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Piloting a Socio-Culturally Responsive Peer-Mentoring Program to Promote HLX+ Students' Sense of Belonging in Engineering Education: Lessons Learned from Year 1

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Piloting a socio-culturally responsive peer-mentoring program to promote *HLX+* students' sense of belonging in engineering education: Lessons learned from year 1

Abstract—An abundance of literature demonstrates that women's and minorities' sense of belonging, or lack thereof, influences their academic performance and persistence in STEM education and careers. To address this problem, we developed and piloted a holistic, socio-culturally responsive peer-mentoring program—with funding from the National Science Foundation—that provided a multidimensional (i.e., academic, institutional, and social) support system for first-year engineering students, particularly Hispanic/LatinX/XicanX students inclusive of their intersectionalities (*HLX+*). The purpose of this pilot program, *Promoviendo el Éxito Estudiantil a través de un Sistema de Apoyo* (PromESA), is to increase *HLX+* students' sense of belonging and, by extension, their persistence and graduation within engineering. [redacted] was integrated into a first-year sequence of courses where students met with their peer-mentors (i.e., Compañeros) during class time. Compañeros (Compas for short) provided their mentees with assistance such as emotional support through building friendships as well as confirmation and affirmation to improve the students' sense of belonging, in addition to tutoring, informal advising, and directing them to available university services.

The research seeks to identify academic, institutional, and social support elements that positively influence *HLX+* students' sense of belonging and explore how integrating Hispanic/LatinX/ XicanX cultural assets and values influence *HLX+* students' perceptions of engineering. Findings from the first year of implementation reveal that participants with peer-mentors from their academic major reported a higher sense of belonging than students with peer-mentors from other academic majors. Also, participants reported receiving social (i.e., peer and classroom) support, regardless of academic major. Participant feedback was mixed, with some reporting that peer-mentoring was a key contributor to their sense of belonging while others reported that it contributed somewhat to their sense of belonging and a few reported that it did not contribute to their sense of belonging at all.

Introduction

An abundance of literature demonstrates that women's and minorities' sense of belonging, or lack thereof, influences their academic performance and persistence in STEM education and careers [1]–[14]. Literature also indicates that peer-mentoring is particularly beneficial for helping Hispanic/LatinX/XicanX students develop a sense of belonging [15]–[19], since Hispanics/LatinXs/XicanXs occupy only 5% of faculty positions across the country [20]. Moreover, formal mentoring programs effectively and positively impact student satisfaction within their program, academic performance, motivation to persist in a program, and completion of degree [21]–[25].

Therefore, with funding from a National Science Foundation grant, we developed a holistic, socio-culturally responsive peer-mentoring program that provided an academic, institutional, and social support system for first-year engineering students by adapting the *Promotores de Educación Program* (PED) and its evidence-based practices developed at California State University at Long Beach (CSULB) [21]. The purpose of this program, *Promoviendo el Éxito Estudiantil a través de un Sistema de Apoyo* (PromESA), is to increase students' sense of belonging and, by extension, their persistence and graduation within engineering, particularly Hispanic/LatinX/XicanX students inclusive of their intersectionalities (*HLX+*). The pilot peer-mentoring program was integrated into the first-year sequence of engineering courses of a

piloting department in the College of Engineering at The University of Texas at El Paso (UTEP). Students enrolled in the first-year sequence of courses met with their peer-mentors (i.e., Compañeros) during class time. Compañeros (Compas for short) provided their mentees with assistance such as emotional support through building friendship, confirmation, and affirmation to improve the students' sense of belonging, in addition to tutoring, advising, directing them to available university services.

Although some research exists in STEM education that affirms the benefits of such programs [26]–[31], still little research explores the impact of these programs on historically minoritized/ marginalized students inclusive of their intersectionalities (*MM+*), particularly in engineering education (e.g., [30]–[32]). Necessarily, our research seeks to identify academic, institutional, and social support elements that positively influence students' sense of belonging and explore how integrating *HLX+* cultural assets and values influence students' perceptions of engineering.

Promotores de Educación (PED) Program

Concepts from cultural capital and critical race theory informed the development of PED, particularly the six types of cultural wealth identified by [33] and her concept of Community Cultural Wealth (CCW). As mentioned earlier, the PED program was developed at CSULB as part of an HSI initiative entitled Mi Casa: Mi Universidad funded by a five-year Department of Education grant [21]. The goal of the program was to "…provide the Latino first-generation educated student with *culturally affirming* and *relevant mentorship* and *linkage to campus services*, while facilitating a *greater understanding and response to the needs of first-generation-educated Latino students* among the CSULB campus community." (p. 48, *emphasis added*) This *HLX+* focused peer-mentoring program employed socio-culturally responsive practices (i.e., building on Latinx cultural strengths to facilitate academic success) and incorporated cultural assets and values "…as an integral part of the educational success strategy…" (p. 40) to improve *HLX+* student retention and completion of baccalaureate degrees—the program was not STEM specific, so promotores and mentees were selected from the pool of eligible students regardless of major. The PED model offered additional academic and service-related support for *HLX+* students, *HLX+* role models for *HLX+* students—given that *HLX+* faculty are scarce [20], and campus employment for peer-mentors (*promotores*). More specifically, PED provided *HLX+* student mentees with "…advising, friendship, tutoring, confirmation and affirmation…" [21] (p. 42) and the *promotores*, served as network providers, connecting mentees with institutional services and programs.

In order for students to participate in the program, as *promotores* or mentees, they had to meet stringent criteria [21]. For example, p*romotores* had to identify as *HLX+* as well as be first-generation-educated, high performing (GPA above 3.0), and bilingual (English/Spanish). They also had to provide a recommendation from CSULB faculty/staff and demonstrate knowledge of and involvement with CSULB programs and Latino-specific groups. After these criteria were met, potential *promotores* were interviewed to assess whether or not they demonstrated an understanding of and appreciation for *HLX+* cultural values and exhibited certain characteristics. Ultimately, only 13 *promotores* were selected per year. If selected, the *promotores* were hired and given responsibility for approximately ten mentees.

The criteria to participate as a mentee are not quite as rigorous. Still, mentees must identify as *HLX+*, have a GPA below 2.5, commit to meeting at least one hour weekly with their designated *promotor*, and proactively access an array of campus services. Once accepted into the program,

mentees remain eligible until they complete two consecutive semesters with a semester GPA of 2.5 or above, respectively. The maximum capacity for mentees is 100 students.

PED and PromESA Values

Community Cultural Wealth (CCW), the intersection of Cultural Capital, Social Capital, and Critical Race Theory, challenges the dominant ideologies and their underlying assumptions that employ deficit mindsets when examining the cultural capital of communities of color [33]. More specifically, CCW challenges the assumption that, "…People of Color [POC] 'lack' the social and cultural capital required for social mobility (p. 70)." CCW can be summed up as the constellation of a culture's aspirational, linguistic, familial, social, navigational, and resistant capital, cultural assets that are abundant in Communities of Color [33] (see Table 1.). As an approach to education, CCW "…involves a commitment to develop [educational spaces] that acknowledge the multiple strengths of Communities of Color in order to serve a larger purpose of struggle toward social and racial justice (p. 69)." Necessarily, CCW is changing the narrative that POC lack necessary knowledge, social skills, abilities, and cultural capital, therefore, education must rescue these 'disadvantaged' students from their racial and class backgrounds.

The PED peer-mentoring program employed socio-culturally responsive practices by building on *HLX+* cultural strengths to facilitate academic success. More specifically, PED incorporated specific *HLX+* cultural assets and values as an integral part of the *HLX+* students' educational success strategy [21]. [21] identified and integrated assets and values, which parallel the six types of CCW, in the *HLX+* community: communitarismo, respeto, confianza, familismo, personalismo, simpatia, and presentismo (see Table 2.). Innately, mentoring programs are well suited to promote the CCW and cultural assets and values of *HLX+* students as part of their personal development [21], [34].

To better contextualize these community/cultural assets, values, and wealth for an engineering education context at The University of Texas at El Paso (UTEP), a Hispanic-Serving Institution (HSI) on the US/Mexico border along the Rio Grande, PromESA established guiding principles (see Table 3.). These guiding principles served as a type of 'quality control' to inform and guide decision making, implementation, and subsequent iterations of the pilot program.

Table 1. Community Cultural Wealth (CCW)

Forms of Community Cultural Wealth	
Aspirational capital	Maintaining consistently high outlooks for the future regardless of the obstacles that must be overcome.
Linguistic capital	The perspective that "Students of Color arrive at school with multiple language and communication skills" (p. 78) often developed by their role translating for parents or other adults and includes skills such as visual art, music, and poetry.
Familial capital	The culture's commitment to community well-being, a broad understanding of kinship, and healthy connection to community and its resources.
Social capital	The peers and other social contacts who provide instrumental and emotional support.
Navigational capital	Skills that initiate exercising agency to negotiate social institutions (e.g., schools, job market, health care, judicial system).
Resistant capital	The community's motivation to continually work toward social and racial justice.

Table 2. Cultural Assets and Values (CAV)

HLX+ Cultural Assets and Values	
Communitarismo	The cultural value of maintaining tightly-knit communities
Respeto	The cultural appreciation for the role of the elderly and persons of authority
Confianza	The cultural value for trustworthiness, being trustworthy and assessing the trustworthiness of others
Familismo	The cultural importance of family unity and the family structure to provide emotional and social support
Personalismo	The value placed on personal relationships as opposed to purely institutional or transactional relationships
Simpatia	The cultural value for agreement and harmony over disagreement and discord
Presentismo	The cultural value for living in the moment

Table 3. Contextualization of Community Cultural Wealth and Cultural Assets and Values

Guiding Principles	Contextualization
Aspirational capital	Providing support for resume building and interview skills as well as communicating engineering job and internship opportunities
Linguistic capital	Normalizing the use of Spanish in academia
Familial and Resistant capital	Encouraging compas to participate in forms of community engagement with their mentees
Social capital	Preparing compas to serve as a means of social support and connecting mentees with members of student and professional organizations (e.g., MAES/SHPE)
Navigational capital	Introducing mentees to services, resources, organizations, etc. provided by the college of engineering and the university to promote self-advocacy
Communitarismo	Forming peer-mentoring groups with mentees from other engineering departments so they connect to others in the college of engineering
Respeto and Simpatia	Modeling respectful yet authentic and safe relationships between TAs, compas, mentees, and faculty/staff
Confianza and Personalismo	Planning deliberate, distributed interaction between compas and mentees to establish familiarity and promote personal relationships that provide emotional support
Familismo	Helping mentees build a personal support network
Presentismo	Empowering compas to adapt the weekly mentoring activities to accommodate immediate concerns or challenges that their mentees may be experiencing

PED Contextual Adaptations

As mentioned earlier, PED is not a STEM specific program. Also, PED established several criteria that must be met to be eligible to participate in the program, as a *promotor* or mentee. Therefore, we had to adapt the program to better suit our particular context.

First, PromESA adapted the PED program by making it specific to an engineering education context. This, along with other logistical challenges, meant adapting the eligibility criteria for participating in the program, as a compa or mentee. For example, compas were not required to be first-generation college students, bilingual (although it was preferred), nor have a GPA of 3.0 or above. A formal faculty/staff recommendation was also no longer required—due to the small size of the piloting department, it was easier to speak to faculty/staff directly regarding a potential compa. Potential compas were still interviewed, but only to learn more about them as a person. Criteria that were added include enrollment in the engineering degree plan of the piloting department and a commitment to attend at least one class section of the first-year sequence of courses (this will be explained below). The criteria that did not change were identifying as *HLX+* and enrollment as an undergraduate. For mentees, the only criterion to participate in the program was enrollment in the first course in the first-year sequence of courses offered by the piloting department.

On a commuter campus such as UTEP, students typically have other responsibilities (e.g., work, immediate family obligations, extended family obligations) in addition to their education. This posed a challenge when coordinating times and locations for mentor-mentee meetings in their already busy schedules, which was exacerbated by the reality that not all students have vehicles. Therefore, PromESA was integrated into a first-year sequence of courses for incoming engineering students, providing a fixed time and location for compas and mentees to meet. Also, one of the goals of PromESA was to help students develop their own support system of peers. Integrating the program into a course facilitated the creation of mentoring groups where a compa would meet with four to five mentees simultaneously, fostering relationships with the compa and among the mentees in the group, as well.

Implementation of PromESA

The plan

The pilot peer-mentoring program would be integrated into the first-year sequence of courses offered by the piloting department. The first course (1301) in the sequence and the second course (1402) in the sequence would be available to first-year undergraduate engineering students whose declared major is in the piloting department. One section (approximately 30 students) of 1301 would be offered during the fall semester and one section (approximately 30 students) of 1402 would be offered during the spring semester. The courses would meet three times per week (Monday, Wednesday, and Friday) with one entire class meeting designated for peer-mentoring (Friday).

Each compa would be grouped with four to five mentees from the course and meet (face-to-face) with them weekly during the scheduled class time. We would hire six compas to work 10 hours per week, this included the weekly in-class meeting with mentees (one hour), weekly compa meetings (one to two hours), and other responsibilities such as weekly reports and corresponding with mentees outside of class time (the remaining hours). Weekly compa meetings would be used to provide mentoring for the compas, as well as to discuss the previous in-class meeting, and plan for future in-class meetings and group activities outside of class. The criteria for selecting compas would be based on classification (junior or senior), degree program (declared major in the piloting department), and commitment to attend the weekly in-class meetings.

UTEP's YES, She Can! (YSC) program would provide a training workshop for the compas in preparation for working with the mentees (see Table 4. for topics covered). YSC would also

Table 4. Yes, She Can! Peer-mentor Training

YSC Peer-mentor Training Topics	
Qualities of an effective peer-mentor	Servant leadership, empathic listening, conflict resolution (negotiating win-win possibilities), team building, creating a network of support
Fostering diversity, equity, and inclusion	*HLX+* cultural competence, cultural sensitivity
Suicide prevention and sensitive topics	Hold space for COVID related conversations, approach sensitively and respectfully, respect diverse opinions, know your boundaries as a peer-mentor, student protection
How to get started	Mentoring value-proposition, meeting your mentees, asking the basics, listening for *their* interests, learning from *them*, planning the next meeting, being real and vulnerable, being honest and kind

offer in-class workshops for mentees regarding higher education financing, skills in personal financial literacy and responsibility, professional skills acquisition required for 21st century STEM workforce, and confidence building activities to enhance inherent student strengths.

The reality

Before the first year of the project began, 1301 was added to the university's core curriculum and made available to all first-year engineering students. Students from civil engineering, computer science, electrical engineering, engineering innovation and leadership, industrial engineering, metallurgical and materials engineering, and mechanical engineering enrolled in 1301 and participated in the program. Additionally, three sections (approximately 80 students) of 1301 were offered during the fall semester. During the spring semester, one section of 1301 and one section of 1402 (approximately 62 students combined) were offered. Enrollment in 1402 was only available to students whose declared major was in the piloting department.

The unexpected increase in enrollment created multiple challenges including recruiting and hiring enough compas to partner with the students enrolled in all of the sections of 1301, particularly for the fall semester. Not only did we need many more compas than anticipated, the recruitment efforts for compas yielded very few responses. In order to meet the demand, the initial mentoring plan and the criteria for selecting compas underwent major revisions. First, we were only able to recruit and hire nine compas—many of them were hired after the semester began. Therefore, some of them were grouped with an additional four to five students from two sections and students enrolled in one of the sections of 1301 were not able to participate in PromESA. Furthermore, weekly mentoring meetings were changed to biweekly meetings and the course sections were staggered, which allowed compas to meet with both groups on a regular basis. This also helped make up for the deficit of compas. The criteria for compas were broadened to include sophomores in the piloting department and graduate students who received their bachelor's degree in the piloting department as well as non-*HLX+* students. During the spring semester, we were only able to hire and recruit eight compas—we retained five compas from the fall semester and hired three new compas. Therefore, only students enrolled in 1402 were able to participate in PromESA.

Due to the challenges associated with the additional sections of 1301 as well as recruiting and hiring compas, YSC was only able to provide the training workshop for some of the compas

before the fall semester. Furthermore, the in-class workshops offered to mentees, throughout the fall semester, were presented virtually to accommodate the additional sections of 1301. Necessarily, weekly compa meetings were modified so that training could be provided for the compas that were hired after the semester began.

As mentioned earlier, to better contextualize these community/cultural assets, values, and wealth for our particular context, guiding principles (see Table 3.) were established to inform and guide

Table 5. Implementation of Community Cultural Wealth and Cultural Assets and Values

Guiding Principals	Implementation
Aspirational capital	UTEP's Yes, She Can! Program conducted a resume workshop and provided resume feedback for all students enrolled in the first course of the sequence.
Linguistic capital	The program was given a Spanish title, *Promoviendo el Éxito Estudiantil a través de un Sistema de Apoyo* (PromESA), indicating its purpose and goals. Peer-mentors are referred to as compa, a close friend.
Familial and Resistant capital	N/A
Social capital	UTEP's Yes, She Can! Program conducted a training workshop for compas in preparation for working mentees. Compas attended biweekly meetings with the project team to prepare for upcoming classes and develop skills to better serve mentees. Members of the engineering student organization LEAD regularly invited mentees to meetings and events.
Navigational capital	Representatives from the various university services, resources, etc. gave presentations during class meetings.
Communitarismo	Peer-mentoring groups were comprised of students from civil engineering, computer science, electrical engineering, engineering education and leadership, industrial engineering, mechanical engineering, metallurgical engineering
Respeto and Simpatia	TAs, compas, and students used the instructors' first names if they felt comfortable to do so. Some interactions between TAs, compas, and instructors intentionally took place in common areas where all students could observe.
Confianza and Personalismo	Peer-mentoring groups met bi-weekly during class time. Each meeting focused on a specific topic (e.g., registering for courses, leadership experiences, financial aid) with related question prompts to engage mentees and promote interaction between peers as well as peer-mentors. The remainder of the meetings were intentionally designated for open-discussion providing a space for mentees to share their struggles and their victories.
Familismo	Each peer-mentoring group created a 'group chat' using a platform of their choice to promote interactions outside of class meetings and continued interactions beyond the semester.
Presentismo	Compas were able to adapt discussion topics, skip a topic, or create a new topic based on

decision making, implementation, and subsequent iterations of the pilot program. To ensure that the guiding principles were realized throughout the program, we developed and employed specific actions and behaviors that we believed would embody the spirit of PromESA (see Table 5.). We were able to fulfill nearly all of the guiding principles with the exception of Familial and Resistant Capitol. Again, due to the challenges associated with additional section of 1301 as well as recruiting and hiring compas, we were unable to facilitate opportunities for compas to participate in forms of community engagement with their mentees.

Methodology

As part of the evaluation and continuous improvement efforts for the pilot, students' feedback were gathered through focus groups with the mentees and the compas, respectively, and open-ended feedback assignments as part of the courses' curriculum. The purpose of these activities was to understand mentees' and compas' attitudes and views of project components, how engagement in the project has impacted their professional and personal development, and how the project may be improved.

Two focus groups were conducted at the end of each semester, one with mentees and one with compas. Seventeen total students participated in the focus groups across both semesters (eight mentees, nine compas). Open-ended feedback assignments were collected from each course section, twice per semester, for a total of 106 submissions. Submissions were de-identified prior to review so student demographics could not be determined. However, the total enrollment for two sections of 1301 in the fall semester was 56 with 21% female, 79% male, and 93% *HLX+*. Total enrollment for one section of 1402 in the spring semester was 42 with 26% female, 74% male, and 93% *HLX+*. Below are some examples of what students had to say.

<u>Positive</u>

"It's encouraging to know that someone has been in my place before and has made it through all the tough obstacles I am currently going through."

"I was blessed to have peer mentors who seemed genuine in helping me find a solution to a problem"

"It's a safe environment for you express yourself and your concerns about your professional and academic careers and lifestyle. If somebody else asked me what it was to be a mentor, I would say that it helps you develop the soft leadership skills while still being able to kind of address it in a professional way."

"Not only did this experience allow me to have a mentor but it allowed me to build a new friendship."

"PromESA helped me feel welcomed and as if I had belonged within [the piloting department]. It helped me settle into [the piloting department]."

"I remember one of my [mentees] specifically. They're a first generation student and they were really glad to have someone that could understand the struggle."

<u>Critical</u>

"...I did not get close to my compa this semester as I did last semester [because] I did not want to open again to someone new."

"I believe the experience would've been better if all of my peers participated. I was there almost every Friday however most of my group wasn't and I believe the lack of participation from the class affected the impact the program had."

Findings and Discussion

Participants who shared the same academic major with their compas reported a higher sense of belonging than students with peer-mentors from other academic majors. One possible explanation for this may be attributed to the limited peer-mentors available each semester. More specifically, because only students enrolled in 1402 during the spring semester were able to participate in PromESA, they benefited from having a compa for two semesters. Furthermore, only students whose declared major were in the piloting department were able to enroll in 1402 which might explain why these students reported a higher sense of belonging. However, all participants reported that they received social support (i.e., peer and classroom), regardless of their declared academic major. The suggests that a higher sense of belonging is not directly related to receiving social support from peers as well as classroom structures.

What's Next

Findings indicate that students who shared the same academic major with their compas reported a higher sense of belonging. However, further research is required to examine the nature of such relationships to understand why this is the case. Also, students reported receiving social support regardless of their declared academic major. Further research is necessary to determine if receiving social support while reporting a lower sense of belonging is enough to improve students' persistence and graduation rates in engineering programs, particularly for *HLX+* students.

References

[1] National Science Board, "Science and Engineering Indicators 2012," National Science Foundation (NSB 12-01), Arlington, VA, 2012.

[2] S. Cheryan, V. C. Plaut, P. G. Davies, and C. M. Steele, "Ambient belonging: How stereotypical cues impact gender participation in computer science," *J. Pers. Soc. Psychol.*, vol. 97, no. 6, pp. 1045–1060, Dec. 2009, doi: 10.1037/a0016239.

[3] C. Good, A. Rattan, and C. S. Dweck, "Why do women opt out? Sense of belonging and women's representation in mathematics," *J. Pers. Soc. Psychol.*, vol. 102, no. 4, pp. 700–717, Apr. 2012, doi: 10.1037/a0026659.

[4] D. Wilson *et al.*, "Belonging and Academic Engagement Among Undergraduate STEM Students: A Multi-institutional Study," *Res. High. Educ.*, vol. 56, no. 7, pp. 750–776, Nov. 2015.

[5] A. Master, S. Cheryan, and A. N. Meltzoff, "Computing Whether She Belongs: Stereotypes Undermine Girls' Interest and Sense of Belonging in Computer Science," *J. Educ. Psychol.*, vol. 108, no. 3, pp. 424–437, Apr. 2016.

[6] M. C. Murphy, C. M. Steele, and J. J. Gross, "Signaling Threat: How Situational Cues Affect Women in Math, Science, and Engineering Settings," *Psychol. Sci. 0956-7976*, vol. 18, no. 10, pp. 879–885, Oct. 2007.

[7] T. Schmader and M. Johns, "Converging Evidence That Stereotype Threat Reduces Working Memory Capacity," *J. Pers. Soc. Psychol.*, vol. 85, no. 3, pp. 440–452, Sep. 2003, doi: 10.1037/0022-3514.85.3.440.

[8] T. Schmader, M. Johns, and C. Forbes, “An Integrated Process Model of Stereotype Threat Effects on Performance,” *Psychol. Rev.*, vol. 115, no. 2, pp. 336–356, Apr. 2008.
[9] S. J. Spencer, C. M. Steele, and D. M. Quinn, “Stereotype threat and women’s math performance,” *J. Exp. Soc. Psychol.*, vol. 35, no. 1, pp. 4–28, Jan. 1999, doi: 10.1006/jesp.1998.1373.
[10] C. M. Steele, “A threat in the air. How stereotypes shape intellectual identity and performance.,” *Am. Psychol.*, vol. 52, no. 6, pp. 613–629, Jun. 1997, doi: 10.1037//0003-066x.52.6.613.
[11] C. M. Steele and J. Aronson, “Stereotype threat and the intellectual test performance of African Americans,” *J. Pers. Soc. Psychol.*, vol. 69, no. 5, pp. 797–811, Nov. 1995, doi: 10.1037/0022-3514.69.5.797.
[12] D. B. Thoman, J. A. Arizaga, J. L. Smith, T. S. Story, and G. Soncuya, “The Grass Is Greener in Non-Science, Technology, Engineering, and Math Classes: Examining the Role of Competing Belonging to Undergraduate Women’s Vulnerability to Being Pulled Away From Science.,” *Psychol. Women Q.*, vol. 38, no. 2, pp. 246–258, Jun. 2014, doi: 10.1177/0361684313499899.
[13] R. M. Marra, K. A. Rodgers, D. Shen, and B. Bogue, “Leaving Engineering: A Multi-Year Single Institution Study,” *J. Eng. Educ.*, vol. 101, no. 1, pp. 6–27, Jan. 2012.
[14] S. G. Brainard and L. Carlin, “A six-year longitudinal study of undergraduate women in engineering and science,” *J. Eng. Educ.*, vol. 87, no. 4, pp. 369–375, Oct. 1998.
[15] V. L. Johnson, P. Simon, and E.-Y. Mun, “A Peer-Led High School Transition Program Increases Graduation Rates Among Latino Males.,” *J. Educ. Res.*, vol. 107, no. 3, pp. 186–196, 2014, doi: 10.1080/00220671.2013.788991.
[16] V. Torres and E. Hernandez, “Influence of an Identified Advisor/Mentor on Urban Latino Students’ College Experience,” *J. Coll. Stud. Retent. Res. Theory Pract.*, vol. 11, no. 1, pp. 141–160, Jan. 2010.
[17] C. P. Zalaquett and A. D. Lopez, “Learning from the stories of successful undergraduate Latina/Latino students: the importance of mentoring,” *Mentor. Tutoring Partnersh. Learn.*, vol. 14, no. 3, pp. 337–353, Aug. 2006, doi: 10.1080/13611260600635563.
[18] C. B. Cox, Y. Yang, and A. K. Dicke-Bohmann, “What Do Hispanic Students Want in a Mentor? A Model of Protégé Cultural Orientation, Mentorship Expectations, and Performance,” *J. Hisp. High. Educ.*, vol. 13, no. 4, pp. 359–376, Oct. 2014.
[19] E. L. Thile and G. E. Matt, “The Ethnic Mentor Undergraduate Program: A Brief Description and Preliminary Findings.,” *J. Multicult. Couns. Dev.*, vol. 23, no. 2, pp. 116–126, Apr. 1995.
[20] National Center for Education Statistics, “Full-time faculty in degree-granting postsecondary institutions, by race/ethnicity, sex, and academic rank: Fall 2015, fall 2017, and fall 2018,” *Digest of Education Statistics*, 2019. https://nces.ed.gov/programs/digest/d19/tables/dt19_315.20.asp
[21] B. Rios-Ellis, M. Rascón, G. Galvez, G. Inzunza-Franco, L. Bellamy, and A. Torres, “Creating a Model of Latino Peer Education: Weaving Cultural Capital into the Fabric of Academic Services in an Urban University Setting,” *Educ. Urban Soc.*, vol. 47, no. 1, pp. 33–55, Jan. 2015.
[22] Y. P. Bynum, “The power of informal mentoring,” *Education*, vol. 136, no. 1, pp. 69–74, 2015.

[23] J. Horowitz and K. Christopher, “The Research Mentoring Program: Serving the Needs of Graduate and Undergraduate Researchers.,” *Innov. High. Educ.*, vol. 38, no. 2, pp. 105–116, Apr. 2013.
[24] A. S. Lenz, “Mediating Effects of Relationships With Mentors on College Adjustment.,” *J. Coll. Couns.*, vol. 17, no. 3, pp. 195–207, Oct. 2014.
[25] D. Wallace, R. Abel, and B. Ropers-Huilman, “Clearing a path for success: Deconstructing borders through undergraduate mentoring,” *Rev. High. Educ.*, vol. 24, no. 1, pp. 87–102, 2000, doi: https://doi.org/10.1353/rhe.2000.0026.
[26] D. Budny, C. Paul, and B. B. Newborg, “Impact of Peer Mentoring on Freshmen Engineering Students,” *J. STEM Educ. Innov. Res.*, vol. 11, no. 5–6, pp. 9–24, Jan. 2010.
[27] J. I. Clark *et al.*, “Peer Mentoring Program: Providing early intervention and support to improve retention and success of women in engineering, computer science, and physics.,” *Proc. ASEE Annu. Conf. Expo.*, pp. 1–11, Jan. 2015.
[28] T. J. Cutright and E. Evans, “Year-Long Peer Mentoring Activity to Enhance the Retention of Freshmen STEM Students in a NSF Scholarship Program.,” *Mentor. Tutoring Partnersh. Learn.*, vol. 24, no. 3, pp. 201–212, Jun. 2016.
[29] J. Neubert, M. Khavanin, D. Worley, and N. Kaabouch, “Minimizing the Institutional Change Required to Augment Calculus with Real-World Engineering Problems,” *PRIMUS*, vol. 24, no. 4, pp. 319–334, Jan. 2014.
[30] D. Rice and M. Alfred, “Personal and Structural Elements of Support for African American Female Engineers,” *J. STEM Educ. Innov. Res.*, vol. 15, no. 2, pp. 40–49, Jan. 2014.
[31] T. C. Dennehy and N. Dasgupta, “Female peer mentors early in college increase women’s positive academic experiences and retention in engineering,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 114, no. 23, pp. 5964–5969, Jun. 2017.
[32] J. Leonard, S. Atwaters, C. Leggon, W. Pearson Jr., and M. Gaines, “Blacks, historical disadvantage, and engineering education: Lessons learned from the United States of America,” in *Proceedings of the 2nd Biennial Conference of the South African Society for Engineering Education*, Cape Town, 2013, pp. 85–104.
[33] T. J. Yosso, “Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth,” *Race Ethn. Educ.*, vol. 8, no. 1, pp. 69–91, Mar. 2005.
[34] S. J. Santos and E. Reigadas, “Latinos in higher education: An evaluation of a university faculty mentoring program,” *J. Hisp. High. Educ.*, vol. 1, no. 1, pp. 40–50, Jan. 2002, doi: 10.1177/1538192702001001004.