

Building Family Partnerships Toward Equitable Community Engagement and Integration in STEM Education

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Abstract

In their quest to further their understanding of the power of *plática* (authentic dialogue) in community engagement efforts, the researchers/practitioners embedded themselves in deep, critical conversations with family leaders from a community-based organization on issues of equity and excellence in education. The researchers/practitioners incorporated a family-centered theory of change, developed through trusting relationships and partnerships with students, their families, and educators, in the professional development of STEM faculty, the revision of STEM curricula, and the transformation of teaching practices. This study advances the body of knowledge on the operationalization of servingness and provides insight into the utilization of sense of belonging metrics to assess the impact of equitable community engagement efforts.

Two-way ANOVA on baseline data (N=779) showed that female undergraduate students have a statistically significant ($\alpha=0.05$) higher sense of belonging than males throughout their first three years of college. Using a mixed-methods (QUAL-QUANT) research design, the researchers/practitioners took a critical ethnographic approach to assess the impact of their

community engagement efforts. Through critical reflection and reflexivity, the researchers used a sense of belonging and student success metrics to assess the impact of the internal processes and methods of a family-centered theory of change, which led to equitable outcomes contributing to student success.

Keywords: theory of change, servingness, sense of belonging, STEM education, community engagement

Introduction

We (researchers/practitioners) engaged in deep critical reflection through an ethnographic approach “to provide the reader with an adequate contextualization of the cultural phenomena under study,” acknowledging the critical role that our home culture and language have on educational reform (Delgado-Gaitan & Trueba, 1991, p. 153). Through the example of Steve, their longtime friend and mentor, Juan and Shelly co-founded AVE Frontera, a nonprofit organization, with the goal of serving as a vehicle of engagement that would bridge the gap between families and education. Since its founding in 2016, AVE Frontera has had a high impact on children and families and has emerged as a significant grassroots movement that is transforming academia in South Texas. The University of Texas Rio Grande Valley (UTRGV) and South Texas College (STC), two of the most prominent institutions of higher education, have fostered the resources to support AVE Frontera efforts in creating family-centered educational opportunities. AVE Frontera leaders bring families into the classroom to collaborate with students and with faculty in professional development workshops. Families are embedded in curricula, class projects, and present at an end-of-semester symposium. We begin this paper by contextualizing our developmental process of building a strong sense of belonging to our place in the Rio Grande Valley by analyzing and reflecting on our personal stories as co-founders, which we captured using oral history methodologies and approaches.

Steve, as many of his long-time friends called him, immigrated from Tamaulipas, Mexico, to Weslaco, Texas, in the 1950s when he was only eight years old. Steve shared that Weslaco was divided by the railroad into two parts during the mid-1900s: “To the north of the railroad lived the Mexicans and Mexican Americans, and to the south were the Anglos.” The educational system was not appropriate for Mexican and Mexican American students during this period because they were not allowed to use Spanish and English together. Steve devoted a major part of his life, which consisted of over fifty years, to serving his community. He mentored and tutored students from all levels and disciplines while also providing his community with access to educational opportunities and resources for their personal needs.

Juan was one of those students. His educational journey in the U.S. began when he arrived in the Rio Grande Valley at the age of ten. He stayed with different relatives and family friends in the border town of Progreso, Texas, while his parents were still living in Mexico. His parents immigrated to the U.S. two years later to better support and provide for him and his siblings. Juan met Steve in the ninth grade and found unconditional support. Steve mentored Juan in mathematics and education and was always there for him, especially when Juan needed him during difficult times. Steve gave Juan over 30 years of friendship until his passing in September 2022. He became a lifelong example for Juan, demonstrating how to help the community by his actions towards others, especially students. Juan’s community engagement experiences during his doctoral studies and research allowed him to reconnect with families in the community

(Salinas, 2018). His upbringing and consejos (advice) by his parents and from Steve developed Juan into an educational leader who now engages at a deeper level with students and their families. Juan continues Steve's legacy by leading a community-based organization where he is able to serve many students, providing them with academic support, mentorship, and nurturing cultural experiences. The goal is to help students become professionals who seek to help others following Steve's legacy. Juan has been instrumental, serving as a guide and a leader in students' educational and professional journeys.

Shelly immigrated from Mexico to Donna, Texas, with her family when she was seven years old during the mid-1980s. She sought migration to northern states in the U.S. to work in agriculture, like many other families. Juan shared with us that the first thing he noticed was that all his relatives and family friends who lived in his neighborhood were farm workers who also had immigrated from Mexico and were migrant farm workers. During Shelly's middle school years, she thought her future would consist of working in the agricultural fields because her family and friends did. Each year, she had to leave school a month early, as her responsibility was to go with her family to work in the fields during her summer vacation. Shelly and Juan met each other at 16 and 18, respectively. After meeting Juan, Shelly was motivated to follow Juan's path; to be the first in her family to attend college and seek a professional career. During her educational and professional career, she had the support and mentorship of Juan and Steve. This continuous support and her 20-year teaching experience led her to form a family support group to help close the gap between families and school. The support group's goal was to influence families to become more involved in their children's education by bringing her students' parents into her classroom to share their talents and skills in front of their children and classmates. Shelly felt that the fifth-grade students she served, most of whom are Mexican American and come from low socioeconomic backgrounds, needed to see and learn the skills their parents used every day in their profession. To Shelly, this connection with real-world applications was something more relevant to many of her students, especially for bilingual students.

We, and many others who knew Steve's work, feel fortunate to continue Steve's legacy in helping families who want excellence and equity in their children's education. We understand that inequities still exist in our educational systems that keep Latino students from reaching their fullest potential (Santiago et al., 2024b). In 2016, along with the family leaders who believed and hoped for this ideology, Shelly and Juan founded AVE Frontera, a nonprofit organization committed to integrate families and education, with the belief that "Family and Education, [is] the Future of a NationSM." In 2025, we can see the impact through the actions of those family leaders who knew Steve's work. We continue the legacy he left in our hearts by following his example of helping other families in our communities get a quality education for their children.

Background

In 2016, AVE Frontera began as a club that Shelly voluntarily formed in her classroom in a local elementary school in Weslaco, Texas. She met with her fifth-grade students during lunch, where they expressed the difficulties they were facing, transforming not only the educational system but also establishing a new culture of caring in this group. Shelly invited families to support their children's needs through dedicated attention and time. When the club transitioned outside of academic premises and into Juan and Shelly's residence, families at AVE Frontera felt more comfortable expressing their personal and professional experiences. Families found a need to engage in their children's education and the education of others. Family leaders organized several community events and collaborated with educational and community leaders, bringing about the necessary resources. The events were designed to share knowledge and experiences with other students and families while simultaneously involving and learning from them what they wanted to share. To organize each of these events, several pláticas (authentic dialogues) took place, during which thorough discussions occurred, trusting relationships were built, and family values and traditions were shared. Through this relational process, conflicts were managed and did not have a negative effect. The collaboration that emerged in these events was strong, and everybody helped in the ways they could. This sort of relationship is what made AVE Frontera seem like a big family. We know each other, we understand each other, and we are always there for one another; this is an important step toward family organizing.

The building of confidence among family leaders through pláticas in the organization, planning, and implementation of social, cultural, and educational events led to a sense of family among members. This sense of family gave family leaders enthusiasm, new aspirations, and a clear look into the future of their children's education. During the summer of 2020, AVE Frontera's family leaders provided training to 60 K-12 teachers on how to build a sense of belonging and community engagement among students, families, and teachers from diverse backgrounds. The evaluation and feedback received from participants expressed that the training they had received had never been seen in other training workshops. The teachers expressed recommendations toward their school and school district to implement this new type of training they had just experienced. The training was presented by family leaders where they shared their community engagement experiences, the impact and transformation within themselves and their families, and how their children benefited from these educational opportunities. The teachers expressed pride in the accomplishments of family leaders and their commitment to education. This way, family leaders began to acquire a new experience within educational settings, an opportunity many had not received before. These new leadership experiences allowed family leaders and their children to feel confident in a now-familiar educational environment.

The Intervention

Conectando Generaciones (connecting generations), the intervention in this study, is a family-centered curriculum created in the fall of 2020 by AVE Frontera family leaders, where families invite students to connect with their parents and grandparents regarding a recipe, a tradition, or an experience passed on by older generations. In the classroom, we want students and faculty to know who AVE Frontera is, as it is not just an organization—we want them to understand that we are students and families just like them. We engage students in the work of AVE Frontera by also inviting them into meaningful *pláticas* where we share with them how being part of AVE Frontera has transformed us, individually. When we introduce ourselves and share our personal stories and experiences, it humanizes the organization and breaks down barriers between us and the students. It helps students see us not as outsiders or authorities, but as part of their community. It also invites them into a space where shared experiences matter, making them more open to engaging with the work we do together. We ask students where their parents and grandparents are from to help them reflect on their roots and begin to understand who they are. This family background becomes a point of connection—not just between the student and their own identity, but also with us and with one another. In these conversations, we often discover that no matter where our families come from—whether different regions, countries, or cultures—we share many common experiences, values, and hopes. It is through this shared humanity that we build community and create space for deeper conversations and relationships in the classroom.

This curriculum centers on the role of education in students' families by focusing on the place of family origin, telling their family's stories, and showcasing the talents and skills of family ancestors. This, in turn, provides students, families, and educators with a platform in which they can interact with one another and share their ancestral and experiential knowledge. These family stories were validated and appreciated by the teachers who connect these stories to scientific knowledge and academic content in similar ways Moll, Amanti, Neff, and González (1992) and Veléz-Ibáñez and Greenberg (1992) described funds of knowledge. For example, a family leader shared a recipe to make “*gorditas de cuajada* (curd).” She used old family pictures to explain in detail how her father made and prepared all of the ingredients and made his own tools from scratch. This recipe has been passed down through at least four generations. After hearing this story, (a) a biology teacher expressed that crops grown by our ancestors were more compatible with our DNA, (b) an engineering teacher found that the ingenuity of family ancestors solved real-world problems which engineers still face today, and (c) language arts teachers discovered a multitude of Spanish words that are not common and felt the need to find innovative and creative ways to preserve them through education. Juan and Shelly realized that this type of curriculum, originally designed for family leaders to connect generations, also connected family and education. Juan and Shelly then decided that they would commit and engage deeply in search of equity and excellence in education and sought the support from the family leaders' network they

built to take on this endeavor (Salinas & Lopez, 2021). Those family leaders then became the creators of the theoretical and axiomatic foundations of the family-centered theory of change and gave rise to a deeper level of family engagement towards a new modality of community-engaged scholarship (Salinas et al, 2024a).

Salinas et al. (2024) analyzed 151 open-ended surveys from the 2022 cohort and found that the intervention instilled in students, families, and faculty a strong sense of belonging, one marked by ownership and pride. Ownership because the intervention was designed and implemented by AVE Frontera's family leaders for the students and their families, by families for families. Pride because their family heritage and stories were embedded in their course of study, families got to appreciate what their children are learning at UTRGV, and students got to see that their families were an integral part of their education, breaking traditional norms in higher education. This transformational change is rooted in the family-centered theory of change. From 2022 through 2025, this intervention has been implemented for three cohorts with over 40 STEM faculty and reaching over 4000 students enrolled in undergraduate STEM courses in biology, chemistry, physics, optics, environmental science, mathematics, computer science, and engineering, to name a few. Students who enrolled in the intervention courses were invited to present their family-centered projects at the end of semester FIESTA (Family Integrated Education Serving & Transforming Academia) Symposium. However, not all students were required to present at the FIESTA symposia because they took place outside of the scheduled class meeting times. Those students who did present at the symposia got the full experience of the intervention. The intervention was implemented twice during the 2022-2023, 2023-2024, and 2024-2025 academic years, in both Fall and Spring semesters.

Purpose of the Study

We share these stories to ground this paper on the work that AVE Frontera family leaders (children, youth, and adults) have done in search of equity and excellence in education. AVE Frontera family leaders volunteer their time and resources to support its mission to “serve as a vehicle of engagement that is family-centered and that instills cultural pride and awareness amongst its members and fulfills their physical, emotional, social, spiritual, and intellectual needs.” To accomplish this mission, family leaders: (a) organize, plan, develop, execute, and evaluate social and cultural community events, (b) engage in weekly pláticas (authentic dialogue) where they share their personal stories, family traditions, and life experiences, (c) provide academic support, mentorship for college access and career pathways, and (d) commit themselves to the growth and sustainability of the organization by recruiting new families and building new partnerships. This work evolved into a family-centered theory of change (Salinas et al., 2024a) and has improved students' motivation, engagement, retention rates, and academic performance. The theory of change process emphasizes the transformational impact of family leaders and their contribution to improving student success at two Hispanic-Serving Institutions

in the Rio Grande Valley. We recognize our stories as true and generate new knowledge to shed light on building a sense of belonging, ownership, and pride among students.

The preliminary findings on sense of belonging with ownership and pride were presented at the American Society of Engineering Education (ASEE) conference in June 2024 (Salinas et al., 2024b). Since then, institutional data on student success have demonstrated that family-centered pedagogy may yield sustainable and equitable outcomes. In this paper, we expand on our findings by disaggregating institutional data on student success that supports racial equity in higher education and further explore implications for theory and practice. Integrating family and education through this theory of change has the potential to advance fundamental understanding and enable actionable outcomes such as improving policies and practices needed for achieving regional sustainability in South Texas. The goal of this paper is to take a critical ethnographic approach to evaluate AVE Frontera's community engagement efforts in our search for equity and excellence in education and propose a national model and process to build family partnerships. To do this, we used the following questions to guide the research:

RQ1. How do AVE Frontera family leaders employ structures of servingness, put forth by Garcia, Nuñez, and Sansone (2019) and Mitchneck (2022), and what factors do they consider are integral to the effectiveness of these contributions?

RQ2. How do AVE Frontera family leaders operationalize a sense of belonging with ownership and pride among students and their families?

RQ3. How do internal and external processes of AVE Frontera's family-centered theory of change yield equitable outcomes among students and their families?

The research questions that follow aim to expand our understanding of student success outcomes quantitatively with larger sample sizes. This combination allowed the researchers to develop a theoretical understanding to advance institutional, community-engagement efforts and inform practice and policy in teaching, learning, and/or research.

RQ4: Is there a difference in means of Sense of Belonging as measured by Salinas (2018) between gender and years at the institution?

RQ5: How and to what extent does the AVE Frontera family-centered intervention, as described by Salinas et al. (2024a), affect student success?

Conceptual Framework

Throughout our work, in practice and in research, we employed concepts of the power of plática framework as a form of inquiry engaging us in multi-dimensional conversations with students and families shaping our understanding (Guajardo & Guajardo, 2013). We used pláticas as a tool that allowed us to engage with our community at a deeper level and build trusting relationships with students and their families. J. Salinas (2018) investigated the complex realities of UTRGV students and their families and how faculty are sometimes disconnected from those realities

impacting their students' sense of belonging to their university and their community. The power of plática helped us transition between practitioners and researchers and in improving our understanding of these complex realities. G. Salinas and J. Lopez (2021) posited that AVE Frontera's (formerly known as La Frontera Club) grassroots efforts in building family partnerships through pláticas had the potential to become a national model, one that would promote family unity by connecting students with their family's heritage, creating educational opportunities for students aiming toward excellence in education, and building a better future for students, their families, and their communities. This model aims to bridge the gap between families and academia by placing students and their families at the center of the learning process. Salinas et al. (2024a) further developed this notion into a family-centered theory of change and pedagogy, coined at the University of Texas Rio Grande Valley (UTRGV) and funded by the National Science Foundation (NSF) (PI: Can Saygin, Award #2122875, 2021-2025). The theory of change was expanded to South Texas College through another NSF-funded initiative, Family Centered Innovations (PI: Juan Salinas, Jr., Award# 2318341, 2023-2027). Later in this paper we present preliminary data on equitable outcomes in student success.

To improve our understanding of the relational process of building family partnerships that integrate family and education, we used interconnections between quantitative and qualitative findings. By engaging in a critical ethnographic approach in the form of pláticas we gave meaning and interpreted these findings. We organized our results using the three internal processes of the family-centered theory of change: (1) family organizing, (2) strategic training, and (3) education and research, as shown in Figure 1. Through these interconnections, "the observed become part of the process of observing, the reality and story of people, cultures, and communities" (Guajardo & Guajardo, 2002).

Pláticas during the family organizing process helped the practitioners/researchers establish trusting relationships with students and their families, allowing them to share their experiences and stories in a safe, family-friendly environment. The power of pláticas (Guajardo & Guajardo, 2013) or weekly gatherings allowed family leaders to engage in conversations about their children's education, educational opportunities, and by sharing personal experiences and traditions. In turn, family leaders reflected in open dialogue building upon the conversation and most importantly learning through the experiences of others. These pláticas created an environment that allowed students to showcase their talents such as music, folklore, art, and other intellectual abilities. Families and their children spoke confidently about their experiences supporting one another with their immediate needs in support of their well-being. The pláticas allowed families to feel supported while discussing education, culture, and family values in their native language. Family leaders built strong connections and pride between their cultural roots and education, leading to equitable outcomes such as a strong sense of belonging (Salinas, 2018).

Strategic training is the relational professional development process where students, families, and faculty listened to one another, learned that they have the same goal - to improve student success, and faculty invited the families to visit their classroom to collaborate with their students as co-creators of knowledge. This allowed families not only to visit a university campus but to present their experiences in the classroom through the form of interactive pláticas. Their pláticas engaged professors, students, and family members to acknowledge their cultural roots and feel connected to one another through their experiences, family heritage, and language, operationalizing their sense of belonging.

Through this mixed-methods research paper, we continued our pláticas with students and families to investigate and assess the impact of family-centered education on student success and in the community. The pláticas multi-dimensionality allowed us to inter-exchange between the permeable boundaries of the family-centered theory of change and be able to analyze all the sources of qualitative data. In essence, every line, sentence, paragraph, etc. of the qualitative data was analyzed to find the answers to our questions.

Methodology

Research Design

We used a mixed-methods (QUAL-QUANT) research design to learn from converging or triangulating results from qualitative and quantitative methods (Creswell, 2014; Denzin & Lincoln, 2011). There were three stages of this study in which we collected three types of data.

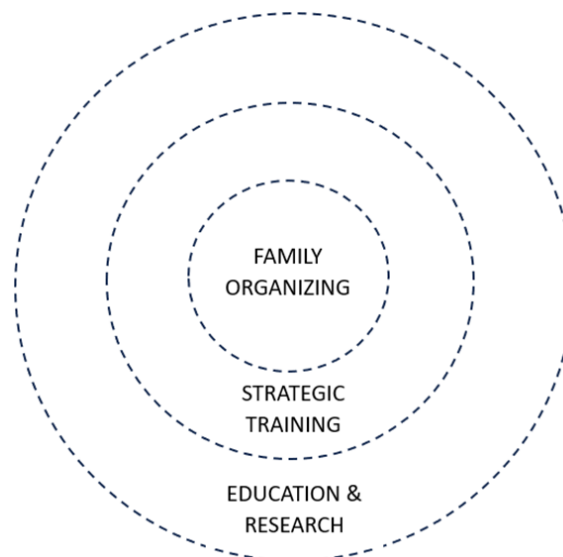


FIGURE 1. Family-centered theory of change model.

First, we used critical ethnography for our exploratory qualitative research to elevate the voices of AVE Frontera family leaders through pláticas. This was to consider family leaders as

intellectuals in academia and change agents of their community (Guajardo & Guajardo, 2002), the Rio Grande Valley. Second, we collected pre-survey and baseline data on sense of belonging from undergraduate students enrolled in the intervention courses during the 2022-2023 academic year. Lastly, we collected institutional first-year retention data from full-time students who enrolled in the intervention courses during the 2022-2023 and 2023-2024 academic years. We define first-year retention as full-time students who enrolled in the Fall 2022 or Fall 2023 and returned as full-time students in the Fall semester for the next academic year.

Description of Participants

We interviewed a total of 10 Mexican American family leaders in Fall 2023. These participants were purposely selected because they had a critical role in the development and implementation of the intervention through their close collaboration with STEM faculty and their students at UTRGV, a Hispanic Serving Institution (HSI). The first group interview consisted of two youth leaders who immigrated from Mexico to the U.S. during their early high school years, the second group was three other youth leaders whose parents immigrated to the U.S, and the last group was five adult women leaders who immigrated from Mexico to the U.S. seeking educational opportunities for their children. All youth leaders were first-generation college students and identified as Mexican American.

We used an online pre-survey questionnaire to collect sense of belonging (Salinas, 2018) baseline data from 779 undergraduate students who enrolled in the intervention STEM courses during the Fall 2022 semester. Ninety-three percent identified as Hispanic, 3% as Black, and 4% as White; 43.2% were males, 53.7% females; and 32.2% were in their first year at the institution, 12.8% were in the second year, 24.5% in their third, 15.3% in their fourth, and 15.1% reported being at the institution five years or more.

In the Spring of 2025, we collected institutional first-year, full-time retention data on N=2043 (86% non-intervention, 14% intervention, of which 27% attended the FIESTA symposium) students who participated during Cohort 1 (Fall 2022 and Spring 2023) where 57% were female, 43% male, and 94% Latinx or Hispanic, 2% White, 1% Asian, less than 1% were Black or African American, and give % identified as Other or Unknown or identified with two or more races. The number of students who participated during Cohort 2 (Fall 2023 and Spring 2024) was N=2601 (87% non-intervention, 13% intervention of which 40% attended the FIESTA symposium) where 59% were female, 41% male, 95% were Latinx or Hispanic, 1% White, 1% Asian, less than 1% were Black or African American, and give % identified as Other or Unknown or identified with two or more races.

Measures and Procedures

Focus-Group Interview Questions

First, we developed the interview questionnaire by reviewing the theoretical framework and identifying its three internal processes: (1) family organizing, (2) strategic training, and (3) education and research. Using these three internal processes as a guiding structure, we formulated open-ended questions designed to elicit stories, reflections, and experiences from participants. We engaged in iterative and collaborative discussions to generate interview questions that would invite reflection, storytelling, and the co-creation of meaning (Tables 1 and 2). We developed two sets of interview questions—one for student focus groups and another for adult women (primarily mothers) involved in AVE Frontera. Through these questions, we intended to explore their personal journeys, the impact of AVE Frontera, and the relational dynamics between family and educational spaces. We also drafted these questions with the intention that the interview process was relational rather than extractive, honoring the voices of students and families as central to the research process. We used the *plática* format to replace the traditional interview methods to prioritize dialogue over interrogation, making space for participants to bring their full selves into the conversation.

We informed AVE Frontera family leaders that we would interview and record them for research purposes. To capture the nuances of speech, each interview was digitally recorded using a camera positioned at a distance from the interviewees at three different times of events for each focus group. AVE Frontera family leaders were asked questions about their individual backgrounds, personal sacrifices to attain an education, student fulfillment, and their engagements with the university and the intervention.

TABLE 1. Student interview questions

Spanish Focus Group Interview Questions	English Focus Group Interview Questions
1. Compartenos tu nombre, que estas estudiando, y cuantos años llevas en la universidad.	1. Tell us your name, your field of study, and how many years have you been enrolled at The University of Texas Rio Grande Valley.
2. ¿Qué es AVE Frontera para ti? ¿Cuánto tiempo llevas siendo líder de AVE Frontera?	2. What does AVE Frontera mean to you? How long have you been a student leader for AVE Frontera?
3. ¿Cuáles han sido tus beneficios?	3. What benefits have you had?
4. ¿Como te has desarrollado?	4. How have you developed and learned to unfold yourself?
5. ¿Qué ha cambiado en tu educación?	5. What has changed in your educational journey?

TABLE 2. Adult women interview questions

Spanish Focus Group Interview Questions	English Focus Group Interview Questions
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1. ¿Qué es AVE Frontera para ti? ¿Qué es tu papel en AVE Frontera?	1. What does AVE Frontera mean to you? What is your role in AVE Frontera?
2. ¿Cuántos años llevas en AVE Frontera?	2. How long have you been involved with AVE Frontera?
3. ¿Cuál an sido tus beneficios?	3. What benefits have you had?
4. ¿Como te has desarrollado como madre estudiantil en la universidad?	4. How have you developed as a mother of a student at the university?
5. ¿Que ha cambiado en tu vida o en tu familia?	5. What has changed in your life or in your family?

Interview protocols were done by interviewing each focus group separately to capture group-specific perspectives. We evenly divided the video recordings with each other (the researchers) to transcribe each interview word-by-word. The researchers double-checked the transcriptions by listening to the audio and video recordings again to ensure they were transcribed accurately. We committed to meet multiple times to engage in pláticas (authentic dialogue) to build from each other's ideas and perspectives, while reaching consensus and final agreements.

We also collected other useful qualitative data sources AVE Frontera conserved from past pláticas (e.g., poster presentations or observational notes) that contained information family leaders had developed on topics of equity and excellence in education. These posters were analyzed by the researchers which included quotes that aligned with our already-generated codes from other sources of data (e.g. video testimonies, written responses to open ended surveys, and personal statements).

Sense of Belonging Scale

Hurtado and Carter (1997) and Nuñez (2009) investigated sense of belonging metrics, three and five item metrics respectively, to assess the complex realities that exist among the social and academic interactions Latinx or Hispanic students experienced in and outside the institution. Salinas (2018) compared Hurtado and Carter's (1997) metric of sense of belonging with institutional integration scales utilized by Pascarella and Terenzini (1980) and by French & Oakes (2004) who all reported validity measures as adequate. Salinas (2018) factor analysis on thirty items resulted in the expansion of the sense of belonging metric from three to seven items with an excellent Cronbach's Alpha reliability statistic measure of 0.91. To collect quantitative data, we used the seven items of the thirty from Salinas' (2018) sense of belonging Likert scale (1: Strongly Disagree, 2: Somewhat Disagree, 3: Not sure, 4: Somewhat Agree, 5: Strongly Agree): (1) I am more likely to attend a cultural event (for example, a concert, lecture, or art show) now than I had before coming to this university; (2) It is important to me to graduate from this university; (3) I see myself as part of the university community; (4) I feel a sense of belonging to this university; (5) I feel I'm a member of the university community. (6) I am

enthusiastic about this university; (7) If asked, I would recommend this university to others. We used an online version of pre-survey questionnaire to collect sense of belonging (Salinas, 2018) data from undergraduate students who enrolled in the intervention STEM courses during the Fall 2022 semester. The students' instructor distributed the pre-survey link via the class online platform and students completed the survey within the first four weeks of the semester.

Student Success: Retention Rates

Lastly, we evaluated our institutional efforts in supporting students through the intervention courses and their impact on students during their first year of college based on their overall success. To do this, we measured first-year, full-time student retention rates for Fall 2022 and Fall 2023 and compared differences between control (non-intervention), intervention (course), and FIESTA Symposia (intervention course and end of semester symposium) groups. UTRGV's Strategic Analysis and Institutional Reporting office provided and certified the retention data. Once all quantitative data was collected, we performed confirmatory and exploratory analyses between both quantitative pre-survey and institutional retention data.

We analyzed the quantitative data on sense of belonging using two-way analysis of variance (ANOVA) and student success using first-year, full-time retention rates and interpreted the finding grounded in the views of participants in the study (Creswell, 2014).

Results

Qualitative Data Analysis

We used open coding as the primary method of qualitative data analysis by highlighting parts of the transcripts with different colors based if they were considered to have same meaning, similar, or different codes. The analysis process that deals with recognizing, labeling, classifying, and characterizing the different phenomena found within the text is what we referred to as open coding. We moved beyond surface-level analysis by asking how meaning was being constructed, whose voices were being represented, and how our interpretations aligned with the family-centered theory of change. As we revisited transcripts and coding decisions, we looked for recurring patterns in language, emotion, and narrative. When differing viewpoints emerged, we used them as opportunities to deepen our understanding, ultimately shaping themes that reflected the relational, cultural, and transformative dimensions expressed through the pláticas. We developed codes from each recording and used small text excerpts to label them (Creswell, 2013). We generated over thirty codes that consisted of similar phrases or themes said by the interviewees. We conducted a theme analysis by grouping similar codes into categories. Through critical reflections and reflexivity, we analyzed the grouped codes developing them into themes that captured the depth and complexity of participants' experiences.

Further analysis of poster presentations and observational notes AVE Frontera kept from previous pláticas resulted in similar codes which were categorized into the existing themes. We did not find any new categories and codes and collectively decided to stop collecting data from any additional sources. Below we present the theme analysis using the three internal processes of the family-centered theory of change and Table 3 shows a summary of the major themes, codes, and definitions.

Theme Within the Family Organizing Process

Becoming a Family Support System

Participants expressed that they learned to consider each member of the organization as part of their larger family because they had similar family values. For example, during the organization of cultural and other community events family leaders shared with one another their family traditions. Another family value they shared was their children's education. One of the adult women interviewed shared:

I also taught my children a lot about Mexico and the culture because they didn't teach it at school and it wasn't the same, they didn't learn the same. In AVE Frontera, there is

Folkloric dancing and other traditional cultural events we celebrate as Mexicans. AVE Frontera not only allows our children to learn and recognize their cultural roots but also grow in an academic aspect.

Participants also expressed the need to support one another as a family, especially academically because they often could not find support for their children in their schools. For example, families noticed their meetings at AVE Frontera were different than the parent meetings that occurred at their children's schools. They described those parent meetings as meetings that tended to be formal, presentation style, and in English (not in a language they could understand). Whenever translations were available, they tended to be fast-paced, the information was presented in a hurry. Parents often felt a lack of appreciation for the families being present ready to learn. The presenters conducted their meetings as business-only transactions with no interest in wanting to get to know the person. The "educators" were not hospitable, and meetings turned out to be a bad experience. Parents often left the meetings with the sensation of not wanting to attend other parent meetings or events. Some participants have been told that parents cannot help their children at school beyond middle school or high school. Another of the women interviewed said in Spanish:

Once our children reach the University level, we, as parents, often think we can no longer be there. When I entered AVE Frontera, it was the first thing they told me, there was no reason why I couldn't be in the life of my children's education. Hearing that gave me encouragement to continue in AVE Frontera. I am very happy and very proud because I am going to university, and I feel like all mothers. Many mothers who want to be there, and perhaps are not there because they do not know they can.

Theme Within the Strategic Training Process

Developing Ownership and Taking it into Action

Participants often shared that faculty they collaborated with seemed to care about their students but did not always know how to connect with them. Parents expressed that students at the beginning of the semester seemed shier and quieter at the university than at home and that once they knew where their families were from and had similar experiences, they became more engaged. One of the participants shared, “What I present may be something small, but for the students it may be something big.” Participants also felt that going to the university to present their own stories and encouraging the students to present their projects at the symposium would benefit the students, the families, and the community. Another of the women said in Spanish:

If we call it FIESTA, then the whole community will come. Yes, it is like a party because there is food, music, folkloric dancers, and we gather to celebrate the students’ achievements throughout the semester.

Theme Within the Education and Research Process

Language, Culture, and Education

Participants focused on how important language, culture, and education was for them, although many of them reported that they did not have the opportunity to attend college or go to school in the U.S. Parents explained that going to the university and present gave them the opportunity to learn from the students’ projects and often times could contribute or give ideas to the students on how to improve their work. Their goal is for the students and families to have a positive experience at the end of semester symposia, so they need to be prepared to share their family-centered projects in a language that families, including children, could understand. One of the youth leaders expressed:

My main focus on this experience, is the importance of integrated culture with education, not necessarily just so the student success, better success rate, have higher grades, mainly focused on the unity between themselves and their environment. It happened to me, I wasn’t able express myself much in Spanish and it started to cause separation within other family, my grandparents, and I see it happen with other families today. ... Ultimately, events like in AVE Frontera’s integrate our culture of being Mexican American in our education.

TABLE 3. Themes, codes, and definitions

Themes	Codes	Definitions
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<p>Becoming a Family Support System</p>	<ul style="list-style-type: none"> ▪ Ave Frontera is Family ▪ Emotional Importance 	<ul style="list-style-type: none"> ▪ Ave Frontera is family because it is rooted in shared stories, a collective purpose, and the unwavering commitment of children, youth, and adults who come together not just to support one another, but to transform their community’s student success. ▪ An emotional support system nurtures encouragement and empathy, which creates a foundation where individuals feel seen, valued, and empowered to succeed together.
<p>Developing Ownership and Taking it into Action</p>	<ul style="list-style-type: none"> ▪ Leaving Family to Seek Opportunities ▪ Student Passion ▪ Becoming the Change 	<ul style="list-style-type: none"> ▪ Students see education as a responsibility, influenced by traditional norms that create a sense of duty to leave their families to pursue a higher education. ▪ Students acquire a passion that fuels their desire to achieve academic success. ▪ Students take the struggles, sacrifices, and dreams of those before them and turn them into action. It’s using education to give voice to those who never had the chance, and becoming a source of guidance, support, and inspiration for those who come after.
<p>Language, Culture, and Education</p>	<ul style="list-style-type: none"> ▪ Parent Involvement in Education ▪ History Impacts the Future 	<ul style="list-style-type: none"> ▪ A parent’s involvement in their student’s education means providing support, encouragement, and stability at home, even if they can’t offer direct academic help. This involvement often looks like emotional guidance, motivation, and instilling the value of education, especially when parents haven’t attended college themselves. ▪ A student’s family background—the challenges, sacrifices, and experiences of past generations—shapes their opportunities and mindset as they move forward. As student’s understand their family history, it helps them appreciate their journey, overcome obstacles, and build a better future for themselves and their family.

Quantitative Data Analysis

Sense of Belonging

We used SPSS version 28 to perform descriptive statistics and a two-way, between subjects' analysis of variance (ANOVA) to compare means in sense of belonging between male and female students and between students separated into groups by the number of years in the institution. To calculate the sense of belonging measure, the sum of the seven Likert scale (1-5) item responses was divided by seven. Table 4 shows the means and standard deviations for sense of belonging. Table 5 shows a summary of the SPSS output results for the two-way ANOVA. The results indicated a significant main effect for gender with $F(1,769) = 5.39$, $MSE = 0.64$, $p = 0.02$, $\eta^2 = 0.01$; no significant main effect for number of years at the institution $F(4,769) = 0.70$, $MSE = 0.64$, $p = 0.59$, $\eta^2 = 0.00$; and no significant interaction between gender and number of years at the institution, $F(4,769) = 0.52$, $MSE = 0.64$, $p = 0.72$, $\eta^2 = 0.00$. The findings revealed that in gender, females ($M = 4.07$, $SD = 0.78$) exhibited higher mean measures of sense of belonging as compared to males ($M = 3.94$, $SD = 0.83$). In other words, the preliminary results based on the two-way ANOVA on baseline data showed that female undergraduate students have statistically significant, at 95% confidence, higher sense of belonging (Salinas, 2018) than males as shown in Figure 2. A general downward trend on the level of sense of belonging was observed during the first four years for both, males and females, although not statistically significant at the $\alpha=0.05$ level.

TABLE 4. Descriptive statistics sense of belonging measure

Gender	Number of Years at Institution	<i>M</i>	<i>SD</i>
Female	0	4.10	0.72
	1	4.13	0.78
	2	4.09	0.80
	3	4.02	0.80
	4 or more	3.97	0.83
	Total	4.06	0.78
Male	0	4.03	0.80
	1	3.88	0.95
	2	3.88	0.81
	3	3.84	0.80
	4 or more	3.96	0.85
	Total	3.94	0.83

TABLE 5. Two-way ANOVA summary table

SOURCE	<i>df</i>	<i>F</i>	η^2	<i>p</i>
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Years at Institution	4	1.35	0.00	0.39
Gender	1	5.39*	0.01	0.02
Years at Institution*Gender	4	0.52	0.00	0.72

* $p < .05$; ** $p < .01$

Equitable Outcomes on Student Success

The national average retention rate for all students across all sectors in Fall 2021 was 67%, whereas the first-year retention rate for Hispanic or Latino students was only 63% (Santiago et al., 2024a). In contrast, the University of Texas Rio Grande Valley (UTRGV) reported a higher retention rate of 76% for all full-time students in Fall 2021, with a slight increase to 79% for the Fall 2022 cohort (UTRGV SAIR, n.d.).

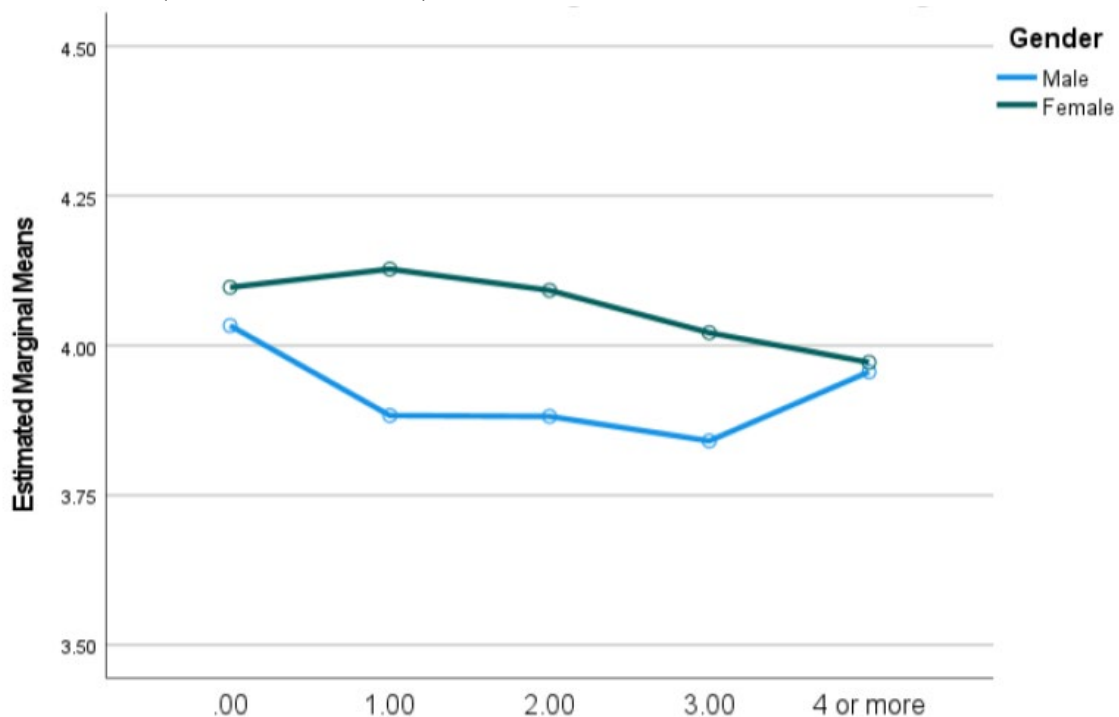


FIGURE 2. Two-way ANOVA: Marginal means on sense of belonging.

A representative sample ($n=284$) of first-year, full-time students accounted for about 14% out of about 2043 (intervention and non-intervention) for Cohort 1, where for Cohort 2, the sample ($n=349$) accounted for about 13% of about 2601 (intervention and non-intervention). Table 6 shows descriptive statistics, and Table 7 shows retention rates for both cohorts.

Retention rates were consistently higher for intervention students than non-intervention retention rates. A subset of students who enrolled in the intervention courses and presented at the end-of-

semester FIESTA symposia are highly likely to enroll at UTRGV for their second academic year.

TABLE 6. Descriptive statistics for cohorts 1 and 2

	Cohort 1 - Fall 2022-23			Cohort 2 - Fall 2023-24		
	Non-Intervention (n=1759)	Intervention (n=284)	FIESTA Symposium (n=76)	Non-Intervention (n=2252)	Intervention (n=349)	FIESTA Symposium (n=141)
Gender						
Female	57.0%	55.6%	44.7%	60.6%	49.3%	52.5%
Male	43.0%	44.4%	55.3%	39.4%	50.7%	47.5%
Ethnicity						
Hispanic	94.3%	93.0%	96.1%	95.3%	93.1%	92.9%
White	1.5%	1.8%	0.0%	1.1%	0.9%	1.4%
Asian	1.3%	2.5%	1.3%	1.2%	2.3%	1.4%
Other	2.9%	2.8%	2.6%	2.4%	3.7%	4.3%

TABLE 7. First-year, full-time student retention rates

	Cohort 1 - Fall 2022-23 Retention Rates					Cohort 2 - Fall 2023-24 Retention Rates				
	Non-Interv. (n=1759)	Interv. (n=284)	%Δ	FIESTA Symp. (n=76)	%Δ	Non-Interv. (n=2252)	Interv. (n=349)	%Δ	FIESTA Symp. (n=141)	%Δ
STEM Major										
Yes	81.4%	88.7%	7.3%	94.6%	13.2%	82.9%	87.2%	4.3%	97.0%	14.1%
No	79.5%	84.1%	4.6%	90.5%	11.0%	78.7%	85.6%	7.0%	91.9%	13.2%
PELL Recipient										
Yes	79.1%	86.3%	7.2%	92.5%	13.4%	78.4%	85.4%	7.1%	92.8%	14.4%
No	83.6%	88.3%	4.7%	95.7%	12.0%	86.2%	89.2%	3.1%	97.7%	11.6%
First Generation										
Yes	77.8%	88.2%	10.4%	93.8%	16.0%	76.9%	82.9%	6.0%	93.1%	16.2%
No	83.0%	85.9%	2.9%	93.2%	10.1%	84.1%	89.3%	5.3%	95.2%	11.1%
Income Level										
Less than \$25,000	76.4%	83.5%	7.1%	92.6%	16.2%	73.3%	84.4%	11.1%	91.8%	18.6%
\$25,000 - \$49,999	81.7%	86.6%	4.9%	93.3%	11.7%	80.2%	88.2%	8.0%	93.9%	13.8%
\$50,000 - \$74,999	83.6%	90.7%	7.1%	92.3%	8.7%	84.3%	83.7%	-0.6%	92.3%	8.0%
\$75,000 - \$99,999	82.8%	83.3%	0.5%	100.0%	17.2%	87.6%	87.5%	-0.1%	100.0%	12.4%

More than \$100,000	84.5%	90.9%	6.5%	90.0%	5.5%	90.9%	94.1%	3.2%	100.0%	9.1%
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As practitioners what have been deeply involved with AVE Frontera family leaders. We meet almost on a weekly basis to engage in pláticas, but we usually follow up with each other throughout the week because there is always something going on. Our goal was to describe the process and determine the effectiveness of the implementation of the family-centered theory of change (Salinas et al., 2024a) as the intervention and to assess its impact on student success with theoretical concepts and measures such as sense of belonging (Salinas, 2018; Nunez, 2009; Hurtado & Carter, 1997) and servingness (Garcia, Nuñez, & Sansone, 2019) through the operationalization of community engagement (Mitchneck, 2022). Our preliminary findings showed the ownership and pride observed among students and their families, and were reflected in the equitable outcomes with increased retention rates, especially for first-generation and low-income students (see Table 7).

Discussion

What factors employ structures of servingness?

One of the adult women leaders explained: “When teachers and administrators listen to your ideas, consider them, and implement them, I like that.” Professional development that involves faculty and administrators listening to families and considering their ideas to improve education can help enhance service. Our findings show evidence of how a family support system can help advance the body of knowledge on the operationalization of servingness (Garcia et al., 2019; Mitchneck, 2022) and provide insight on the utilization of metrics to assess the impact of equitable, community engagement efforts of servingness at institutions of higher education, especially at Hispanic-Serving Institutions. Our critical ethnographic approach and the rich data collected through oral histories and interviews helped us describe in detail the operationalization of deeper community engagement efforts by AVE Frontera family leaders. Its operationalization can be derived from the internal processes of the family-centered theory of change and the themes described there: (1) family organizing – becoming a family support system, (2) strategic training – developing ownership among first-generation college students, (3) education and research – language, culture, and education. The family-centeredness and engagement are what led students and families to feel a sense of ownership and contributed to the increase in family engagement at the end of the semester, as evidenced by the FIESTA (Family Integrated Education Serving & Transforming Academia) Symposium. Starting in spring 2022, the number of participants increased from 150 in the first year of the NSF-funded project (Award#: 2122875) to over 1,000 in year two, over 1,300 in year three, and over 1,500 in year four.

How to operationalize a sense of belonging with ownership and pride?

The sense of belonging metrics utilized in prior research (Hurtado & Carter, 1997; Nuñez, 2009; Salinas, 2018) do not consider family support explicitly. One major outcome institutions of higher education would like to achieve is increased student retention and ultimately graduation. To accomplish this, students must feel supported and that they are not alone. Our findings showed a non-significant but steady decline in students' sense of belonging throughout the first three or four years at the institution. One family leader stated:

In order for students to succeed, the teacher must do his/her job, the student needs to do his/her job, and the parents must do their job.

On the other hand, a sense of belonging, ownership, and pride was found to be the result of integrating family in teaching, learning, and research. The feedback from students, families, and faculty is consistent. In each symposium, participants express that they want more family-centered courses so that more students and families get this opportunity. The direct impact is even more significant because scientific knowledge is passed down through several generations. Grandparents share what they learned from their parents with their children and grandchildren. At the FIESTA Symposium, this experiential and ancestral knowledge is then shared with other families from the community. Everyone is involved, including students, families, faculty, staff, and administrators, with AVE Frontera family leaders serving as facilitators integrated into higher education. A FIESTA Symposium participant shared:

I go back home happy that education is in good hands. I am proud and thankful for what the AVE Frontera leaders, Juan and Shelly, are doing. For their dedication and vision to a better future for our youth attending the university.

The transformational impact on family leaders has the potential to transcend to a generational social change where families take on a leadership role as part of higher education.

How to achieve equitable outcomes for students and their families?

A family leader stated: "If you want change in education, sometimes you have to be that change." Our goal as practitioners was to bring AVE Frontera family leaders into the classroom to transform teaching practices, foster relationships between students and professors, and make content culturally relevant (Ladson-Billings, 1995) and family-centered (Salinas et al., 2024a). This connection between STEM education and families' experiential and ancestral knowledge capitalizes on students' funds of knowledge (Moll et al., 1992). Through this intervention/enrichment, professors can build stronger relationships with their students. Students feel more comfortable asking each other where they are from, where their families are from, and create relationships with each other through common traditions and family values. Through this intervention, professors can transform the classroom environment from a professional academic tone to a more caring environment.

We purposely implemented this intervention in STEM gateway courses that students find challenging. The family-centered projects also allow the student to associate their course of study with their family heritage and find a deeper passion and commitment to their career pathways in STEM, contributing to sustainable, regional transformation and workforce development. Our findings show that the family-centered theory of change (Salinas et al., 2024a) considers how students', families', and faculty's language and family heritage are intertwined and may yield more equitable outcomes for students, especially for first-generation and low-income students.

How does gender affect sense of belonging?

A youth leader affirmed: “Our femininity has value and purpose that drives and strengthens our determination to overcome challenges in our STEM careers.” The expanded sense of belonging metric (Salinas, 2018) detected higher levels among female, undergraduate students than on males. This is consistent with institutional data that show higher first-year, full-time retention rates for female (83%) undergraduate students than males (77%), especially in STEM. Previous research has also shown a positive relationship between a sense of belonging and graduation rates (Hurtado & Carter, 1997). The interconnections between qualitative and quantitative analysis in this study helped us realize that items relating to the sense of belonging do not necessarily consider family support. The qualitative and quantitative data collected in this study provided strong evidence that family support has a significant impact on student success. The intervention responds to both academic and social interactions inside and outside the institution as recommended in previous studies (Hurtado & Carter, 1997; Salinas, 2018).

How does family-centered education affect student success?

One family leader stated, “By leaving our children alone during their university studies, we are leaving all the responsibility in them.” Our findings show strong evidence that the AVE Frontera family-centered intervention improves student success, as evidenced by the consistent increases in first-year, full-time retention rates across two cohorts. In general, STEM, PELL, first-generation, and low-income students benefited from the intervention. For instance, first-generation data for Cohort 1 presented in Table 7 shows a reversal of the retention gap from – 5.2% for non-intervention students to +2.3% for intervention students. In other words, first-generation students had a lower retention rate (77.8%) than their counterparts (83.0%) without intervention.

On the other hand, first-generation students had a higher retention rate (88.2%) than their counterparts (85.9%) with the intervention. The difference in retention rate (% Δ) columns consistently show positive values, which suggests that the intervention contributed to student success among all students, especially first-generation and low-income students. Intervention students who presented their family-centered projects at the end of semester FIESTA symposium

got the full experience of the intervention yielding larger differences in retention rates (%Δs). This outcome reflects the intervention's intentional integration of families into the students' educational journey. AVE Frontera positions itself not as an external authority, but as a part of the student's community. The organization recognizes that academic persistence is deeply connected to emotional, cultural, and academic support systems, formal and informal. The intervention encourages faculty to invite families into their curricula and incorporates family engagement as a way to help students bring their family background and cultural identity into higher education. Through this approach, students (particularly first-generation) feel empowered to create a bridge between home and their academia that validates their lived experiences. This process not only strengthens the bond between students and their families but also cultivates a support system rooted in shared understanding and mutual encouragement. As students become closer to their families through these connections, they gain emotional resilience and motivation, helping them persist through academic challenges. The equitable outcomes in retention rates found in Table 5 underscore the extent to which AVE Frontera's holistic, family-centered model fosters sustained engagement and long-term academic success.

Implication for Theory and Practice

For decades, the role of students' sense of belonging without their parents' support has demonstrated their inability to enrich their own higher education experience. Servingness and community engagement frameworks do not emphasize families as an integral part of education (Garcia et al, 2019; Mitchneck, 2022). If students cannot find at home and/or university the social, cultural, and academic support and resources they need, students feel repressed from persevering in difficult courses such as STEM courses. AVE Frontera has created a family-centered approach that integrates course-based research, project-based learning, and culturally relevant practices for students and that encourages family unity. The intervention we investigated incorporated the family-centered theory of change model (Salinas et al., 2024), which helped transform student experiences by providing them support from their own families and from AVE Frontera. We recommend future research on interconnections that enhance students' sense of belonging with family support.

Community-engaged scholarship has become an integral part of higher education's teaching, learning, and research practices. Traditionally, students and faculty form communities of practice that tend to focus on issues that affect the communities they serve. In general, these communities of practice form collaborations with for-profit and non-profit community organizations seeking to reach marginalized communities from which the students come from. Communities of practice would benefit from institutional systems of support that would allow them to form family partnerships that include students and families. However, before systemic change can occur, scholars must be that change. We recommend programs and departments that promote community-engaged scholarship to partner with community-based organizations that work

directly with families from underserved communities and integrate them into classroom initiatives. To have concrete, equitable outcomes in student success through community engagement efforts requires a deep level of engagement and collaboration between students, families, and faculty embedded in teaching and learning practices inside and outside the classroom, such as the intervention studied in this paper. The family-centered theory of change can serve as a guide to building family partnerships and community cultural wealth (DeNicolo et al., 2015; Yosso, 2005) that can enhance servingness and deepen community engagement efforts. Although first-year retention rates may be a way to assess student success, the work does not stop there. Our evaluation methods in this study suggest that the intervention is effective because it reached a large number of students, families, and faculty from various STEM disciplines. As educational leaders, we believe that families are the most valuable and most committed resources in the communities higher education institutions aim to serve and that through family partnerships we can help students thrive in their quest for success.

Limitations

While this study includes data spanning several years, the sense of belonging data were only measured at baseline, before the intervention was introduced. As a result, we are currently limited in our ability to assess how the intervention may have influenced students' sense of belonging over time quantitatively. This constraint limits us from making generalizable claims or identifying trends related to this construct. However, subsequent data on sense of belonging have been collected post-intervention, and we plan to incorporate these in future analyses to evaluate both immediate and longer-term effects.

In addition, the university where this study was conducted has a student population that is predominantly Hispanic or Latinx, which may limit the generalizability of the findings to other institutional contexts, including Hispanic-serving institutions that may differ in terms of size, geographic location, resources, or student demographics. The data analysis we performed on student retention rates is only descriptive, which is substantial given that retention rates are a measure of student success among higher education institutions. In future studies, we plan to use more robust methods of inferential statistics such as fixed or mixed effects regression, structure equation modeling, or random forests for sense of belonging and retention rates.

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