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Work in Progress: Moving Beyond Research: Supporting Engineering and Computing Identity Development for Latina Students

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Work in Progress: Moving Beyond Research: Supporting Engineering and Computing Identity Development for Latina Students

Latina students are entering institutions of higher education at greater rates than ever, yet they remain underrepresented in engineering and computing. In particular, Latina students attained fewer bachelor's degrees in engineering and computing in comparison to other STEM fields (NCSES, 2021). Latinas earned more bachelor's degrees in psychology, social sciences, and biological and agricultural sciences than in other STEM fields. In engineering, Latino men earned 3.5 times the number of bachelor's degrees in engineering as Latina women did (Anderson et al., 2018) and Latina women make up only 2% of all computing bachelor's degrees (McAlear, 2018). Their share in engineering and computing bachelor's degree attainment has remained flat (around 2%) over the past 20 years.

Engineering and computing contexts may be particularly difficult to navigate due to their environments being entrenched in exclusionary, masculine, competitive, and identity-evasive practices (e.g. Secules, 2019; Rodriguez & Lehman, 2018). These inequities are the result of historically oppressive racist, sexist, and other oppressive structures embedded in STEM (Carlone & Johnson, 2007). Historically and contemporarily, women of color in STEM experience a "double-bind:" they are simultaneously marginalized as women and as people of color within predominantly White men's spaces (e.g., Ong et al., 2011). In recent years, scholars have called for identity-conscious, assets-based approaches to leverage Latinx STEM students' own *conocimientos* (Anzaldúa, 1987; Mejia et al., 2018), or ways of knowing, including cultural and familial pedagogics and other assets such as students' curiosity, resilience, and resistant capital (Mejia et al., 2018; Rendón et al., 2019; Rodriguez et al., 2020a, 2020b; Rodriguez et al., 2023).

This scholarly paper serves as a research to practice guide for translating elements of engineering and computing identity development for Latina students into holistic, actionable approaches for equitable outcomes. Rather than the existing, more stabilized identity frameworks within engineering and computing education, this work also encourages researchers and practitioners to view identity development in a fuller, more complex way, emphasizing the dynamic, shifting, and often messy work of becoming oneself within these fields. It is intended to generate discussion and engagement with a multi-prong approach to engineering and computing identity development among scholars and practitioners. The primary charge of this work is to share concrete strategies for how educational stakeholders can support engineering and computing identity development practices, policies, and collaborations for Latina students as they progress through their educational journeys. This call to action will be dually articulated around a distinctly Chicana Feminist (Anzaldúa, 1987; Anzaldúa & Moraga, 1981) approach to enhancing engineering and computing, including a recognition of the multiple borderlands of experience that Latina students may find themselves at during this identity development process.

How Can Chicana Feminism Help Us to Be More Identity-conscious and Assets-based In Serving Latina Engineering and Computing Students?

Chicana feminism is a form of feminist thought and activism that emerged in the United States among Mexican American (Chicana) women (Conchas & Acevedo, 2020). Chicana feminism emerged in the late 1960s and early 1970s as part of the larger Chicano Movement, which was a political, social, and cultural movement aimed at empowering Mexican Americans. Chicana feminists challenge the ways Chicana women have been historically marginalized and oppressed, both within their communities and in wider society. They address issues of gender, race, class, and sexuality and seek to create a more inclusive and equitable society for all Chicanas (Hurtado, 2003). Chicana feminists argue that traditional forms of feminism, which were often developed by white, middle-class women, did not adequately address the experiences of Chicanas (Anzaldúa & Moraga, 1981). They sought to create a feminism that was

grounded in the experiences of Chicanas and that took into account the ways in which gender, race, class, and sexuality intersect and shape the experiences of Mexican American women.

For example, the Chicana Feminist concept of *Nepantla* (Anzaldúa, 1987; Anzaldúa & Moraga, 1981) can be instructive. Nepantla is a Nahuatl term that is central to the work of Chicana feminist writer and scholar Gloria Anzaldúa. *Nepantla* represents a space of creative and cultural transformation, where Chicanas and Latinas can reclaim and reinterpret their cultural heritage, and develop new forms of identity and cultural expression that draw from both their ancestral traditions and their experiences. Anzaldúa argues that being in *Nepantla* can be a painful and disorienting experience, but also one of great potential for personal and cultural transformation. She writes that being in *Nepantla* can lead to a deeper understanding of one's own culture and heritage, as well as a heightened awareness of the intersections of race, gender, sexuality, and other forms of oppression and marginalization. Anzaldúa's concept of *Nepantla* has been influential in Chicana feminist thought and activism, and has helped to bring attention to the experiences and perspectives of Chicanas and Latinas. It has also been influential in shaping broader discussions and debates around identity, cultural heritage, and social justice.

At its core, Chicana Feminism can be a radical approach to serving Latina engineering and computing students in which we, as members of the field of engineering education, acknowledge Latina students as having multi-dimensional identities that often times cause them to be at the "borderlands" between their Latinx cultures and the U.S. educational system. In particular, this means acknowledging that Latina engineering students have historically and contemporarily existed in a state of marginalization by the U.S. educational system and U.S. society writ large. In order to be more socially just in our service to Latina students in engineering and computing, it means believing and honoring that Latina students are the holders and creators of knowledge because they engage in both formal (academic) and informal (home/community) practices that inform their ways of knowing and moving through the world.

What Are Some Practical Ways to Move Beyond the Research in Order to Support Engineering and Computing Identity Development for Latina Students?

Chicana feminism invites us, as engineering education educators, to step into consciousness in order to serve students. This means promoting identity development within and outside of the classroom by investigating the **teaching and curriculum** as well as **advising and support** changes needed to support Latina students in these fields. In addition, this means empowering **college leaders** to act as catalysts of change and community building in order facilitate a multi-prong approach to enhancing engineering and computing identity development for Latina students.

To fully embody this vision will require engineering education practitioners for an **integrated, assets-based approach** to engineering and computing identity development that draws upon identity theory and research, community cultural wealth as well as funds of knowledge and identity. Chicana feminism offers a framework for understanding and addressing the experiences and challenges faced by Latina engineering and computing students. Here are practical ways engineering educators might apply Chicana feminist principles in working with Latina engineering and computing students:

- **Valuing cultural heritage and identity:** Encourage students to explore and celebrate their cultural heritage and identity and help them understand the ways in which their cultural experiences and perspectives are valuable and worthy of recognition. Demonstrate that the multiple identities that Latina students bring are valued within these fields.

- **Promoting critical consciousness:** Encourage students, faculty, staff, and leaders to think critically about how race, gender, sexuality, and other forms of oppression intersect and impact

their lives and experiences. This might mean re-imagining curricula, programming, and goals to make space for such explorations.

- **Incorporating diverse perspectives:** Ensure that course materials and class discussions are inclusive and representative of a wide range of perspectives, including those of Latinas. For faculty members, this might look like examining curricula for ways to incorporate more varied examples, attention to problem solving that involves the Latinx community, or partnering with Latinx organizations to make your curricula more culturally relevant.

- **Supporting political activism:** Encourage students to engage in activism and advocacy work aimed at challenging systems of oppression and promoting social justice. Faculty, staff, and administrators may have to examine institutional policies and practices in order to redistribute power to students for their own educational experiences.

- **Fostering community:** Create opportunities for Latina students to connect with one another and build supportive networks. This might look like going beyond supporting efforts like Society of Hispanic Professional Engineers (SHPE) or the National Center for Women & Information Technology (NCWIT) to *also* supporting and getting involved with efforts like SHPEtinas (https://2022.shpe.org/conferences/shpetinas/) or Technolochicas (https://technolochicas.org/), which both focus on advancing Latinas within these fields.

- **Recognizing the centrality of whiteness and combating microaggressions:** Address the centrality of whiteness as well as combat microaggressions and other forms of discrimination and bias that Latina students may encounter in the classroom or other college educational settings. For faculty, staff, and leaders this may mean professional development to more fully understand what whiteness is, how it is perpetuated, and how to create an environment in which microaggressions are not tolerated. Given the growing political climate, it might also mean being proactive against institutional and state legislation that seeks to thwart diversity, equity, and inclusion efforts.

By incorporating these principles, engineering educators can help create an educational environment that is supportive, empowering, and inclusive for Latina students in engineering and computing within college.

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