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Arrebatos and institutionalized barriers encountered by low-income Latino/a/x engineering students at Hispanic-Serving Institutions (HSIs) and emerging HSIs

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Abstract

Background: Latinos/as/xs continue to face many barriers as they pursue engineering degrees, including remedial placement, lack of access to well-funded schools, and high poverty rates. We use the concept of *arrebatos* to describe the internal reckoning that Latino/a/x engineering students experience through their journeys, particularly focusing on the impact of socioeconomic inequalities.

Purpose: To bring counternarratives in engineering education research focusing on the experiences and lived realities of low-income Latino/a/x engineering students. These counternarratives are an important step in interrogating systemic biases and exclusionary cultures, practices, and policies at HSIs and emerging HSIs and within engineering programs.

Methods: *Pláticas* were conducted with 22 Latino/a/x engineering undergraduates from four different universities in the US Southwest. These *pláticas* were coded and analyzed drawing from Anzaldúa's theoretical concept of *el arrebato*. Special attention was given to participants' *arrebatos* triggered by their college experiences as low-income individuals.

Results: Analysis indicates that Latino/a/x engineering students' a*rrebatos* arise from events that shake up the foundation of their own identity, including an institutional lack of sociopolitical consciousness. This lack of consciousness becomes evident not only in individuals' attitudes toward these students but also in institutional policies that put them at a further disadvantage.

Conclusions: Findings have implications for engineering programs, particularly at HSIs and emerging HSIs regarding the creation of policies and practices that aim to secure the retention of low-income Latino/a/x engineering students and alleviate the systemic barrier they face by affirming the practice of servingness.

KEYWORDS

arrebatos, Hispanic-Serving Institutions, Latinos/as/x, low-income students, *pláticas*

1 | INTRODUCTION

While more Latinos/as/xs are attending US colleges, they continue to face barriers that profoundly shape their higher education experiences including high poverty rates, first-generation status, part-time enrollment, and remedial placement (Campaign for College Opportunity, 2018). In addition to these barriers, engineering education research suggests that Latina/o/x engineering undergraduates' struggles are the result of different factors like systemic biases (Ohland et al., 2011), exclusionary cultures (Camacho & Lord, 2013; Godfrey & Parker, 2010; Marra et al., 2012), and the potential lack of satisfaction in terms of self-efficacy, interests, and expectations (Flores et al., 2014), among others. These barriers are often the result of historical factors, an aspect often overlooked in engineering education research. Noteworthy legal cases, such as *Rodriguez v. San Antonio Independent School District, Covarrubias v. San Diego Unified School District, and LULAC v. Richards*, have profoundly influenced the unequal educational opportunities encountered by Latino/a/x students (Valencia, 2008), which continue to reverberate for Latino/a/x engineering students today. For example, the *Rodriguez v. San Antonio Independent School District* case laid the groundwork for the current inequitable school financing system that governs funding allocation for schools (Valencia, 2008), putting Latino/a/x students from low-income backgrounds at a greater disadvantage.

Seeing these increasing disparities in education, the Hispanic Association of College and Universities (HACU) served as the catalyst to push for congressional action and the formal recognition of Hispanic-Serving Institutions (HSIs), as well as making them the target of federal financial support (Núñez et al., 2016). Although with the emergence of HSIs—defined as 2-year or 4-year colleges and universities with 25% or more Hispanic/Latino undergraduate enrollment (Laden, 2004)—within the past 30 years we have witnessed an increment of Latinos/as/xs pursuing higher education degrees, the number of Latinos/as/xs obtaining engineering degrees continues to be stagnant (National Science Board, 2018). Moreover, Latino/a/x students from low-income backgrounds, particularly those who are first-generation students, continue to struggle to obtain their degrees despite being enrolled in *Latinx-serving* institutions (Garcia, 2017). Even institutions that are moving toward becoming HSIs, also known as *emerging HSIs* for having between 15% and 24% Hispanic/Latino undergraduate enrollment, continue to be mostly focused on enrolling Latino/a/x students rather than providing the necessary services for them to become successful in terms of educational attainment (Garcia, 2017). It is this historical and current context that is fundamental in engineering education research to better understand the factors that negatively affect Latino/a/x engineering students.

However, traditional scholarship in engineering education continues to be normed by White epistemological perspectives that have failed to examine the structures of domination and oppression in educational settings. Against this backdrop, and seeking to provide an overall picture of the factors impacting low-income Latino/a/x engineering students at HSIs and emerging HSIs in the US Southwest, this original research article addresses the need to include counternarratives in engineering education research. We posit that an important step in interrogating the institutional factors that oppress students is to unveil the systemic practices that may be preventing HSIs and emerging HSIs from making substantial transformative change in engineering programs. As Latino/a/x researchers in engineering education, we argue that these counternarratives must be told in *our own language*, using approaches from *our own culture*, which would allow us to provide solutions to *our communities* while dismantling oppressive historical structures.

Deriving from a larger longitudinal ethnographic study, this paper draws from Gloria Anzaldúa's theoretical construct of *el arrebato* (Anzaldúa, 1987; Anzaldua & Keating, 2015; Keating, 2022) to describe how Latino/a/x engineering students make sense of their lived sociopolitical and socioeconomic realities, and how those realities have impacted their pathways to and through engineering. In this paper, we conceptualize *arrebatos* as the ruptures (i.e., physical and emotional responses) that disturb the foundational beliefs, identity, and worldviews of the individual as a result of the events, ideas, or disruptions encountered in everyday life. We argue that the historical, social, and political lived realities of Latino/a/x engineering students not only result in *arrebatos* but also influence their engineering journeys. Particularly, the *arrebatos* described in this paper illustrate how coming from low-income backgrounds rattles not only the students' journey to and through engineering, but also their how they see themselves in engineering spaces.

Anzaldúa describes *el arrebato* as a continuous internal reckoning with one's reality, which is the result of different experiences emerging from abrupt life changes that in turn may result in a higher consciousness and new beginnings (Keating, 2022). The concept of *el arrebato* serves as the template to analyze the ways in which Latino/a/x engineering students experience their engineering pathways (Mejia et al., 2022). This theoretical concept recognizes that identity is

not static and that systemic barriers create these abrupt fragmentations and new beginnings for the students. Thus, we honor these experiences and the voices of students by positioning them as holders and creators of knowledge (Delgado Bernal, 1998). Moreover, this work also provides a perspective—much needed in engineering education research—that seeks to reject epistemological colonialism by repositioning students' knowledge at the front and center rather than just reducing them to statistical points (Revelo et al., 2024).

The study described in this paper recruited 22 self-identified Hispanic and Latino/a/x engineering sophomore and junior undergraduates from four different institutions, including one public research-intensive HSI, one private emerging HSI, and two public research-intensive emerging HSIs in the US Southwest. The US Southwest setting is exceptionally significant because of its longstanding history of racialization, and for being an area with a large number of HSIs and emerging HSIs (Mejia, 2023). Throughout this manuscript, we choose the term Latino/a/x as an identifier to describe the participants as people from Latin American descent while at the same time acknowledging the ethnoracial affiliations used by the participants (e.g., Mexican, Hispanic) in this study to self-identify (Villanueva Alarcón et al., 2022). Through this analysis, we sought to answer the question: *how and in what ways do events, ideas, and disruptions encountered by low-income Latino/a/x engineering students at HSIs and emerging HSIs in the US Southwest result in arrebatos?* Research findings indicate that institutional practices at HSIs and emerging HSIs perpetuate adversity for low-income Latino/a/x engineering students by reproducing *arrebatos* constantly. We focus on examining these Latino/a/x engineering students' (henceforth participants) experiences in navigating their engineering programs and departments as individuals from majority low-income family backgrounds, because of the limited scholarship in this area of engineering education research. Findings have implications for engineering education research and practice, particularly regarding the creation of policies and practices that secure the retention of low-income Latino/a/x engineering students and challenge the systemic barriers they constantly face.

2 | THEORETICAL FRAMEWORK

This paper draws from a Chicana Feminist Theory sociocultural perspective to critically analyze issues impacting Latino/a/x students in engineering. Specifically, we draw from Gloria Anzaldúa's theoretical concept of *el arrebato*, a stage developed within Anzaldúa's theoretical framework of *conocimiento* (Anzaldua & Keating, 2015). Anzaldúa describes the path to *conocimiento*, or consciousness raising, using seven nonlinear, iterative, and cyclical stages: (1) *el arrebato*, (2) *nepantla*, (3) *Coatlicue*, (4) *el compromiso*, (5) *Coyolxauhqui*, (6) *clash of realities*, and (7) *spiritual activism* (Anzaldúa, 1987; Anzaldua & Keating, 2015; Keating, 2022). "Conocimiento often unfolds within oppressive contexts and entails a deepening of embodied perception that brings access to nonordinary realities" (Keating, 2022, p. 109). In her exploration of her own upbringing as a Chicana, queer woman, in the US–Mexico borderland, Anzaldúa dismantled the conceptualization of knowledge by envisioning a space where internal and external lived experiences are a source of valid forms of knowing (Anzaldua & Keating, 2015). Through a process of self-reflection, she describes how *conocimiento* represents a transformative and empowering way of knowing that integrates personal wisdom and cultural heritage, contributing to a richer and more inclusive understanding of the world (Anzaldúa, 1987; Anzaldua & Keating, 2015). As shown in Figure 1, the seven stages of *conocimiento* are part of a complex onto-epistemology developed by Anzaldúa that make it difficult to comprehensively define in linear forms (Keating, 2022). According to Anzaldúa (1987), *conocimiento* is like a vortex where the seven stages inform each other and may or may not occur sequentially. Figure 1 shows how this vortex leading to *conocimiento* initiates with the first stage—*el arrebato*—which disrupts our foundational sense of self, our beliefs, ideologies, and worldviews (Mejia et al., 2022). In this paper, we pay particular attention to *el arrebato* because it is fundamental for the understanding of the interplay between institutional discourses and marginalization in engineering along the lines of gender, race, and class. Moreover, analyzing instances where *arrebatos* cause internal and external fragmentations (e.g., loss of sense of self, language subtraction, racialization, etc.) for Latino/a/x engineering students is essential to create more welcoming and culturally affirming engineering spaces, particularly at HSIs and emerging HSIs.

As described by Anzaldúa, for individuals living in a cultural, linguistic, and ideological borderlands, *el arrebato* stems from experiencing a critical event or an idea—a *choque* or cultural collision (Anzaldúa, 1990)—that uproots their sense of self, their beliefs, and their worldviews, thereby shaking the foundation of their worlds and their sense of reality (Keating, 2022). Thus, for these individuals living between two worlds—both the physical and metaphorical borderlands—*el arrebato* "turns [their] world upside down and cracks the walls of [their] reality, resulting in a great sense of loss, grief, and emptiness" (Anzaldúa, 2002, p. 546). As such, *el arrebato* constitutes a rupture or break that

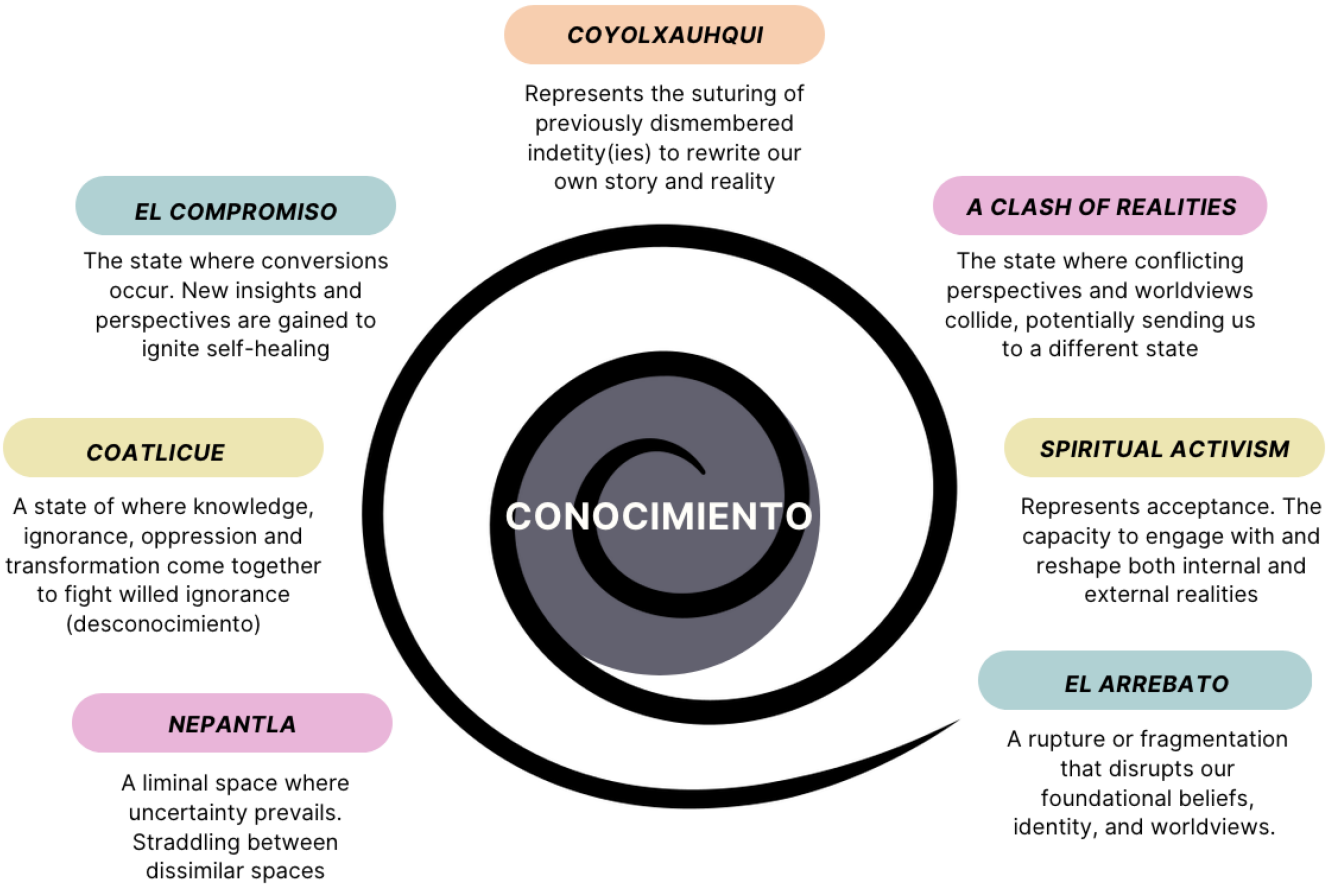

FIGURE 1 Seven-stage framework of *conocimiento*. *Source*: Adapted with permission from Mejia et al. (2022).

"dislocates an individual's reality and forces [them] to alter [their] self-description, the world, and [their] position within that world" (Acevedo-Gil, 2017, p. 835). *El arrebato* has been described as an earthquake that "jerks [them] from the familiar and safe terrain" (Anzaldúa, 2002, p. 544), and as "a tug of war in the clashing contradictions in which home, family, and ethnic cultures are now being challenged with assimilation to an Anglo world" (Reza-López et al., 2014, p. 548).

In the context of this study, *el arrebato* is the initial stage where participating Latino/a/x engineering students may encounter a rupture between who they are, what they believe in, who they want to be, and what the world of engineering expects them to become. Within engineering education, *el arrebato* takes place because Latino/a/x students are recruited into and enter an institutional space where they must figure out the desirable ways of knowing, being, and representing themselves (Chen et al., 2019; Esquinca & Mejia, 2022; Mejia, 2023; Rodriguez et al., 2019). As they transition into this institutional space, they arrive with notions of self and aspirations rooted in their lived experiences as members of Latino/a/x families and historically marginalized communities, many of which conflict or do not align with the culture and expectations of engineering (Mejia, 2014). *El arrebato* in this sense can stem from feelings that they do not belong in the culture of engineering, encounters with differences in class and schooling opportunities, and/or disruptions to their identities as racialized individuals (Mejia et al., 2022). Realizing that their ways of knowing, doing, and being are marginalized and that they need to align with those privileged individuals who practice "being an engineer" (Stevens et al., 2008) become the critical events that produce *el arrebato* for these historically marginalized students.

Broadly, our use of Anzaldúa's *conocimiento* framework and exploration of *el arrebato* provides a culturally relevant means for interpreting Latino/a/x engineering students' experiences through a lens oriented toward "indigenous beliefs about the connection between the spirit and consciousness" (Hurtado, 2015). In addition, we believe that centering our inquiry on the first of seven stages, *el arrebato*, has helped us pinpoint the origins of the rupture. Moreover, specifically focusing on the tensions that induce *el arrebato* among Latino/a/x students allowed us to become more acquainted with the social and cultural contradictions of race, gender, sexuality, ethnicity, and class among colonized peoples from

an individualized perspective (Gutiérrez, 2022). On a broader scale, contradictions that exist between intersecting aspects of the self can impact Latino/a/x engineering students' interactions with the world at large. Accordingly, tensions (i.e., belonging/exclusion, obscurity/hypervisibility, diversities/stereotypes, equalities/microaggressions) routinely present challenges distinctive to individuals "of color, the working class, speakers of languages other than English, lesbians/gays/transgender peoples" (Gutiérrez, 2012, p. 35). Following Hurtado (2015) and Mejia et al.'s (2022) call to employ theories created by members of the Latino/a/x diaspora (i.e., Anzaldúa) to examine Latino/a/x students' experiences, in this paper, we center Latino/a/x engineering students' *arrebatos* within engineering spaces to better understand the institutionalized barriers shaping their worldviews and experiences in engineering.

3 | HSIs AND EMERGING HSIs AS CONTEXT FOR LOW-INCOME ENGINEERING STUDENTS

Previous research examining institutionalized inequities has focused on marginalization based on gender and race, with less attention to how Latino/a/x students' family socioeconomic status negatively impacts their college experiences (Niu, 2017). With a few exceptions (Major, 2019; Smith & Lucena, 2016a, 2016b), the impact of socioeconomic status in engineering education spaces has been understudied, particularly when it comes to the context of HSIs and emerging HSIs. This limited research focus on the repercussions of socioeconomic status at HSIs and emerging HSIs is surprising because income inequalities have continued to grow in the United States (Becerra, 2010), and these institutions enroll predominantly low-income Latino/a/x students (Camacho & Lord, 2013; Garcia et al., 2019). Although low-income students have the most to benefit from attaining a college degree, they are the ones who get the least out of it (Anderson & Hearn, 1992; Garcia, 2020), largely because the predominately Latino/a/x K–12 schools they transfer from are under-resourced and lack college preparation courses (Gándara & Contreras, 2009; Niu, 2017). This historical inequitable funding of schools for Latino/a/x communities results from *de jure* policies established by cases such as *Rodriguez v. San Antonio Independent School District*, which based the financing of schools on the racial and class profiles of school districts and their location (Valencia, 2010).

Furthermore, low-income Latino/a/x college students tend to face financial limitations that often force them out of college (Becerra, 2010). While HSIs are popularly believed to better *serve* Latino/a/x students, there is no common policy that outlines the parameters defining "servingness" (Garcia et al., 2019), leaving it to institutions to define what it means to serve Latinos/as/xs. Instead, the Title V Program Statute of the Higher Education Opportunity Act, amended in 2008 as federal law, only specifies the definition of HSIs based on an enrollment of at least 25% Hispanic/Latino-identifying students (of whom at least 50% must qualify for financial aid) (Higher Education Opportunity Act, 2008). There are no metrics or parameters that can help determine how "servingness" is supposed to be framed or the best way to ensure "servingness." One significant benefit of achieving the HSI status is that it allows institutions to have access to different mechanisms for federal funding (Higher Education Opportunity Act, 2008) aimed at broadening the participation of Latinos/as/xs in higher education. It is important to note that several institutions of higher education have sought to achieve the HSI designation over the past 30 years (Garcia, 2020; Laden, 2004), although it is hard to define whether or not these initiatives are motivated by economic intentions, national demographic changes and shifts, or a true desire to attend to the needs of Latino/a/x students (Vargas & Villa-Palomino, 2019). Nonetheless, as Gonzalez et al. (2020) explained, Latino/a/x students have been given no voice in defining what it means to serve them. In fact, enrolled Latino/a/x students are often unaware of the HSI designation of their institutions or believe it has little to no meaning in practice (Gonzalez et al., 2020).

In addition, the US Southwest, which serves a large Latino/a/x student population and is home to several HSIs and emerging HSIs (Laden, 2004), has historically been characterized by de facto racialization and segregation of Mexican, Mexican American, and Latino/a/x students (Blanton, 2003; Mejia, 2023; San Miguel, 2005; San Miguel & Valencia, 1998). The presence of HSIs and emerging HSIs in the US Southwest has not guaranteed the eradication of racialized ideologies or equitable fund allocation at these institutions (Sanchez, 2017; Vargas et al., 2020; Vargas & Villa-Palomino, 2019), thus impacting the education of Latino/a/x students in general and engineering in particular. Latino/a/x students are often faced with the overwhelming presence of deficit ideologies—or the idea that students, their families, and their communities are to blame for school failure and the insistence that Latino/a/x students' have inherent deficits or deficiencies (Valencia, 2010)—even at HSIs and emerging HSIs (Sanchez, 2017). Staff, administrators, and faculty who adhere to deficit ideologies believe that such deficits manifest in the form of "limited intellectual abilities, linguistic shortcomings, lack of motivation to learn, and immoral behavior" (Valencia, 2010, p. 8). Ching

(2019) found that STEM professors at an HSI blamed the students and their families for their "unpreparedness," instead of looking into the ways the institution could better serve them. Even within HSIs, low-income Latino/a/x students experience discrimination, racial stereotypes, social isolation, and racial microaggressions (Cuellar & Johnson-Ahorlu, 2016; Sanchez, 2017). In her study, Sanchez (2017) found that faculty failed to address the racism and micro-aggressions taking place in the classroom, especially at emergent HSIs and HSIs with Hispanic populations below 50%.

While most research on the college experiences of low-income Latino/a/x students has focused on higher education in general (see Garcia, 2018), limited research exists in the particular contexts of STEM and engineering at HSIs and emerging HSIs. For instance, Garcia et al. (2020) found that, across the 10 HSIs, STEM faculty "reported higher color-neutral racial attitudes (and therefore lower awareness) than faculty in humanities, social sciences, and professional schools" (p. 7). In addition, Niu (2017) found that precollege academic preparation—especially having strong academic achievement in math—and high socioeconomic status predicted minoritized students' enrollment and success in STEM majors. Taking a more ethnographic approach, Foor et al. (2007) documented a low-income, multiminority engineering student's (Inez) struggle, including having to work to meet her financial obligations while trying to maintain her GPA at the institution's acceptable minimum. A year into college, Inez lost her scholarship, which led her to take on 30-h work weeks while concurrently enrolled in five classes. Inez's situation is not uncommon for other low-income Latino/a/x students. Access to financial aid is a critical resource that allows low-income Latino/a/x students the opportunity to focus on their academic progress. Without financial aid, these students are forced to keep at least part-time employment while working toward their degree, which jeopardizes their overall academic attainment (Becerra, 2010).

As Foor et al. (2007) argue, "a student who comes from an economically disadvantaged background outside the dominant culture [...]" is less likely to participate in engineering (p. 103). Immersed in engineering spaces (e.g., classrooms, labs) where Anglo White culture and class privilege still constitute the norm, low-income Latino/a/x students struggle to develop a sense of belonging (Camacho & Lord, 2011) and to envision where and how they fit into the culture of engineering (Espino et al., 2022). Low-income Latino/a/x students' struggles to belong are concerning because students who succeed in their engineering degrees are those who have positive self-perceptions, have a strong precollege preparation, feel supported by peers and faculty in their academic programs, and can identify with engineering (Revelo & Baber, 2018). Framing Latino/a/x students' struggles as individual failure has limited much needed attention to systemic inequality in engineering education (Revelo & Baber, 2018), and the particular attention that needs to be paid to socioeconomic status at institutions intended to serve minoritized students. When marginalization and inequity remain invisible, there is no impetus for change, and everything continues to run business as usual (Camacho & Lord, 2013).

Considering the importance of socioeconomic status and the complex reality of HSIs and emerging HSIs, more research is needed that examines the experiences of low-income Latino/a/x engineering students within HSIs while problematizing the existing institutional structures that exacerbate their success. The present study contributes to the existing literature on engineering education research by centering the voices of low-income Latino/a/x engineering students completing their engineering degrees at HSIs and emerging HSIs in the US Southwest. However, rather than reporting percentages of low-income Latino/a/x students and their graduation rates, we foreground their lived experiences as low-income individuals, with particular attention to how they navigate systems made for a White, upper-class target audience.

4 | METHODOLOGY

4.1 | Research context and participants

Data analyzed in this paper stem from a broader longitudinal multisited ethnography conducted across four different campuses in the US Southwest seeking to explore the pathways of Latino/a/x students to and through engineering. For the purpose of this paper, we particularly focused on data that evidenced the ways in which socioeconomic status impacted the engineering trajectories of the Latino/a/x participants in the larger study. The institutions included in the larger study consisted of one public R1 HSI, one private teaching-focused emerging HSI, and two public R1 emerging HSIs. Although the student population at each institution is very diverse, their engineering programs abide by similar accreditation rules, disciplinary norms, institutional structures, and curricular cannons. Some of the differences across campuses are based on institutional contexts (e.g., organizational structure, academic plans, etc.) while others point to the diversity of students attending these schools (e.g., socioeconomic status, accessibility, transnational experiences, bilingualism, etc.).

Participants were recruited via advertisements, information sessions, and media postings distributed across all campuses and through student organizations such as the Society of Hispanic Professional Engineers (SHPE), the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), the Movimiento Estudiantil Chicano de Aztlán (MEChA), and others. A total of 22 self-identified Hispanic and Latino/a/x engineering undergraduates voluntarily participated in the larger study, all of whom reported to have an interest in partaking in research that contributes to Latinos/as/xs in engineering. Eighteen out of 22 participants were first-generation, low-income, college-going students, except for Jacinto and Rafaela (all participants' names are pseudonyms), who self-identified as second- and third-generation college students, respectively. In addition, most participants ($N = 18$) were of Mexican descent (i.e., Mexican American), except for Santi and Eva (who self-identified as having Honduran descent), Lena (who self-identified as having Peruvian descent), and Rafaela (who self-identified as having African American and Mexican descent). As Table 1 below shows, participants represent a broad range of cultural identities, generation status, and engineering disciplines, with the highest number of participants majoring in mechanical ($N = 6$) or biomedical ($N = 4$) engineering.

TABLE 1 Students' demographic information.

Pseudonym	Ethnic identification	Generation	Major	Institution type
Alberto	Hispanic/Latino	First Gen	Mechanical	HSI
Carlos	Mexican	First Gen	Electrical	HSI
Elena	Latina	First Gen	Biomedical	HSI
Eva	Honduran Garifuna	First Gen	Biomedical	HSI
Fernando	Hispanic	First Gen	Mechanical	Emerging HSI
Gerardo	Mexican American	First Gen	Mechanical	Emerging HSI
Jacinto	Mexican American	Second Gen	Electrical	Emerging HSI
Jessica	Latina	First Gen	Mechanical	Emerging HSI
Lara	Mexican American	First Gen	Environmental	Emerging HSI
Larissa	Mexican	First Gen	Computer	Emerging HSI
Lena	Hispanic/Peruvian	First Gen	Structural	Emerging HSI
Leo	Mexican American	First Gen	Mechanical	Emerging HSI
Lety	Mexican	First Gen	Civil	Emerging HSI
Lucía	Mexican American	First Gen	Mechanical	Emerging HSI
Luis	Mexican	First Gen	Chemical	HSI
Luz	Hispanic	First Gen	Biomedical	HSI
Mauricio	Hispanic	First Gen	Biomedical	HSI
Nana	Mexican American	First Gen	General	Emerging HSI
Nuria	Mexican/Latina	First Gen	Computer	Emerging HSI
Rafaela	Hispanic, Black, and White	Third Gen	Civil	HSI
Santi	Honduran American	First Gen	Materials	Emerging HSI
Sole	Mexican	First Gen	Chemical	HSI

4.2 | Data collection and analysis

Although the larger study relied on a variety of data sources—*pláticas*, focus groups, journey mappings, document analysis, and community walks—this paper largely draws on data coming from *pláticas* with the participants. The first author of this paper conducted a series of one-on-one *pláticas* (Fierros & Bernal, 2016) over a period of 3 years to flatten the relationship between the researcher and the participant (Delgado Bernal, 1998; Delgado Bernal et al., 2012; Delgado Bernal et al., 2017). The purpose of using *pláticas* was to foster *confianza* (or trust) between the researcher and the participant (Hausmann-Stabile et al., 2011). A *plática* is "an expressive cultural form shaped by listening, inquiry,

storytelling, and story making that is akin to a nuanced, multidimensional conversation" (Guajardo & Guajardo, 2013, p. 160). In the context of Chicana Feminist Epistemology, *pláticas* are used not only to make sense of lived experiences, historical realities, and sociopolitical contexts, but also as a way to create community, co-construct knowledge, express emotions, heal, and decolonize Western assumptions about what constitutes knowledge, who creates knowledge, and how knowledge should be communicated (Fierros & Bernal, 2016). In this study, *pláticas* evolved over time from friendly, informal conversations, to a reciprocal process where ideas, experiences, and stories were shared while openness and vulnerability from the researcher and participants were at the forefront (Fierros & Bernal, 2016). These *pláticas* took place online and in-person, and were initially guided by a particular topic of discussion, such as upbringing as a Latino/a/x in the US Southwest, schooling experiences, linguistic practices, and other cultural and social factors that had shaped the participants' trajectories in engineering. The questions asked during these *pláticas* were intended to shed light on how the intersection of language, gender, education, and culture influenced their engineering pathways.

Given the deeply personal nature of the topics discussed in the larger study, building *confianza* was key to make sure participants felt at ease sharing their experiences and lived realities in engineering. Thus, becoming vulnerable and sharing with participants is extremely important for *pláticas* so that reciprocity exists in the process of collecting the data (Fierros & Bernal, 2016; Guajardo & Guajardo, 2013). Drawing from his own experiences as a Mexican American engineer, the first author openly shared with participants the instances of racialization he encountered throughout his engineering journey, and the adversity faced as a low-income student (Mejia et al., 2022). In the course of these *pláticas*, he also recounted his background, personal experiences, and vulnerabilities as a first-generation Mexican American engineer. This disclosure served as a reciprocal gesture, reinforcing the trust dynamic between the researcher and participants and acknowledging the researcher's role as an instrument (Secules et al., 2021).

Over a span of 3 years, the *pláticas* evolved into a space where participants could unpack instances of marginalization and discrimination that might otherwise have gone unnoticed within institutional and engineering program contexts. Participants took part in as many as six *pláticas* that ranged from 40 to 90 min. These *pláticas* were conducted in both English and Spanish, and often included translanguaging and code-switching practices. On numerous occasions, the first author validated participants' experiences by acknowledging their emotions and providing emotional support and guidance when requested. Thus, *pláticas* also offered a potential space for healing as well as contributing to the participants' attempt to make meaning of their lived realities—a fundamental aspect of Chicana Feminist epistemology (Fierros & Bernal, 2016).

Pláticas were de-identified to ensure participant confidentiality and transcribed verbatim using Sonix. Transcriptions were then transferred to NVivo 12 for inductive, axial, and deductive coding. During the inductive coding stage, the research team contrasted participants' data to identify recurring topics through memos. The coding process was guided by what Dolores Delgado Bernal describes as *cultural intuition* (Delgado Bernal, 1998), which emphasizes the distinctive insights that Chicano/a scholars contribute to their research. Cultural intuition involves the understanding, awareness, and sensitivity researchers must have regarding the cultural contexts of the communities they study (Delgado Bernal, 1998). As a member of the Latino/a/x community in engineering, with a background shaped by similar sociopolitical contexts in the US–Mexico borderlands, the first author in collaboration with the second and third authors was able to identify the cultural norms, values, beliefs, and practices that influence the lives of the study participants. This cultural intuition provided the necessary guidance to critically analyze the data from a culturally situated perspective.

This initial analysis rendered over 60 recurring topics that were then subject to axial coding for interrelatedness and the creation of broader themes. The stage of axial coding was guided by Anzaldúa's *conocimiento* framework (Figure 1). It was in this axial coding stage that we focused on Anzaldúa's conceptualization of *el arrebato* (Keating, 2022) to extract the data that would be used for this paper. For instance, participants' accounts of experiences connected to competitiveness, engineering stereotypes, professional expectations, and economic and class disparities were classified as *arrebatos* because these often involves emotional and physical responses to events that created fragmentations in the participants' lived experiences and realities. Furthermore, students' narratives related to their perceptions of inequity, schooling, and opportunity gaps, and transition from high school to college were categorized as *arrebatos* because reactions to these events triggered further questioning about their sense of self, self-value, and an internal and external confrontation with the world of engineering. Table 2 provides a visualization of how the codes were defined and organized into themes related to *arrebatos*.

TABLE 2 Emergent themes and categories obtained from data analysis related to *arrebatos*.

***Arrebato* themes**	**Codes**
(In)opportunity in engineering—*participants reflecting on and reckoning with the disparities experienced in engineering due to socioeconomic status*	• Epistemological divide between participants and institution (e.g., engineering ways of knowing, doing and being) • Financial Stressors (e.g., lack of access to generational wealth) • Competitive nature of engineering (e.g., perceptions of competition vs. cooperation) • Expectations of engineering (e.g., calculus readiness) • Schooling and opportunity gap (e.g., long-lasting impacts of attending poorly funded schools) • Impact of first-generation status (e.g., lack of access to institutional knowledge) • Financial limitations (e.g., socioeconomic status as a source of financial burden)
Confronting lack of institutional consciousness—*participants reflecting on and reckoning with the institution's lack of critical awareness related to their socioeconomic status*	• Institutional lack of flexibility (e.g., not acknowledging part-time students) • Faculty, peers, and staff as oppressors (e.g., not acknowledging financial adversities faced by students) • Familial obligations (e.g., lack of consciousness regarding obligations of low-income, first-generation students) • Self-reliance assumption (e.g., meritocratic ideology)
Institutional barriers toward financial well-being—*participants reflecting on and reckoning with the inability to achieve financial well-being despite doing the constant work demanded by the institution*	• Financial departments as obstacles (e.g., Financial Aid Office staff's lack of socioeconomic awareness) • Bias and discrimination (e.g., constant microaggressions received by the institution) • Racialization (e.g., reflecting on the role that race plays in economic disparity) • Institution as gatekeeper (e.g., policies that create financial obstacles)

5 | LIMITATIONS

It is important to mention that this study is situated in a very contextual setting—the US Southwest—and the majority of the participants have historical connections to the culture, the land, and the Mexican American ancestry of the region. Thus, this study should not be generalizable to all Latinos/as/xs because this population should not be conceptualized as a monolith (Revelo et al., 2017; Revelo et al., 2024). The specific context of the study, involving a particular geographic region and demographic group, may limit the broader applicability of the findings to a more diverse or different population. That is, the unique sociocultural and economic factors influencing the experiences of Latino/a/x students in the US Southwest may not necessarily mirror those encountered by individuals in other regions or with different ethnic backgrounds. Therefore, while the study offers rich qualitative data and deep contextual understanding, caution should be exercised when attempting to extrapolate the findings beyond the specific parameters of the research setting.

5.1 | Researcher positionality

The first author self-identities as a first-generation, bilingual (Spanish and English), Mexican American engineer from a low socioeconomic background. As a *transfronterizo*, he also has experienced living in the borderlands—both geographically and metaphorically speaking—similar to the experiences described by the participants. It is this closeness to similar lived realities that he was able to build the *confianza* to conduct the research. Driven by his own experiences in the United States and Mexico, his teaching and scholarly work seeks 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. He began his 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. The second author self-identifies

as a Latino (Costa Rican), bilingual (Spanish and English), critical language-in-education scholar who works at the intersection of critical applied linguistics and anthropology of education. Having experienced his bilingualism in racialized ways, his research centers on bilingual Latinas/os/xs' negotiation of identity at the nexus of language, ethnicity, race, and space/place, especially within multilingual/multicultural settings. His work examines language-related tensions within US institutions, as well as the ways these become reinscribed and contested in home/community spaces on both sides of the US–Mexico border. He approaches this line of inquiry using critical ethnography and critical discourse analysis. The third author is a queer, working-class, Xicana (The use of the letter "X" in place of "Ch" in the spelling of the word *Chicana* signifies the author's nod to her Mexican indigenous heritage.) whose scholarship examines academic culture and student experiences within higher educational settings with a specialization in Queer, Trans, Black, Indigenous, People of Color (QTBIPOC) student populations. As an interdisciplinary scholar, she has also explored topics of sexual literacy and sexuality among Chicanas, embodied language learning, and Latino/a/x STEM identities in higher education. Her proximity to this study involves her social, cultural, and ethnic affiliation to the Latino/a/x diaspora and a class consciousness relative to the working-class experience. Further, her K–12 educational experiences as a student who attended poorly funded public schools in a predominately low-income, Mexican American neighborhood and her current status as a university student connects her to the study's participants.

As critical scholars invested in racial equity, our broad aim is to elevate these students' voices, epistemologies, and help (re)frame Latino/a/x engineering students as holders and creators of knowledge that should be acknowledged in our pursuit of educational equity in engineering. Our research opposes the notion that students possess inherent deficits that must be "fixed." Instead, we argue that these deficit ideologies further marginalize students and perpetuate false models of meritocracy in engineering. We 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 research. It is through these actions that we can move toward more liberative practices in engineering education.

6 | FINDINGS

In this section, we discuss participants' experiences that fall under the broader theme of *arrebatos* caused by socioeconomic disparities and the ways the participants reflected on these as they pursued engineering degrees at HSIs and emerging HSIs. Specifically, we describe these *arrebatos* by organizing them in three specific themes: (1) awakening to an (in)opportunity gap to and through engineering, (2) confronting an institutional lack of sociocultural and political consciousness, and (3) encountering barriers to financial well-being.

6.1 | Awakening to an (in)opportunity gap to and through engineering

Participants frequently referenced the various difficulties that arose from having grown up in low-income households and having attended what they described as poorly resourced middle schools and high schools. Although participants have long been aware that these socioeconomic hardships were detrimental to their schooling, these became a new source of *arrebatos* since the onset of their engineering programs at both HSIs and emerging HSIs. For instance, Carlos—Mexican, first-generation, chemical engineering student—recalled that his high school was not "college pushing" in the sense that efforts to create a pathway to college were insufficient. Having lacked the necessary support and mentorship for the college application process, Carlos described researching prospective college programs as an "intimidating" task that he had to complete on his own (*Plática*, 03/04/21).

In addition to not being institutionally supported to pursue college pathways, participants described their high schools as institutions that provided—as they perceived it—inadequate and poor academic training, which left them feeling unprepared for the academic expectations of engineering and higher education. To illustrate, Leo—Mexican American, first-generation, mechanical engineering student—expressed resentment toward the lack of support in math and science at his high school, which he described as under-resourced:

> Our science classes were kind of lousy. I remember my physics was a joke. It was such a joke. Nobody passed the [...] A.P. physics exam. And it was really rare for somebody, unless they did their own work by themselves (*Plática*, 09/30/21).

As Leo observed in this excerpt, students interested in learning math or science would have to self-teach or find the resources outside the classroom through personal means. Other participants mentioned not even having access to A.P. mathematics or science courses at their high schools. Conversely, as Leo became more aware of the gaps in his education, he observed that his White, upper-class peers arrived to college having had access to equipment such as "3D printers" and prior exposure to "hands-on training with engineering tasks" (*Plática*, 04/22/21).

Larissa—Mexican, first-generation, computer engineering student—stated that she started her computer engineering major not "having a lot of background in computer science or engineering." In addition, she never took calculus in high school, causing her to have to "learn in 10 weeks what [her] peers learned in a year" (*Plática*, 04/19/21). As a result, Larissa felt stuck in an academic limbo caused by a lag in exposure to higher level math subjects in high school. Many other participants expressed the same feelings of disruption (i.e., *arrebatos*) caused by educational and socioeconomic disparities. For instance, Lena—Hispanic, first-generation, structural engineering student—commented that coming into her first math class, it was evident that "everyone was at different levels" and that these different skill levels caused non-Latino/a/x peers to develop the mindset "that they're superior [to] someone who didn't get as many resources" (*Plática*, 04/21/21). Although all participants expressed that they believe they avoided comparing themselves to others, they confessed they could not help but notice stark differences in schooling among peers who came from different income households. For instance, Leo stated:

> I usually try not to compare myself because [...] we all have different experiences in high school. After talking to so many people about their high school experiences, I'm like, "oh, I didn't have that." I'm like, "okay, I didn't have the resources that I needed to know, to have the same skill level" (*Plática*, 09/30/21).

On a subsequent *plática*, Leo recalled an experience in which he was among the few students in class who had not previously used MATLAB when he was in high school (*Plática*, 11/11/21). Without these skills, Leo quickly developed a strong sense of being a burden in class and in teams because he was unable to follow along during group work. As reflected through his *plática*, this schooling and opportunity gap adversely impacted his ability to participate in the social and cultural aspects of his engineering program leaving him more isolated.

Likewise, Lara—Mexican American, first-generation, environmental engineering student—referenced the ways that coming from an under-resourced school impacted her experiences in engineering. When asked to describe her education trajectory from K–12 to the present, she recalled math as her strong suit prior to entering her engineering program. Now as a current sophomore student, she expressed feeling a sense of shock at failing a math placement test by which she was mandated to retake precalculus and deemed "not calculus ready." When confronted with a reality that conflicted with her positive experiences excelling in math at the high school level, Lara expressed, "a lot of teachers that set you up for college have not really taught you much" (*Plática*, 03/11/21). From the position of a student whose academic identity is at odds with the assumptions embedded in the expectations and culture of engineering, Lara perceived that the efforts of her high school were not as effective as she had believed. Similarly, Nana—Mexican American, first-generation, integrated engineering student—and Nuria—Mexican, first-generation, computer science student—also stated that their high schools did not offer a strong math curriculum nor expose them to engineering, which they now understand as a major setback in college, in comparison with upper-class peers.

Lety—Mexican, first-generation, civil engineering student—provided an illustration of what this opportunity gap looks like in the classroom:

> Whenever we're in class and the teacher asks, "All right, what's the answer?" I'm still typing. And somebody else is already like, "Oh, it's this, this, this." And I'm like, "Wait! How did you ...!?" And I'm still working it. I am fast and smart, but they are definitely ahead. I don't know how (*Plática*, 10/04/22).

Participants were also cognizant that the opportunity gap was the direct result of systems of inequality beyond the realm of schooling, as they have observed inequities with other types of support emanating from upper- and middle-class social stratifications. For instance, Larissa explained:

> Well, first, my other friends are kind of from like, middle-class areas, and I kind of grew up in a working-class area. So, I think that's one of the factors, as to why we grew up differently, like they went to different schools, and then there's the factor of, like, I think their parents were also engineers, like for all of them. All my friends have engineering parents and it's kind of, like, they have that other support system that I don't have. Yeah. I feel like they grew up to be engineers, if that makes sense, just because of their parents (*Plática*, 04/19/21).

From this perspective, participants observed two distinct sources of support: (1) guidance from schools with access to programs and coursework that prepared them for college, and (2) assistance that comes from the networks provided by the access to professionals and economic and financial assets. While school-based support systems remain crucial among participants, they also pointed to financially-based support as important in creating pathways to college and engineering. The perception of support and systems of access among students has given rise to notions of engineering as a skill that is either inherent or acquired: "They grew up to be engineers" (*Plática*, 04/19/21).

Finally, participants also confronted an opportunity gap in college, where their low-income status has negatively affected access to activities and programs that would allow them to build networks with fellow engineering classmates. For example, prior to starting her engineering program, Lara was accepted to attend a summer program but could not afford the initial out-of-pocket cost. She later explained that admitted students could apply for financial aid to cover the cost, but they are given very little turnaround time to file their FAFSA for consideration. This is a tall order for individuals who are filing this document for the first time, as was Lara's case, or for those that are undocumented, as was the case for other participants. Lara expounded that she would have been able to build a solid network of friends to form study groups and receive support if she had attended the summer program (*Plática*, 04/22/22). Unfortunately, this additional financial burden, and the lack of communication from the Financial Aid Office, puts students at a much bigger disadvantage and subsequent emotional reckoning with their lived realities.

6.2 | Confronting an institutional lack of sociocultural and political consciousness

Besides commenting on the opportunity gap that they have faced in their journeys to and through engineering, participants also expressed that the institutions and engineering departments they navigate lack sociocultural and political consciousness concerning their struggles as Latino/a/x students from low-income households. Drawing on Freire (2007), we conceptualize sociocultural and political consciousness as the critical perspectives about what ways of being, knowing, and doing are valued in the presence of power dynamics, and the capacity to address such institutionalized inequities. As participants recounted, this lack of sociocultural and political consciousness is perceivable not only in the assumptions expressed in exchanges and interactions with their mentors, professors, and peers, but also in institutional policies limiting their college opportunities and experiences.

Lena observed that the realities and identities of "Hispanic students" are not valued in engineering but rather overlooked. To illustrate, Lena referenced her own encounter with a mentor who she found to be oblivious to the existence of a divide in the material conditions associated with distinctions in socioeconomic class:

> I had a meeting with my mentor today about getting an internship [...] Her background was different than mine [...] And she didn't really understand that I don't really have a lot of opportunities as people who do come from an engineering family ... She told me "just ask one of your family friends for one [internship]" (*Plática*, 03/05/21).

Later in the same *plática*, Lena explained she initially met with this mentor with the hope of receiving assistance with obtaining an internship. Much to her surprise, the advice she received was more of a suggestion that she ask her family to connect her with such an opportunity. In response, Lena explained that her family recently migrated to the United States and that she is the first in her family to go to college, and therefore, she did not have access to that advantage.

Similarly, Leo recalled meeting with his coordinator (academic advisor) who questioned why he was pushing himself "so hard as a student by juggling multiple jobs in order to make ends meet" (*Plática*, 11/11/21). Prior to this exchange, Leo had not fully considered the prospects of not needing a job to support himself through college because, unlike some of his peers, his parents were not able to financially support him. When presented with a reality where some students did not hold a job, but rather could dedicate their time to studying while receiving financial support from their families, Leo was taken aback. In addition to mentors and advisors, participants also described some faculty as lacking an awareness of the financial limitations faced by low-income Latino/a/x students. When asked what the university can do to help students such as herself, Sole—first-generation, chemical engineering student who self-identifies as Mexican—expressed that professors should not assign homework assignments that require that students purchase access to expensive websites: "the homework website is like $140. I can't afford that" (*Plática*, 03/28/22). Sole noted that the constant financial burdens placed on students by the institution are always a source of shock and stress to low-income students (i.e., *arrebatos*).

Participants also explained that their middle- and upper-class peers sometimes do not understand why Latino/a/x students receive certain financial aid. Lena illustrated this point by recounting an instance at her local grocery store where she felt a need to explain to her peers why she uses a federal assistance program that helps eligible low-income individuals purchase their food, and why she receives financial aid via FAFSA: "I think that intersection sometimes can be difficult for them to understand that it's not like, it's not like a reward per se. It's like just for like equity" (*Plática*, 09/30/21). This experience was problematic because her classmates' lack of knowledge about societal inequities gave rise to their assumptions of monetary entitlement and good fortune as opposed to a federal benefit offered to people whose income level is below poverty. Peers described Lena as "lucky" (*Plática*, 09/30/21) for getting housing accommodations at her university, even though Lena must work part-time as a research assistant to receive such benefits, without which she would not be able to afford food, let alone living on campus.

Yet, beyond the individual level, participants recognized that a lack of consciousness and social awareness also extended to the institution as well resulting in fragmentations about how they felt about engineering. They described policies that set them at a greater disadvantage as individuals from low-income households who often need to hold part-time or full-time jobs while completing their degrees. For example, Leo—who holds two jobs to be able to pay for rent—encountered a "no extensions, no exceptions" class policy:

> I was going to email my professor (about an extension) because I was just busy over the weekend planning out my outreach event [for SHPE on campus]. But I just never did because I just remember going through the syllabus [and it] saying, they don't do any extensions or anything (*Plática*, 04/25/22).

Although Leo was working 40 h a week on campus while taking courses, the language of the policy cited in the course syllabus gave Leo the impression of having no other options. Getting an extension would have been a way to level the playing field because the professor's office hours were set at times that conflicted with Leo's work schedule, which also prevented him from joining student-organized study groups that met during his work hours.

In a follow-up *plática* that same year, Leo shared that his financial circumstances had grown worse as he had failed one of his summer courses. The issue of not passing a course generated yet another financial hardship as he was consequently placed under academic probation. As part of the conditions imposed onto students who fall outside the threshold of good academic standing, Leo was required to undergo an administrative process involving the collection of signatures from two of his advisors and from the professor who taught the course he failed. In conjunction with academic jeopardy, failing the course came at a price in the amount of $5000, the full balance of course tuition received from financial aid. According to Leo, the policy indicates that student who fail a course must abide by the rule to "pay out-of-state tuition for any courses that are retaken" (*Plática*, 09/27/22). Still reeling from the adverse effects of having failed a course two quarter sessions prior, Leo voiced that he was both frustrated and fearful of the repercussions of which he had more recently become acquainted:

> I don't have that money. I already asked my parents. My dad doesn't have any money saved. Of course. My mom luckily did because she ended up paying, helping me pay for the financial aid for the other paper that I need signatures for my advisor. So, I had to pay it and then they'll refund it to me once I complete that, or so they say (*Plática*, 09/27/22).

In like manner, Alberto—first-generation, Latino, mechanical engineering student—encountered a series of institutional obstacles. Coming from a low-income family, Alberto is obligated to keep part-time employment at a large supermarket as a forklift driver in order to financially support himself. Because of his need to provide for his basic living needs, Alberto is unable to enroll as a full-time student—"I couldn't do four classes because of how much I have to work now" (*Plática*, 04/04/22)—which makes him ineligible for financial aid. Moreover, the money he makes from his part-time job is not nearly sufficient to pay for tuition, food, and housing. Alberto's struggles as a low-income student did not stop there, as he later found more institutional hurdles. In the fall of 2021, he registered for a thermodynamics class but withdrew from it due to unforeseen circumstances. He later registered for this class again in the spring semester of 2022 and failed it. To his surprise, when he registered for the same class the following term, he was charged over $4000 because of what he described as the "three strike rule," which means that students taking a class for the third time must pay out-of-state tuition (*Plática*, 09/26/22). What he had assumed was a safeguard against failing the course, Alberto's decision to withdraw from the class the first time around, backfired and ultimately counted against

him. These examples demonstrate the consistent perils that Latino/a/x students are confronted with due to the lack of understanding from the institution regarding the sociopolitical realities that the students live in.

6.3 | Encountering barriers to financial well-being

Participants frequently referenced the financial stressors they faced as Latino/a/x students from low-income backgrounds, some of which included not only the stress of juggling work and school and the need to provide financial support to their families, but also the fear associated with the uncertainty of possibly losing the financial aid that allows them to stay at school. As we discuss in this section, participants' financial struggles are often aggravated by financial aid structures and practices that complicate their readily access to financial aid and scholarship opportunities. That is, *arrebatos* created by institutional barriers continuously shook the ways in which low-income Latino/a/x engineering students experienced their engineering journeys.

Participants reported developing anxiety at the prospect of losing the financial aid that allows them to stay in engineering. They characterized the ability to attend college as a one-time opportunity to forge a better life for themselves and their families. To illustrate, Sole explained, "I received a scholarship to get here, and without the scholarship, I probably wouldn't even be attending a four-year university at all. I probably would have stopped at my associates" (*Plática*, 03/28/22). Later in the same *plática*, she stated that there is the option of renewing her scholarship at the end of every spring semester, which also makes her anxious because "if I don't get it again, I don't know how I'm going to pay for my expenses and my tuition and everything" (*Plática*, 03/28/22). On yet another *plática*, Sole stated that she is very serious about her education and hyper focuses on studies because her options are limited: "I'm very, very serious about school because personally I know I have one chance [...] I don't get to, 'oh, if I fail this class, my dad will pay for it.' No, I don't get any of that" (*Plática*, 11/23/21).

Adding to their stress is the way participants have been received and treated by representatives of the Financial Aid Office at their respective institutions, which they perceive as hindering their ability to properly access financial resources and scholarships. Participants often described financial aid staff as either providing little guidance or no guidance at all, poorly communicating, and frequently ignoring their requests. For example, Leo attended a university-hosted summer program prior to starting his first fall semester in an engineering program. Although he received some financial assistance with the cost of attendance courtesy of aid from NASA, he was responsible for paying the remaining balance of $3000. The high cost of the expense prompted a visit to the Financial Aid Office to ask about his options for repayment in the form of an installment plan. He recalled that the representative "bluntly" informed him that he had to pay the full balance in one lump sum. Consequently, Leo's father and brother were obligated to find the money to pay the balance off. It is important to mention that Leo had to visit the Financial Aid Office at least four times to ask the same question about paying the balance through an installment plan, and it was not until his fourth visit that a staff member told him he could have paid the balance through an installment plan. Leo pointed to a pattern of obstacles associated with visiting the Financial Aid Office (*Plática*, 09/27/22), which he candidly described as "intimidating" (*Plática*, 03/25/22). Furthermore, Leo also shared that he applied for university scholarships on at least five separate occasions during his freshmen year to no avail. He explained that no matter how much time and effort he put into his applications, he was never selected as a recipient; he never even received a response or rejection letter from the Financial Aid Office, which he found to be discouraging and not insightful into the reasons why he was not selected: "it's sort of like going through all the essays and all that stuff for scholarship or money that you're not going to get, or in my case, I won't get it" (*Plática*, 03/25/22).

In a like manner, Luz also had negative experiences with the Financial Aid Office at a different institution. In one of her *pláticas*, she expounded that she had been "dealing with Financial Aid," which often gives her "the biggest trouble" about filing for financial aid on an independent status. Seven months before the start of the first semester, Luz's mother passed away. Further complicating her family situation, Luz's biological father had never played a role in her life. As a result, there are various documents she must submit before she gets her financial aid approved. In a *plática*, Luz described her experience with the Financial Aid Office in the following way:

> Like for this semester, they denied my independent status, basically, because I couldn't prove that my dad wasn't in my life, even though they had approved it the year before. And I had submitted a letter from my teacher stating my dad wasn't in my life. I never had my tax documents, like, I filed independently because my mom passed away. So, it's just really mean. And like that was so like, just like a stab again and again because on top of that I'm also struggling in my classes. It's like I have this anxiety constantly, like, am I going to get dropped from my classes because my financial aid is not going through? (*Plática*, 03/25/22).

In search of assistance with refiling, Luz set up an in-person appointment to talk to a financial aid representative. When she asked for an explanation for the need to refile, it was explained that her application was denied because she failed to submit her father's death certificate—something that had erroneously been interpreted by the Financial Aid Office. Luz was shocked to learn the reason for the denial as she had previously submitted documentation as evidence reflecting her father's absence from her life. At her insistence, the representative checked Luz's file, located the documentation from the year prior, and proceeded to approve Luz's application. However, this was not the first time Luz had trouble with this office. She explained that the previous year (2021) was the first time she had to file for FAFSA without her mother's tax information. This process took a long time, impeding her financial aid disbursement to the point that she thought she was going to be dropped from her classes—as it is the institution's policy to drop students if they have not paid their tuition. Her mother having passed away, Luz did not have any form of income to make the tuition payment deadline while the financial aid situation got resolved (*Plática*, 11/11/21).

As a final illustration, Rafaela—a mixed race (Hispanic, Black, and White), third-generation, civil engineering student—also reported negative experiences with the Financial Aid Office at the institution she attended prior to transferring to her present school. She described the office as "not necessarily the most business keen" and "discombobulated" (*Plática*, 11/22/21). She explained that financial aid representatives were rude to her over the phone for asking about work–study opportunities: "So people got nasty with me over this phone because I would ask for like (work-study). Like, 'why do you need work-study? You're, you're paid for. You get this, you get that'" (*Plática*, 11/22/21). Rafaela was classified as a Legacy Student at that campus, which means that her parents graduated from the same institution. In retrospect, Rafaela believes that her Legacy Student status led these representatives to believe that she does not need financial support.

7 | DISCUSSION AND IMPLICATIONS

Entering the world of college and engineering education spaces involves a steep learning curve, even more so for students from disadvantaged communities affected by wealth inequality. Low-income, Latino/a/x students transitioning from high school or community colleges enter their programs with diverse academic and economic needs that require keen awareness of their social, cultural, and economic realities. Moreover, these situations present students with ruptures—physical and emotional responses—and disruptions that disturb their foundational beliefs about the world around them, their identity, and how they perceive (Anzaldúa, 2002) engineering spaces. However, as we discussed here, participants' economic needs have not been met at their institutions. Instead, all participants pointed to an institutional lack of sociopolitical consciousness about the material conditions facing them, which has negatively impacted their experiences in engineering and intensified the many stressors that they constantly confront.

All participants reiterated that they fear losing whatever financial aid they had, because without it they would need to drop out of college. Participants' accounts illustrate the ways in which HSIs meant to serve the historically underserved Latino/a/x student population may be hindering low-income, Latino/a/x engineering students' retention in college, and ultimately their academic success. Faculty, advisors, peers, and institutional structures, in fact, create the perfect conditions for *arrebatos* that detrimentally affect Latino/a/x engineering students.

As the findings illustrate, participants are often impacted by economic disparities that are overtly ignored by or unknown to faculty, administrators, and the institution itself. As noted by the participants, the constant struggles with the institution demonstrate that HSIs and emerging HSIs are not necessarily facilitating the success of engineering students based on the practices, policies, and the lack of critical consciousness regarding the wealth disparities existing among their students. In that sense, HSIs and emerging HSIs are also framing Latino/a/x students as a monolith (Revelo et al., 2017; Revelo et al., 2024), neglecting the multiple intersectionalities of the students. In addition, the fact that these engineering programs are embedded within HSIs and emerging HSIs also speaks to the coordinated work needed to ensure that institutional consciousness about low-income Latino/a/x engineering students is achieved. First, organizational and structural collaborative work is necessary to (re)frame how servingness is defined not only by HSIs and emerging HSIs but also by engineering programs within those institutions. Aspects of competitiveness, meritocracy, and racialization, which have been documented in engineering education research (see Cech, 2013; Hacker, 2017; Mejia, 2023; Riley, 2017), should be explored extensively to ensure that wealth disparities, policies, and discourses negatively impacting Latino/a/x engineering students at HSIs and emerging HSIs are challenged and addressed. Changes must focus on understanding the obstacles faced by low-income Latino/a/x engineering students while paying attention

to the institutional behavioral changes needed to eliminate decades of disparities (Garcia, 2020; Garcia & Cuellar, 2023) while allowing students to develop an engineering sense of belonging that is devoid of *arrebatos*.

Many of the participants' *arrebatos* show that they have been aware of these economic disparities from an early age but are often ignored by faculty, peers, and administration. Ever since the participants started their engineering programs, they have come to realize that coming from low-income backgrounds results in not only not having access to the same resources as students from higher income households, but also confronts them with the sociopolitical realities of higher education: the fact that the institution was not created for people of color to thrive and succeed (Corces-Zimmerman et al., 2020; Leonardo, 2009). This structural inequity then leads to an unavoidable lack of resources, such as access to textbooks and other learning materials, as well as access to internships, which can be essential for success in engineering. Furthermore, many of these students may not be able to afford the cost of tuition for engineering programs and may have to take out loans to cover the cost or take on additional part-time or full-time jobs. This reality is particularly significant for those Latino/a/x engineering students who do not conform to the definition of a "traditional" college student, and instead must juggle different financial and familial responsibilities that are often ignored by institutions (Becerra, 2010; Espino et al., 2022; Garcia et al., 2019). Thus, economic disparities can have a significant impact on the success of engineering students from lower income households, particularly Latino/a/x engineering students.

Additionally, the data collected from the *pláticas* also illustrate historical sociopolitical realities that have kept Latinos/as/xs away from higher education—even from HSIs and emerging HSIs, the institutions intended to provide more access to higher education for Hispanics/Latinos (Higher Education Opportunity Act, 2008). There are several policies that have impacted the population of Mexican and Mexican American students in the US Southwest (Blanton, 2003; San Miguel, 1999; Valencia, 2008), the area where the four institutions in this study are currently located, which the participants identified as continuing to exist. Latino/a/x students in the US Southwest have faced exclusion from schooling by being subjected to inferior education, Americanization, and unpaid labor (Gonzalez, 2013). Gonzalez (2013) argued that Latino/a/x children in the Southwest were the most impacted by the project of Americanization in the United States because it continued to push for vocational education, language subtraction, and tracking. The impacts of these historical factors are still evidenced among Latino/a/x engineering students at HSIs and emerging HSIs in the US Southwest as related in the descriptions of their *arrebatos*. These sociopolitical realities continue to exist in the form of differential education and racialized ideologies (Gonzalez, 2013; MacDonald, 2004; San Miguel, 1999; San Miguel, 2022; San Miguel & Valencia, 1998), which places Latino/a/x engineering students in a path to potentially truncated engineering pathways. It is important for engineering programs at HSIs and emerging HSIs to confront this historical legacy to promote more welcoming environments for Latinos/as/xs—perhaps by challenging the deficit ideologies that continue to dictate how engineering educators frame and racialize students in the classroom (Mejia, 2023).

Participants were also cognizant of the inequities that result from not having access to engineering social capital and the resulting *arrebatos*. Almost all participants highlighted the fact that higher income meant access to networks of individuals with knowledge of and about engineering. Although the significance of access to engineering social capital has been reported by engineering education research previously (Martin et al., 2020; Skvoretz et al., 2020), little has been said about how low-income Latino/a/x engineering students at HSIs and emerging HSIs are detrimentally impacted academically by not having this closeness to individuals in engineering spaces. It is important to recognize that even at these institutions meant to serve a large number of Hispanic/Latino students, there are still socioeconomic disparities among the student body (Garcia & Cuellar, 2023). Low-income households are often unable to access the same resources as their higher income peers, such as textbooks, technology, and tutoring—let alone internships or other opportunities that could help propel their engineering pathways. As a result, they are also often at a disadvantage regarding academic success as indicated by almost all participants. Furthermore, low-income households often cannot afford to send their children to private schools or pay for extracurricular activities (Niu, 2017; Vargas & Villa-Palomino, 2019), which can be essential for success in engineering and the workforce. Additionally, as schools are funded through property taxes (Donato & Hanson, 2012), schools in low-income neighborhoods are often underfunded—something participants in this study alluded to—leading to overcrowded classrooms with fewer educational resources (Valencia, 2010). This can further contribute to the educational gap between students from different economic backgrounds, which can be exacerbated even more in engineering programs where high costs are the norm and calculus readiness can impose additional financial burdens to incoming minoritized students (Long et al., 2009).

The *arrebatos* experienced by low-income Latino/a/x engineering students are also often exacerbated by the policies established at each institution. One of the most predominant issues that participants mentioned was the ways unclear financial aid policies and the changing messages received from financial aid staff members make it difficult for them to navigate the institution. It is well known that Latino/a/x students often face challenges in their engineering programs,

within which they are often underrepresented and misrepresented (McGee, 2016). However, the amount of research exploring the complexity of navigating financial aid offices and handling financial stressors imposed by the institution needs further examination. As revealed by participants like Luz, Lucia, Sole, and Alberto, financial aid structures often create barriers that keep them from being successful in engineering programs. Many Latino/a/x students come from economically disadvantaged backgrounds, and thus may not be familiar with the process of applying for financial aid, eligibility requirements, or ways to prove independent status in their FAFSA forms. The process for financial aid eligibility and approval is often dragged, murky, and inconclusive, making it difficult for students to continue their enrollment and success in engineering programs. While staff working in financial aid offices try to abide by the rules and policies of the institution, the complexity of navigating financial aid is rarely communicated effectively to students and assumptions are frequently made by staff members resulting in *arrebatos* for students. The same financial stressors are also a source of mistrust in the institution, staff, and administrators. Participants mentioned having to talk to financial aid staff members several times over a short period of time to no avail. This lack of communication often leads to anxiety among students, who frequently experience feeling ignored by the institution. Further research on how to provide more culturally responsive training to staff members at HSIs and emerging HSIs should be considered to prevent the perpetuation of events, actions, and situations that lead to *arrebatos* (Anzaldúa, 2002).

8 | CLOSING THOUGHTS

Although more Latinos/as/xs are attending college, they continue to face many barriers, resulting from different systematic biases and exclusionary cultures. Most empirical research has focused on barriers along the lines of race and gender, with less attention paid to the hardships faced by Latino/a/x students from low-income backgrounds at HSIs and emerging HSIs. The concept of *el arrebato* explored in this study brings light to the importance of analyzing the experiences and lived realities of Latino/a/x engineering students from different perspectives, as well as the emotional fragmentations that these create, particularly by introducing critical frameworks that reject White hegemonic ways of interpreting lived experiences. *Arrebatos* are intensified by the stress derived from having to keep part-time jobs while doing well academically and by a Financial Aid Office that hinders their access to financial aid and scholarships. Gloria Anzaldúa's concept of *el arrebato* is deeply connected to the oppressive structures that Latino/a/x individuals often face. It is a reminder that despite oppression, Latino/a/x individuals can still find liberation and strength in their identity. *Arrebatos* are intensified by the stress derived from having to keep part-time jobs while doing well academically and by a Financial Aid Office that hinders their access to financial aid and scholarships. *El arrebato* is a powerful concept for understanding the complexities and nuances of Latino/a/x identity and its connection to oppressive structures (Anzaldúa, 2002) while acknowledging that an engineering identity—even within HSIs and emerging HSIs—is always evolving and not a static construct (Secules & Mejia, 2021).

Under these circumstances, higher education scholars posit that defining "servingness" requires that HSIs and emerging HSIs interrogate their histories of colonialism and their complicity in the exclusion of Latino/a/x youths from the educational pipeline (Garcia, 2018). The task of defining "servingness" for engineering programs is also critical because low-income Latino/a/x students enrolled at HSIs and emerging HSIs arrive with a set of systemic disadvantages that only increase when overlooked by the institution (Becerra, 2010; Cuellar, 2019; Garcia et al., 2020). That is, low-income Latino/a/x students' fragile position within US higher education institutions is further compounded by college faculty who interpret their needs for additional support through a deficit lens (Menchaca, 1997; Valencia, 1997).

We concur with scholars that engineering education must implement policies and practices that support these students. However, we argue that being able to envision concrete measures for this purpose requires that we better understand the hurdles and struggles that these students encounter throughout their educational trajectory and the institutional policies and practices that may be perpetuating barriers for low-income individuals at HSIs and emerging HSIs. We invite other engineering education scholars to critically engage in research that problematizes the historical, social, and political impacts on the current status of engineering education, and move toward the contextualization of systemic problems that have led to decades of educational oppression in engineering.

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