others in the majority group will continue to challenge and criticize their healing, through criticism of minoritized groups' voices, works, or actions. As minoritized individuals begin to challenge the actions from majority groups to erase their tongues and experiences, *a clash of realities* occurs (sixth stage of *conocimiento*). Moraga and Anzaldúa (2015) describe this clash of realities as the way in which the lack of inclusion creates a multitude of realities that cannot be contained by artificial means or embodiments. For example, as part of the feminist movement, third-world feminist authors contributed to many epistemological ideas for social justice and equity, but White women and scholars would not recognize their privilege and power and how it impacted the recognition of women of color (Moraga and Anzaldúa, 2015). Third-world feminists acknowledged that destructive patterns of majority groups in denying their contributions to colonization, either by delegitimizing the tongues of minoritized groups or by epistemological theft (stealing of ideas and claiming ownership or not recognizing originators of ideas) within the feminist movement, in scholarship, society, and learning/working spaces,

prevented real change from happening (Moraga and Anzaldúa, 2015). Even after learning to love and reform themselves, third-world feminists were met with a challenge from White feminists to be able to truly unite and allow the movement to push forward. Thus, although a new script and evolved identity(ies) can be discovered from healing, it can be immediately challenged by the dominant culture, leading to a new clash of realities that reverts the minoritized individual back into nepantla.

The *transformation and spiritual activism*, the final stage of *conocimiento*, is where one learns to take the lessons being dealt with inside and apply them to a larger community. It is the pinnacle of acceptance of one finding their own truth and seeing connections where others see separateness or boundaries. Anzaldúa (1987) describes this vision as a built universe where one learns to belong when not being able to fit in anywhere else. *El Mundo Zurdo*, as Anzaldúa (1987) calls it, is where all people can find their own unique balance in between worlds, and their balance is respected by everyone else. This phase is not about having everyone buy into the same belief but coming to a natural solution of self-acceptance and self-realization through criticism and listening to multiple ideas and backgrounds. Through this process the world can be transformed around as both minoritized and majority people will find unity through acceptance and airing out differences. The feminist aspect of this theory, which reclaims agency in the rewriting of one's narrative, makes Anzaldúa's framework of *conocimiento* a helpful interpretive tool for engineering education to unveil the multiple intersectionalities of Latinx engineers as they move through pathways in a society and engineering culture that has inadvertently sought to erase their narratives.

It is important to reiterate that although it may seem that *conocimiento* is described as a linear process, the stages of *conocimiento* are intertwined and can be iterative and messy. For example, there may be several arrebatos throughout the process and one can be thrown into nepantla constantly. It is also important to mention that when a linear identity development for individuals is delineated, one may not attend to the realities that are intertwined with diverse populations like Latinxs. Acevedo-Gil (2017) interpreted this nonlinear process as a "serpentine" (p. 829) and used *conocimiento* to describe the cyclical process of information and reflection "in relation to their intersectional identities" (p. 829) that Latinx students experience as they make college career choices. Latinx students' aspirations to attend college may be interpreted as an impactful event (i.e., el arrebato), but the search for information from different sources can lead into a space of turmoil, particularly when the student is encountered with deficit ideologies in the educational system (i.e., nepantla). Self-awareness and negotiating a self-narrative is constantly occurring (i.e., Coatlicue), as well as the unrest emerging from navigating the college admissions process. Nonetheless, Latinx students have set a goal for themselves and their communities (i.e., el compromiso) while imagining a new purpose and path to success (i.e., Coyolxauhqui). Once in college, Latinx students are faced with the constant structural barriers of higher education (i.e., a clash of realities) that can lead to more clashes or arrebatos. Thus, one always develops nuevo (new) *conocimiento* since a new choque(s) or arrebato(s) will destabilize this consciousness, forcing one to rework themselves all over again (Anzaldúa, 1987, 2003; Bobel et al., 2006; Vallone,

2014). As a result of this cyclical process, internal and external transformation can occur to foster self-advocacy and provide support to other Latinx peers (i.e., transformation and spiritual activism).

Anzaldúa (2003) acknowledges that these stages are usually always happening simultaneously on some level and that this cyclical process can be triggered at any time. *Conocimiento* is an interpretive framework to help scholars situate their "insider/outsider" status in qualitative research, serving as a reflexive practice for scholars to experience fragmentation with their populations of study and to ethically present the intersectionality of stories for marginalized populations (i.e., Latinx) that are authentic to the lived realities of individuals.

3. *ATRAVESADOS* IN ENGINEERING EDUCATION

To better describe how the *conocimiento* framework contributes to research in engineering education, we draw from the authors' *testimonios*. We choose *testimonios* as a way to disrupt the apartheid of knowledge present in academia (Delgado Bernal and Villalpando, 2002; Huber, 2009a,b; Huber and Cueva, 2012), where the knowledge emerging from the experiences of communities of color continues to be overshadowed and judged as illegitimate (Huber, 2009b). *Testimonio* challenges those Eurocentric epistemological perspectives, centers the lived realities of people of color, and provides a critical reflection embedded within the specific sociopolitical realities that people of color navigate (Delgado Bernal et al., 2017). *Testimonio* emerges from the social movements and struggles in Latin America to create a counternarrative that breaks away from the dominant narrative of the West (Beverley, 2004). *Testimonio* examines subaltern cultures to understand how agency, sociopolitical reality, oppression, resistance, and empowerment occurs in a postcolonial context (Delgado Bernal et al., 2017). It is important to mention that *testimonios* are not intended to represent a group of people but to illustrate "how people are marginalized, repressed, exploited" (Beverley, 2004, p. xvi) and how individuals interpret the world in order to resist and create change. In addition, *testimonios* are intentional because they honor individuals' perspectives and acknowledge them as agentic actors (Solórzano and Yosso, 2002). Thus, we use *testimonios* in order to understand the social world of engineering education and its impact on Latinxs by drawing from theories and methodologies that create a complete picture based on the voices of Latinx individuals. This type of analysis (i.e., using *testimonios* and *conocimiento* as a framework) is necessary because engineering education research has presented Latinxs as a monochromatic and monolithic group (Revelo et al., 2017).

Researchers outside of the Latinx community have mapped out concepts or understandings from their own views, thus misrepresenting the epistemologies of people of color (Delgado Bernal and Villalpando, 2002). It is our *testimonio* and our insider/outsider identification, crossing into each other's worlds (Anzaldúa, 1987), that helps us better understand the context of the belief systems, language use, practices, culture, and other aspects that otherwise may be ignored from a Eurocentric perspective. We call ourselves *atravesados* because we are sometimes seen as transgressors (Conchas and

Acevedo, 2020) who are often seen as the prohibited or invalid inhabitants of this borderland called "engineering + education." We are those who "cross over, pass over, or go through the confines of that normal" (Anzaldúa, 1987, p. 25). We were also, some time ago, experiencing similar issues to those experienced by our engineering students today. Yet, oftentimes we do not get the opportunity to give our *testimonio*—our critical reflection of our lived realities embedded within specific sociopolitical realities (Delgado Bernal et al., 2012, 2017). We take this opportunity to share our process of *conocimiento* while at the same time legitimizing our tongue in a period where communities of color and other minoritized groups are seen as transgressors rather than inhabitants of spaces where "the only 'legitimate' inhabitants are those in power, the Whites, and those who align themselves with Whites" (Anzaldúa, 1987, pp. 25–26).

While there is a broad range of research that addresses Latinxs in engineering spaces, most of the current approaches are largely devoid of the insider perspectives and methodologies that disaggregate their lived realities (Revelo et al., 2017). Other times, scholars critique, take ownership, ignore/overlook, or delegitimize our ideas, resulting in epistemological injustices (de Sousa Santos, 2015; Mejia et al., 2018) that steal and delegitimize our tongues, contributions, and experiences. Such methodological approaches perpetuate traditional, dominant ways of knowing and epistemologies. This also serves to further marginalize historically minoritized students from engineering as hierarchical classifications in which scholars and educators place value on what kinds of knowledge are deemed worthy in engineering and which are not. This type of engineering education and research gatekeeping risks erasing minoritized students' and faculties' ways of knowing and meaning-making practices. We, as a group of Latinx engineering education scholars and practitioners, bring a counternarrative perspective that is much needed in the engineering education and research field. This framework of *conocimiento* highlights the importance of drawing from the experiences of Latinx engineers and building upon their "theory in the flesh" (Moraga and Anzaldúa, 2015)—or the practice of knowledge creation through thought and reflection along with action and application (Mejia et al., 2018; Villanueva et al., 2020).

4. *TESTIMONIOS* IN THE BORDERLANDS

To provide our *testimonios*, we reflected individually and collectively on the different sociohistorical, political, and situational events that led us into the world of engineering and engineering education and research. The reflections included conversations about cultural background, familial struggles, academic trajectories, victories, and instances of oppression we have experienced. These reflections are detailed in the following sections and they are representative of our ongoing path to *conocimiento* (Anzaldúa, 1987). The discussion section then summarizes how the theoretical framing of *conocimiento* can be used to analyze *testimonios* of Latinxs living in between worlds (nepantla) as they encounter choques and arrebatos to rewrite their own personal narratives (Coyolxauhqui) for collective empowerment (transformation and spiritual activism). The *testimonios* are also used as backdrop to provide context of the sociopolitical forces that need to be

considered (and are often omitted) when doing research with minoritized populations. In other words, context matters, and it is necessary to effectively use the *conocimiento* framework in engineering education research to understand identities, consciousness, meaning-making processes and opportunities, and to honor the purpose of the framework itself. To maintain the authenticity of our roots, each of us selected a pseudonym representative of our culture, language, and heritage.

4.1 Opiyel Guobiran

When I was asked to be part of this paper, my emotions were in disarray. I knew that having to come to terms with my brokenness in this "engineering + education" world would generate many *arrebatos* in me. I couldn't begin to explain how my multiple liminal identities have influenced my brokenness: (a) racial/cultural, (b) professional, (c) personality, (d) family/faith, and (e) social responsibility. In the cultural sense, I am a mestiza (mixed races) whose origins are multiple (Taíno/Arawak Indian, West African, Spaniard, and American). And yet I don't quite belong to any particular race or culture. Growing up I learned very little about my heritage, and the stories that I learned were about how my people were enslaved, tortured, abused, and almost erased through genocide (~ 3 to 4 million dead by the late 1400's at the hands of Spaniards under the leadership of Christopher Columbus). While many of my people in Puerto Rico have a high percentage of Taíno/Arawak blood as more recent genetic research has found, finding our ancestors is not easy. When the U.S. colonized Puerto Rico in the late 1800s, census documents did not recognize Blackness in Puerto Ricans, and even if your skin was Brown, you were immediately labelled as White. To this day neither our mestizo-ness nor the color "Brown" is recognized in the U.S. census. At the same time, culturally we are mixed. We have all forms of cultures, traditions, and beliefs that are generated by a blend of our racial/cultural heritage: Catholic masses (Spain), Vejigantes (Africa), Fourth of July (America), Festival Indígena (Arawak/Taíno). Notwithstanding, we don't have our own sense of cultural identity: we are not White enough, Black enough, Latinx enough, or Native enough. Even within the context of the U.S. we are considered an "unincorporated territory," not fully Americans but American enough to serve at the frontlines of military and other "social experiments and programs." Our sense of being is covered in liminality and is full of contradictions or *nepantla*.

Speaking of *nepantla,* living a life and an education of contradictions has been something that has been exacerbated in my profession. When I decided to pursue a degree in engineering, not all of my family was supportive. Many said that an engineer should be for a man and that a woman's role was in the house with her children. No one in my family had the means or the resources to go to school, nor did they have the income to send me to college. At the same time, I knew that my life was meant to be different and that through faith and work, I could make a difference in my community through my education. I worked and studied and I began to apply for scholarships. I knew that any money that I had could help me get my degree. There were times that I

had no food. It was through the generosity of friends and my partner (now my spouse) that I was able to make it through college. I also had a responsibility to my family, and I had to help my mom pay for my brother's medical bills. I had to help my dad with the unexpected death and burial of my sister. I became, as a student, a source of mental, emotional, and financial support for my family. I did all this while working toward my degree in engineering, toiling over finding a sense of community and sense of self. Over time and with great sacrifice, I became the first engineer in my family, and I still am the only one to this day. Opening the door was my early contribution as a first-generation student, but over time I have realized that keeping that door open requires a village.

I used to think that my career in engineering would be long-standing, until I discovered engineering education and research, my second career. I discovered that not all professional paths have to be linear. And yet I also discovered that opening this new door also placed me in liminality, in an "engineering + education" world. I say this because engineering is caught in between two versions of itself (one of technical prowess and one of service to society). At the same time, engineering education as a combinatory field juxtaposed between the meritocratic and individual (engineering) and transformative and social (education). It seems that in this "engineering + education" world I experience both marginalization (not fitting in engineering nor education) and unification (connecting engineering with education). And yet, in this liminal space is where I break the status quo of who is an engineering educator and researcher and find my authentic being through *Coatlicue*.

My *Coatlicue* initiates my process of healing. My introverted self has helped me to internalize oppressive thoughts and find ways to authentically navigate these spaces. Within engineering, my introverted nature has been viewed or criticized as a weakness and as someone who is "not able to make it in engineering," as "a person lost without a cause," or as a "person whom they had to cut (me) for not having what it takes." On the other hand, I recognize that in my role within engineering education and research, my introvertedness could message to others that I don't speak enough about inequities and therefore I am "not advocating for the cause," "not truly fighting the fight," or "not walking the talk." And yet, in my "engineering + education" world, my introvertedness allows me to find a way to coexist with the hurt and pain caused by others and equips me to internalize the souls and painful experiences of other minoritized groups. It helps me to empathically and ethically respect other's voices and struggles within these professional and societal worlds. In this process I experience healing authentically, as a person that can not only thrive in the third space but as an empathetic, strong, independent, quiet, and passionate self. In this third space I have also found *compromiso*, thanks to the help of my fellow authors.

My fellow coauthors, companions of pain and adversity (my village), have come together over the years to form a support group. All were authentic individuals in the liminal spaces of "engineering + education" as Latinxs, as dreamers, as migrants to a new land, culture, and way of being. Even though we are all in engineering, our stories and experiences are different due to our backgrounds, cultures, and worldviews. While

many times thought of as monolithic (Revelo et al., 2017), we are truly individually and contextually unique. Sharing our stories, our frustrations, and our hopes with each other has allowed us to find a place to coexist within our liminal spaces and together, legitimize our voices to heal each other. We created *compromiso* as we navigated our professional worlds and still held on to our roots (cultural, linguistic, ethnically, regionally). We are unchanging and rooted in our identities but flexible and open to new epistemologies and axiologies that not only represent us but that consider our future selves and the messages we will convey to others about our heritage and visions for the upcoming generation of Latinx engineers, educators, and researchers. Thus, for us our "engineering + education" worlds must coalesce and align with our unique realities and our united voices but recognize our individuality in order to deepen our narratives.

Through our writings and narratives, we establish a new identity called *Coyolxauhqui*. In this collectively new yet fluid identity, we embody our unique funds of knowledge and dismember any notions or suggestions of a Latinx monolithic identity. We reject the restructuring or restorying of our narratives by other scholars/peers who claim to do work for and on behalf of minoritized groups but whose intentions are self-centered and self-serving. Instead we take ownership of our voices and realities to create our Coyolxauhqui visions for social justice.

And while we may experience a *clash of realities* due to our diverse identities and experiences with our "engineering + education" worlds compounded with our sense of obligation to our communities, we are continually torn about how things continue to be the norm in engineering as well as engineering education and research. These norms serve to remind us that we don't quite fit in any of these worlds and spaces that were not made for us. We have had to live and thrive in third spaces, where through our brokenness we find healing and purpose. Thus, our healing happens at the root of *transformation and spiritual activism*, which manifests in our collective breaking of our silence and legitimizing our individual tongues. We express our tongues authentically to create new life out of ashes, a beautiful bond of growth and restoration.

4.2 Gabachito

I identify as Mexican American. I was not aware of what the term Mexican American meant until I moved to the United States. Even though I was born in the U.S., I never knew what it was like living *en el otro lado*. My parents and my brother lived in the U.S. when I was born but moved back to a small town in northern Mexico when I was just 3 years old. I grew up thinking I was born in Mexico until some family members started calling me *gabachito*. That was my first *choque*, and it made me realize that there was something about me that made me different from others. Later on I realized that being born in the U.S. put me in a place of privilege that I was able to understand only after my father passed away when I was 10 years old. This devastating experience broke my life into several pieces. The trauma of seeing my father die continued to follow me for

several years. My desire to continue my education also crumbled, because the death of my father also meant I had to spend more time working in the fields during harvesting season.

After I graduated from middle school, I was determined to attend high school even if that meant moving to the closest city where there was a high school. My town did not have a high school and the closest city was about three hours away. I asked my mother to help me financially so I could attend high school. Even if my mother wanted to help me, she couldn't. Ever since the North American Free Trade Agreement (NAFTA), signed the year my father died, people from my town unwillingly immigrated to the U.S. My family lost most of our land because we could not compete with the capitalist new reality imposed on us by complicit governments and oppressive policies. NAFTA damaged any farming prospects in Mexico when competition was opened to the highly subsidized U.S. farming industry.

That was when I understood the privilege of being born in the U.S. and being *gabacho*. I was the only one in my family to be born in the U.S., and my mother suggested I move to the U.S. to get my education. This move also meant moving alone—I would have to move to a stranger's home on my own and away from my family. I accepted and moved in with a relative—a cousin of my father—who lived in one of the largest U.S.–Mexico border cities. That person was someone I had no relationship with whatsoever (it was the second time I saw him in my entire life). I became an outsider who didn't speak the language, wasn't White, and didn't understand the culture. I also became a student considered to be "at-risk." Like many other Latinx engineering students in the U.S., I came from a low-income background and my native language was Spanish. I also came from a single-parent home and my native language was seen as a deficit, which automatically categorized me as at-risk.

I enjoyed school and learning, and education was always something that kept me going, but in high school I was seen as someone who could not contribute much to conversations or student clubs. Even my counselor told me to consider vocational school when I told her I wanted to go to college and get an engineering degree. I guess she did not expect too much from me. I was placed in sheltered classes, even though I could do math and chemistry better than anyone else in my classes. I was not allowed to take advanced placement courses because I was part of the English as a Second Language program. That was when reality slapped me in the face. I started to view the world with a different lens. I noticed I was different, and no matter how hard I tried I would always be perceived as "less than."

Once I went to college and started my engineering degree, it was interesting to hear people asking me about my experiences in Mexico and how I had "made it" but then accused me of taking advantage of the American people and that my spot in engineering and my scholarships could have been taken by someone else—someone more deserving, I guess. I had never felt more insecure. I lost my self-confidence, and it took me a long time to get it back. I seemed to portray a hybrid and disturbing nature, yet Americans thought of it as "fascinating." I was the target of comments that made me feel like I should leave who I am at home and magically become an individual that fits in. At the

same time I was expected to speak as the voice of all Latinxs in the U.S. because we "are all the same."

I worked in the aerospace and mining industries because I thought, "I need to give it a chance." But nothing changed. I felt alienated everywhere I went. Choques and arrebatos happened almost daily. I was thrown into a state of *nepantla* over and over. It was not until I decided to change my trajectory and focus on engineering education that I started to understand myself and my surroundings. I began my engineering education career by studying the ways in which different ways of being, knowing, and doing were important to the engineering narrative and practice, particularly to dismantle dominant discourses that (re)produce deficit models. As a Latinx engineer myself, I was interested in issues of social justice and educational equity for Latinxs in STEM and have continued to work on these issues through various organizations including the Society of Hispanic Professional Engineers (SHPE), the Society for the Advancement of Chicanos/Hispanics and Native American in Science (SACNAS), and other local and national initiatives.

Yet, I realized that putting the pieces together—collecting all those fragmentations—required more than just going against the grain. It was when I met my *colegas* (colleagues) that I was able to talk openly about these issues, my experiences, and challenges. Our compromiso brought us together, and we started to see how we have the capacity to help others caught in between worlds. We continue to create those bridges not just between ourselves but also for our students. This process has contributed to navigating spaces that can be distressful, where we are reclaiming our seat at the table by rewriting and reconstructing our own engineering narratives.

4.3 María Elena

As a seven-year-old child I watched a movie titled, *Ni de Aquí, ni de Allá*, which translates to "Neither from Here, Nor from There." I identified with the main character, La India María, immediately. The plot of the movie illustrates her struggles as a Mexican immigrant in the United States but in a light-hearted and comedic manner. As a young immigrant myself, I could relate to this character's story since my family had just moved to the U.S. I experienced my first *arrebato* in that process. I had left my homeland and everything that I knew, and was trying to learn a new language and culture.

One of the most challenging aspects of being an immigrant was not being able to understand or speak English or communicate in Spanish, my native language, in school. I went from being excited about going to school in Mexico to quickly dreading it after moving to the US. I could not understand the teacher or students, and was picked on because I could not speak English. I pleaded with my mother to let me stay home, instead, to help my grandmother with cooking and chores. My mother, a former teacher in Mexico, told me that if I continued with my education one day I would be "*más inteligente*" (smarter) than the children who poked fun at me because I would speak two languages fluently. I reluctantly went back to my second-grade classroom the next day.

While I struggled to learn a new language, I understood numbers and math specifically, and continued to excel in this subject. Math became my lifeline as an immigrant

when I could not use my native tongue in the classroom. In high school, physics was one of my favorite classes and I would often ask for extra-credit problems. My physics teacher suggested that I pursue engineering as a college major. He explained that I would be able to take more advanced math and science classes. While my parents were supportive and encouraged me to continue my education, they were unfamiliar with the college search or application process. I had to learn how to navigate that process on my own while working two jobs evenings and weekends. When it came time to submit my college applications, I asked my mother for her credit card to pay for the application fees. I knew that this was a stretch for my family financially. Her response to my request was, "*Sí, mija. Buena suerte.*" (Yes, daughter. Good luck.) This experience taught me that higher education is not accessible to all, and there are different levels of financial means, familial support, intentionality, and sometimes luck, based on each student's social network and capital.

Another *arrebato* for me was attending a selective university for my undergraduate studies. During my first year I realized that there were not many other students that came from a similar socioeconomic or cultural background. In addition to taking a full credit load each term, I had to work, take out student loans, and continue with my family obligations. The first-year engineering coursework was incredibly challenging. I also realized that I did not have the same academic preparation as my peers. I was the only first-year engineering student that had not taken calculus in high school. While other students were learning and applying new theories that build on calculus, I was expected to learn calculus for the first time and take the same engineering classes that required it as a prerequisite. Calculus, similar to English, was a new language that I had to learn quickly during this *choque*, a clash within a familiar mathematical space. My undergraduate experiences continued to teach me about persistence, diligence, and "*trabajo duro*" (hard work).

After graduating and beginning my engineering career in technology, it became apparent that this field was not one that I wanted to pursue as a long-term career. I first became interested in education in my first master's program while enrolled in a research methods seminar. One of the assigned course readings was Paulo Freire's *Pedagogy of the Oppressed* (Freire, 2003). The book changed how I viewed the power of education, especially for groups that have been historically minoritized in education and leadership positions in the United States. Freire's words, ideas, and concepts opened a new world and provided me with a framework and language to see the power of education through a new paradigm. I felt a responsibility and passion to engage in the struggle for liberation through education and to make this my life's work. Specifically, I focused my research on improving access to engineering for traditionally minoritized students.

I attended my very first annual meeting of the American Educational Research Association (AERA) in 2015. One of the goals of AERA is to promote educational research to serve the public good. At the time, I was a doctoral student and also working full time as a lecturer teaching first-year engineering design courses. I was also in the *Coatlicue* state, working in engineering education and at the same time learning how it has historically and systematically excluded people like me—immigrants from marginalized

backgrounds. Additionally, I had not met any other Latinx faculty or doctoral students in engineering education and did not see a representation of my experience or others with a similar background reflected in the literature.

At the AERA conference I was fortunate to meet two of my coauthors and learned about the third, whom I met soon after. I was inspired to learn that there were other Latinx scholars in engineering education with similar backgrounds and research interests. We shared our experiences, challenges, and created a welcoming and supportive space in the process. My colleagues' scholarship and research give a voice to my experience as a Latinx engineer—as a student, professional, and now professor. We bring our identities and the importance of their intersectionalities into this space that includes being bilingual, multicultural, Latinx engineers, professors, researchers, and friends (in no particular order) as we question and make sense of our *borderland* identity (Anzaldúa, 1987). It is within this space and the *conocimiento stage* that my identity as a Mexicana and engineer has also changed. For many years I considered myself "neither from here, nor from there." Today I consider myself *de aquí y de allá* (from here and there).

4.4 Mamarracha

I have experienced aspects of Anzaldzúa's *conocimiento* framework in my lifetime, and especially in engineering, but in this *testimonio* I will focus on part of my graduate school journey. Soon after completing the master's in electrical and computer engineering, I knew that I had fallen out of love with research in power systems but not with research. I was fortunate and privileged to have a community of people who were willing to have discussions with me about my future in academia.

Between 2009 and 2010, I began to see the beginnings of how my achievement in higher education was not (as immigrant family members would have me believe) the result of me simply "working hard" or being smart, nor (as naysayers would have me believe) was it a result of (the myth of) affirmative action (e.g., being accepted into higher education only due to my minoritized status and not due to my academic record and achievements). My achievements in higher education are a result of a number of academic programs that were designed to make achievement for students of color more equitable. Programs like the Hispanic Women's Group (Mundelein High School), the Morrill Engineering Program (University of Illinois at Urbana-Champaign), the Summer Research Opportunities Program (National), the Society of Hispanic Professional Engineers (UIUC Chapter, National), and the Women in Engineering Program (University of Illinois at Urbana-Champaign). Having this *conocimiento* about the impact these programs had on my academic and professional career was critical in my choosing to go back to graduate school and study engineering education as a field of research and scholarship. This was the beginning of seeing my education from a systemic and collective perspective rather than individual. After all, my parents, sister, family, friends, and caring educators are also part of my academic achievement.

While in engineering graduate school, I felt harbored from needing to understand the educational landscape and programs that have led me to where I am today. Once enrolled in the PhD program in the College of Education, I was thrown into the deep end of *Coatlicue*, to face head on the reality that had been all around me, but somehow engineering had not allowed me to **really** see it, acknowledge it, or accept it. All of the classes I took as a graduate student in the higher education program discussed race and systems of oppression openly, connecting these subjects back to student development, diversity, history of higher education, etc. In learning about social stratification and Latinx student development, I was forced to acknowledge my own internalized racism, growing up in a culture that does not openly talk about race but operates on colorism (Charles, 2021). Reading and learning more about Ogbu (1987), I was forced to acknowledge the allusion of the immigrant mentality. In other words, and what I lovingly express as nowadays: I was forced to see *The Matrix* (Wachowski and Wachowski, 1999). Once you have an understanding of the systemic and systematic oppression of people of color, you can't go back—once you see the matrix, you can't unsee it.

I felt empowered and fueled by my graduate school courses and conversations with others in the College of Education. As I began to dream up my dissertation project and propose it to engineering educators to receive feedback, I experienced my first *choque* within the engineering education community. All the engineering educators with whom I discussed my interest in studying the experience of minoritized students in engineering as part of my engineering education career told me that my topic of interest was not engineering education research. It was difficult to wrap my head around this response. It made me question (once again) what I thought was worthy scholarship in the field—how studies about identity and marginalization within engineering education were not considered research by some, in turn making me question my own researcher identity as it intersected with my personal identities, history, and pathway through engineering. Nonetheless, I continued to trod on and build my case for my dissertation (and continued) work.

After graduate school I slowly started finding *un compromiso* with the knowledge I gained and the new world that I was seeing. While I'm still navigating this stage of having to understand my role in moving forward with this knowledge, I am now driven by my responsibility in helping others in this process, as well as the friendship that I've built with my coauthors in this paper, who in their own ways have also seen the matrix.

5. DISCUSSION

In order to explore the pathway toward *conocimiento*, we use *testimonios* to express and communicate our lived realities. These *testimonios* show how the path to *conocimiento* involves challenging cultural norms, assumptions, and professional journeys. Although the *testimonios* center on Latinxs' life histories, all experiences differ in terms of sociocultural and sociopolitical contexts. Similarly, when engaging in research with Latinxs in engineering education, it is important to recognize the multi-

tude of intersecting identities that are present in the lives we have inherited and those we wish to live.

The *testimonios* show that arrebatos can occur at any point in time. These can range from cultural erasure and language delegitimization to poor treatment from others in engineering spaces. These arrebatos extend beyond space and time and continue to exist because of the institutionalized systems of oppression. Although we have been able to work together through our healing process, we continue to experience arrebatos such as being tokenized, questioned about our credentials, harassed and bullied, and treated as individuals who do not belong in engineering, engineering education, or research. It is important to note that everyone experiences choques and arrebatos differently despite all being Latinxs. Choques and arrebatos create new ways of being and allow new knowledge (*conocimiento*) to be built upon.

Tensions, choques, and arrebatos are always negotiated in nepantla. These *testimonios* also allow us "to bear witness to what haunts us" and to "reparar el daño (the damage)" (Anzaldúa and Keating, 2009, p. xxxii) that has been created through institutionalized systems of oppression. Arrebatos do not happen at the same time or at a particular time in life for everyone. Arrebatos and choques are both contextual and situational, and are not representative of a monolith. We used our *testimonios* to illustrate the dangers of situating stories of Latinx engineering participants in scholarly studies through a single narrative. It is important that we honor the individuality and complexity of each story. In addition, we cannot thematically code for everything, because not all of our stories fall within predetermined codes.

The Coatlicue stage is manifested in these *testimonios* in the form of shame, fear, guilt, and hopelessness, but also by the recognition of issues that need to be questioned and addressed. For example, acknowledging that a system (i.e., engineering education and research) was created for people that do not look like us is part of that recognition. It was in this stage where we started to question not just the world around us but also those internalized narratives that prevented us from reclaiming our space in engineering. It is in this stage that we can begin to break down hegemonic scripts of what a Latinx engineer should look like. As indicated by the *testimonios*, it is also the first step to rewrite our own narratives.

Although not all *testimonios* may seem to manifest all *conocimiento* stages to the same degree, all show experiencing arrebatos, choques, nepantla, a clash of realities, and coming together to heal the fragmentations that happened throughout these journeys. Grappling with arrebatos is a necessary element in the path toward *conocimiento*. Not confronting these realities prevents individuals from recognizing oppressive systems and, consequently, addressing them. Thus, a prerequisite for achieving *conocimiento* is an internalized pattern of intentionally re-negotiating harmful scripts about oneself, one's cultural group, and about other minoritized groups in general. During this process of renegotiation, *conocimiento* can include iterative cycles as individuals externalize what they have internalized and processed. The constant renegotiation may take several attempts until healing is achieved. Be warned that if we (STEM educators, scholars, influencers, mentors, etc.) are not able to provide that space for Latinx students to ex-

ternalize their voices, it will be very difficult to truly ignite and create transformative change in engineering education, as there is a risk of catapulting our students into a continual state of nepantla, thus preventing full healing and visions for social justice to cement and flourish.

Another important aspect that emerges from these *testimonios* is that the path to *conocimiento* is not linear and can involve *des/conocimiento* (willful unawareness) (Anzaldúa and Keating, 2009; Vallone, 2014). In other words, it is possible to approximate and be committed to *conocimiento* while still struggling with choques, pain, and limiting scripts of oneself, one's culture, and/or others. Everyone is socialized to some extent by hegemonic structures. Thus, (un)learning and reconstructing narratives involves continuous processes fundamental to this framework (Anzaldúa, 1987; Anzaldúa and Keating, 2009). As Anzaldúa (Anzaldúa, 1987; Anzaldúa and Keating, 2009) suggested, stages often overlap with other ones, elucidating that they do not occur in isolation but rather are intricately connected like a multilayered web. For example, one may negotiate an arrebato (e.g., not be considered "engineer enough") while simultaneously grappling with other arrebatos (e.g., navigating spaces where native language is illegitimized).

This paradox of des/*conocimiento* is representative of nepantla, where the individual is living in between spaces, leading to distress and willful ignorance. Latinxs are expected to follow particular hegemonic social scripts, and being *ni de aquí ni de allá* (neither from here or there) makes following that script very painful and stressful. An intentional undoing is necessary to recognize these colonial underpinnings that have created these hegemonic structures and break away from them. It is important, nonetheless, to recognize that taking such actions is difficult unless it is supported collectively (e.g., Coyolxauhqui, transformation, and spiritual activism stages).

Individuals may decide to take action at certain stages of *conocimiento* or simply never take action. *Conocimiento* as a framework allows us to acknowledge that there is complexity in how individuals act and take action, such as in instances when individuals encounter the support or the tools to take action. As indicated in the *testimonios*, there are instances where self-preservation is the default action. Bringing this awareness to engineering education and research means understanding and critically analyzing how instead of asking "Why is it that minoritized groups do not take action when faced with difficulties?" and instead ask "What is in place to support students to ensure that the default action of minoritized groups is not just self-preservation?" In addition, it is important for engineering education practitioners and researchers to understand that actions are either internal (e.g., I can do work on myself rather than externalizing it) or external (e.g., providing the support to others and creating bridges for others). Taking action in different stages of *conocimiento* to counter arrebatos is a continuous process and not necessarily bounded by time. As Anzaldúa (1987) points out, it is likely that one will never completely arrive at *conocimiento*, because there will always be another arrebato that throws you back into nepantla. The question we originally posed for our readers is presented again: "How are you contributing to lib-

eratory praxis and the genuine interpretation of *conocimiento*?" It is through a close introspection of the readers' intentions and actions that our tongues can begin to truly experience legitimization.

6. SUMMARIZING THOUGHTS

The current national discourse on antiracism requires that we shift our attention to ways of being, knowing, and doing that are not centered on Whiteness. We need to create a unique conversational space that does not perpetuate epistemicide (de Sousa Santos, 2015). As insiders in the community, we seek to elevate Latinx voices through an asset-based and insider perspective. We believe it is important to consider the *conocimiento* framework and the individuals constructing their own *conocimiento*, not because of what it means for the researcher but because it validates and authenticates the lived realities of Latinxs.

All the authors in this work have had to excavate their own traditions of silence, defragment, and process the inequalities brought to them by society and their engineering education, practice, and research and share narratives in an effort to heal and liberate each other. For some of us, handling borderland issues and the injustices suffered from being a migrant to the United States have left deep scars that are never fully healed. For others, the continual colonialist dance of opposing cultural identities and the injustices that stem from them have left traumas that are unresolved. Our stories, like those of many Latinxs, are the expressions of *choques* and *arrebatos* that involve a counterstance between the oppressor and the oppressed and influence our voices and actions. The importance of the *conocimiento* framework is that it highlights the fragmentations that happen through different sociopolitical contexts while acknowledging that the system itself is unable to address unless the tradition of silence is eliminated.

It is important for the readers of this paper to acknowledge that epistemological injustice continues to exist in research and in education. Anzaldúa's framework of *conocimiento* provides a foundation for that collective activism and liberatory praxis that is needed to create change. Change in engineering education is not about having everyone buy into the same belief but coming to a natural solution through criticism and genuinely listening to multiple ideas and backgrounds. Through this work the world can be transformed around as people will see unity through the acceptance and airing out of differences. As of right now, in the research being done in engineering education, where outputs and productivity are the main drivers of what is considered innovation, transformation, and success, there is unfortunately little room for this type of reflexivity to take place.

We posit that while this work is intended primarily for researchers and scholars, this work can translate to other audiences who struggle with *choques* and *arrebatos* as breathing and living beings of this society. We understand that everyone suffers through struggles and breaks silences through acts of resistance. As such, audiences who are marginalized in their everyday lives and in engineering, including Black, indigenous, and people of color (BIPOC) individuals, can benefit from this work, as this framework

can help each of them (and their allies, advocates, and accomplices) to extract the reasons behind their traditions of silence. To the latter point, BIPOC allies, advocates, and accomplices (Moore and Cox, 2021) can participate in this process while honoring the authenticity of BIPOC voices by directly engaging in "dialogue in ways that increase their own risk and vulnerability" (p. 6). However, as Moore and Cox (2021) indicate, dialogue is only the beginning, and there is a need to move away from the safe spaces of dialogue into action. Action looks different to everyone, from speaking up about their rights to enacting policy initiatives and groups of support. Whatever form of action it takes, it is essential that reflexivity happens (Secules et al., 2021). We don't want to ascribe a set of recommendations for change, as these run counter to Anzaldúa's arguments for her *conocimiento* framework, which is situated in diverse sociopolitical contexts. Thus, institutions should recognize those place-specific sociopolitical contexts and the ways in which *conocimiento*-based principles are the foundation for intentionally allowing minoritized students to develop a healthy engineering identity and agency. Leadership models, programmatic changes, and even curricula can become more culturally affirming by leading with *conocimiento* as a guiding principle. For example, acknowledging the lived realities of minoritized groups and the arrebatos created by institutionalized deficit-based ideologies can use the collective *conocimiento* to engage in honest—even if difficult—conversations that will truly lead to change. It is our hope that what we have written here will initiate you in your own process of *conocimiento*, authentic growth, and self-discovery.

Finally, it is also important to note that the *conocimiento* framework is a tool to challenge colonialism and dominant discourses, and it should be used with caution and respect. We will not be able to change the structures that keep oppressing minoritized students unless the framework is used with its intended purpose in mind. We do not expect everyone to become an activist, and we do not want others to assume that only faculty of color should be the agents of change. Yet, we caution the use of this framework without having an insider perspective. *Conocimiento* is an interpretive framework to help scholars situate their "insider/outsider" status in qualitative research, which serves as a reflexive practice for scholars to experience fragmentation with their populations of study and to ethically present the intersectionality of stories for marginalized populations (i.e., Latinx) that are authentic to the lived realities of individuals. Everyone's identity relationship with power is different. Closeness to Whiteness is also different. Legitimizing tongues is the next stage. While readers may never experience the *conocimiento* framework to the extent we (coauthors) and we (BIPOC) have experienced it, the process and experiences can still be acknowledged, valued, and accepted.

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