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Building a Pathway to Engineering: The Influence of Family and Teachers Among Mexican-Origin Undergraduate Engineering Students

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Abstract

This study draws on sociocultural perspectives of identity to understand the ways in which Mexican-origin undergraduate students are recruited into the "figured world" of engineering. The analysis of in-depth, ethnographically situated interviews with 14 participants revealed three sets of recurrent discourses in students' accounts of their pathways to engineering: discourses about the family and the "choice" to study engineering, discourses about childhood activities tied to engineering aspirations, and discourses about teacher support to become an engineer.

Resumen

Este estudio se apoya en perspectivas socio-culturales de identidad para entender las formas en que estudiantes universitarios de origen mexicano se reclutan en (y al) "mundo de números" de ingeniería. El análisis de entrevistas profundas de etnografía situacional de catorce participantes revelaron tres conjuntos de discursos recurrentes en las narrativas de los estudiantes en su camino a ingeniería: discursos a cerca de la familia y la decisión de estudiar ingeniería; discursos sobre actividades de la niñez relacionadas con aspiraciones ingenieriles; y discursos sobre el apoyo de maestros para ser ingenieros.

Keywords

Latina(o), engineering, identity, recruitment, sociocultural, STEM

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The underrepresentation of Latinx students in higher education persists in spite of more than two decades of research and interventions addressing the problem. Data continue to show disparities in postsecondary attainment for students of color: As of 2011, 13% of U.S. Hispanics ages 24 to 29 years had earned a bachelor's degree, in comparison with 39% of Whites (Aud, Fox, & KewalRamani, 2010). Higher education research has pointed to a range of factors impacting the completion rates. Early action/early decision admittance, cost of attending, and college size have been identified as the three factors that have the greatest influence on degree completion across populations (DeAngelo, Franke, Hurtado, Pryor, & Tran, 2011). For Latinx students, additional factors impacting completion include undue financial burdens, compromised academic preparation, generational status, and social isolation, all of which impact students' time-to-degree (Becerra, 2010; Carter, 2006; Kinzie, Gonyea, Shoup, & Kuh, 2008; Lord et al., 2009). Within science, technology, engineering and mathematics (STEM) fields, particularly engineering, Latinx underrepresentation is even more pronounced: According to U.S. Census data, only 7.9% of engineering bachelor's degrees were awarded to Hispanics in 2011 (Landivar, 2013).

Explanations regarding the key influences on students' pathways into undergraduate engineering abound. Several studies have examined the role of motivation and self-efficacy in influencing students' choice of engineering (Kolmos, Mejlgaard, Haase, & Holgaard, 2013; Nugent et al., 2015); others have pinpointed the role of family in career decision making (Whiston & Keller, 2004), especially in decisions to pursue STEM careers (Miller & Kimmel, 2012; Pearson & Miller, 2012). These studies, however, have tended to focus on majority populations in engineering, especially White males. Fewer studies have examined the pathways of underrepresented students, especially Latina/os, into STEM fields, particularly engineering. For Latinx students, *recruitment*—rather than retention—has been a key issue for increasing their representation in engineering, as Latinx students have been found to persist in undergraduate engineering studies at similar rates as their peers (Camacho & Lord, 2013b; Lord et al., 2009).

Although a handful of large-scale studies have examined key factors influencing the recruitment and retention of Latinx students into engineering, such as social support (Camacho & Lord, 2013a), less is known about the specific role that families and mentors play in influencing Latinx students' decisions to pursue engineering. Moreover, while several studies have highlighted the positive impact of family involvement on Latinx college and career attainment in general terms (Arbelo-Marrero & Milacci, 2016; Fisher & Padmawidjaja, 1999; Trusty, Plata, & Salazar, 2003), few have focused on the role of family in influencing Latinx students' pathways to engineering, specifically. To address these gaps, the present study draws on discourse analysis of 14 ethnographically situated interviews of Mexican-origin undergraduate engineering students to illustrate the complex ways in students represent the role of their families, as well as school-based teachers and mentors, in shaping their decisions to pursue engineering studies. The central questions guiding this inquiry were as

follows: (1) How do Mexican-origin students describe their pathway into engineering? and (2) How do Mexican-origin engineering students construct their identities in describing their pathways to engineering? Our analysis revealed three sets of recurrent discourses in students' accounts of their pathways to engineering: discourses about the family and the "choice" to study engineering, discourses about childhood activities tied to engineering aspirations, and discourses about teacher support to become an engineer.

Sociocultural Perspectives on Identities and Discourses

This study relies primarily on sociocultural theories of discourses and identities. From a sociocultural perspective, identity involves being recognized as a particular kind of person (Gee, 1996), in this case, as an engineer or engineering student. Gaining that recognition is a socially constructed process and involves the appropriation of D/discourses, that is, "ways of being in the world," including "words, acts, values, beliefs, attitudes, and social identities as well as gestures, glances, body positions, and clothes" (Gee, 1989, pp. 6-7). In this way, identity formation and learning—such as disciplinary learning in engineering—are closely interconnected (Lave & Wenger, 1991). An engineering identity emerges out of a "double-sided process" that involves how one identifies oneself, and how one is positioned by others, including both individuals and institutions (Stevens, O'Connor, Garrison, Jocuns, & Amos, 2008). Individuals learn to use language and other markers to signal their group affiliation, ranging from the use of in-group words, specialized phrases, or references to dense grammatical constructions, such as heavily nominalized words, to signal their acquisition of a particular D/discourse—in this case, the discourse of engineering.

To understand the identity construction of Latinx engineering students, we rely, in particular, on Holland, Lachicotte, Skinner, and Cain (1998) concept of "figured worlds," which they define as "collectively realized as-if realms" (p. 49) where "particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others" (p. 52). Figured worlds are mediated via cultural artifacts, that is, "objects or symbols inscribed by a collective attribution of meaning in relation to figured worlds" (Bartlett, 2007, p. 217). These artifacts draw attention to the simultaneous material and ideational aspects of figured worlds, which are fluid and dynamic rather than static; it is in the constant "flux" of the figured world that identities are shaped and enacted, within what Holland et al. (1998), drawing on Bakhtin, call "the space of authoring" (p. 63).

One important element of figured worlds is that of *recruitment*. In this way, Urrieta (2007) characterized figured worlds as a "cultural phenomenon to which people are recruited, or into which people enter, and that develop through the work of their participants" (p. 108). In our analysis, we focused on the ways in which students discursively constructed their entry into the figured world of engineering through their accounts of how they chose to study engineering, or in other words, how they were recruited into the world of engineering.

Research Context

This study is part of a U.S. Department of Education-funded extracurricular leadership development program at a high-research activity public university located on the U.S.-México border. In 2017-2018, the university – which is categorized as a Hispanic Serving Institution - enrolled more than 25,000 students, more than 80% of whom were Hispanic, with an additional 5% of students who were Mexican nationals. Approximately 37% of students enrolled at the university were Pell-eligible, and more than 50% of students at the university were first-generation, defined as students whose parents held a high school diploma or less (Pascarella, Pierson, Wolniak, & Terenzini, 2004).

Given our broader interest in students' language use, identity construction, and learning, the study was primarily ethnographic in orientation, with the goal of understanding students' "insider" perspectives on and experiences with engineering education (Hammersley & Atkinson, 2007). Ethnography allows for researchers to become immersed in the everyday experiences and practices of participants, to understand how their "meanings emerge through talk and collective action, [and] how understandings and interpretations change over time" (Emerson, Fretz, & Shaw, 2011, p. 5).

Over the 4 years of the project (2011-2015), the research team, which was comprised of two education faculty and several doctoral students, collected four primary sources of data: a background survey; participant observation and video recording of semester-long leadership workshops; focus groups; and in-depth interviews with 35 participants. More than 60 combined hours of workshop observations were conducted by the members of the research team. Focus groups took place on a semester basis and generally lasted 20 min to 1 hr; questions focused on students' experiences in the leadership program. The in-depth interviews with the 35 focal students, which typically lasted between 50 and 70 min, were conducted by both faculty and doctoral students in the language chosen by the participant. In the interviews, students were asked to talk about key people and experiences that influenced their decision to become engineers as well as their college experiences in engineering. During years 2 and 3 of the project, researchers integrated the use of timelines, where students were asked to create a visual representation of the people and events that influenced their path to engineering. The intent of these timelines was three-fold: to break the ice, to provide participants with an opportunity to reflect on their past using a different representational mode from talking (e.g., drawing), and then to provide participants with the opportunity to "talk through" the experiences that led them to engineering, based on their visual representation.

For the purpose of this analysis, we selected 14 focal participants who participated in interviews during years 2 and 3. The 14 participants represented different backgrounds: Six had family members who were engineers; three were the first in their families to study engineering; and five were the first in their families to attend college. Of this group, five were female and nine were male, and all were from México or had parents who were from México. In terms of schooling, three participants attended K-12 schools in México, seven solely in the United States, and four in both countries.

Table 1. Focal Participants.

Name (pseudonym)	Schooling	High school type	Family member in engineering	Primary language
Adela	México/United States	Public	Father and brothers	Spanish
Adriana	United States	Public	Father and cousins	Spanish
Cristian	México/United States	Public	Father	Both
Amelia	México	Public	Father	Spanish
Mario	México/United States	Private/public	Father	Both
Eleazer	México/United States	Public	Father	Both
Donna	United States	Public	First in engineering	English
Leonardo	United States	Public	First in engineering	Both
Hugo	United States	Public	First in engineering	Both
Josue	México	Public	First to attend college	Spanish
Pablo	United States	Public	First to attend college	Spanish
Luis	United States	Public	First to attend college	Both
Karina	United States	Public	First to attend college	English
Eduardo	México	Public	First to attend college	Spanish

Eight of the participants chose to do the interview in English, while six chose Spanish (see Table 1).

Data analysis took places in multiple stages. In the first stage of data analysis, led by the doctoral students, the interviews were transcribed and coded for patterns in NVivo10 using an open and focused approach to coding (Emerson et al., 2011). Several codes and subcategories were developed related to engineering identities, language use, and peer/family support. During the second round of coding, the entire research team focused on students' descriptions of their decisions to pursue engineering; researchers independently and then collectively identified focused codes related to students' accounts of their pathways into engineering. The most relevant codes during this stage included *family in engineering, family support, teacher mentoring*, and *teachers mentioning engineering*. Once relevant codes were identified, the researchers entered a more detailed stage of analysis, which involved discourse analysis of the interview data. Discourse analysis looks closely how language is used in

context and, particularly, how language invokes social and cultural patterns and identities (Gee, 2005). Throughout the data analysis process, the research team met on a regular basis to share notes, compare codes, and discuss emerging findings. The findings that emerged from this recursive process of coding and analysis are presented in the next section.

Discourses About the Family and Childhood Activities

The Figured World of the Family and the "Choice" to Study Engineering

In our in-depth interviews with students, "family" emerged as a significant theme when discussing their own pathways to engineering. Three male students, Cristian, Mario, and Eleazer, all three of whom had completed the majority of their K-12 schooling in México, emphasized the role of their families—and their fathers in particular—in shaping their decision to study engineering. When asked about who or what influenced his decision to pursue engineering, Cristian, a civil engineering major who was actively involved in extracurricular activities and internships related to his major, remarked,

> Well *obviously*, well he [my father] has told me, I mean, *obviously* any father wants his son to follow in his footsteps . . . that, yes, if I had wanted another type of engineering apart from civil, I mean, well, he says yes, but well that is what has interested me up until now. (emphasis added)

In this case, Cristian represents his family, and particularly his father, as the driving force behind the decision to pursue engineering generally, and civil engineering in particular. For Cristian, pursuing civil engineering was the "natural" (or "obvious") choice, justified by the fact that "any father wants his son to follow in his footsteps."

In describing his decision to pursue engineering, Mario—an engineering leadership major—said, ". . . I grew up in a family where all of the grown men were engineers, all of my uncles, including my father, were engineers, all of them . . . so that affected me." Mario's timeline read, "Crecí en una familia donde todos los hombres mayores eran ingenieros."/"I grew up in a family where all of the older men were engineers." Like Cristian, Mario discursively produced his family as central to the decision to study engineering. Also similar to Cristian, this choice was tied up in the profession chosen by other males in his family.

When asked how he decided to study civil engineering, the third student, Eleazer, confessed that his father instructed him to become an engineer, even though it was not something he felt he was born to do:

> . . . well, I feel bad saying this, but . . . my father told me to do it. It wasn't something that I . . . that I said, "I was born to be a civil engineer." My father told me first, when I was little, that with my abilities, I was going to be an engineer, and I said, "Yes, papi, of course" [. . . pues me da vergüenza pero . . . me dijo mi papá que lo fuera, no fue algo que yo . . . que haya dicho "nací para ser ingeniero civil." Mi papá me dijo primero, cuando era chiquito que con mi habilidad iba a ser ingeniero y yo dije "ah no sí papi claro que sí."].

In the case of Eleazer, he represents the "choice" to become an engineer not so much as an autonomous decision but as an obligation to fulfill his father's wishes for him. He describes being positioned as an engineer by his father from a young age because of his "abilities," and he in turn positions himself as "the good son" in this passage by describing his compliance with his father's ("papi's") aspirations for him. In sum, he represented his decision to study engineering as a form of compliance with his father's wishes.

In all three of these students' accounts of their pathway to engineering, the "family"—and particularly the father—was central to their "decision" to study engineering. In all three cases, students portrayed the choice to study engineering as a foregone conclusion, given their family backgrounds. In this way, the figured world of the family became inseparable from the figured world of engineering; one was mapped onto the other. More importantly, all three of these students were "recruited" into the figured world of engineering early on in their lives by key family members, especially male family members; their participation in family life from young ages represented an entrée into the world of engineering.

The family as a site of engineering preparation—and the role of the father, in particular—also emerged in the accounts provided by three female engineering students, Adriana, Adela, and Amelia. Adriana, an industrial engineering major who grew up in United States, remarked that she "started liking engineering because of my family . . . like they instilled it upon me." Adriana represented herself as moving into the figured world of engineering in part because of the influence of her cousins, who actively recruited her by "telling [her] about engineering." In this case, similar to the others presented here, the figured world of engineering was inseparable from the figured world of family, notably Adriana's extended family. Civil engineering major Adela, who spent the early part of her childhood in México before moving to the United States in fifth grade, revealed that she chose civil engineering as her major because of her brother's influence:

> I was gonna go for electrical engineering but he was like, "oh no, you should do civil so we can have different, all four different categories within the family," so I was like, "okay, I'll try it."

In this quote, Adela discursively constructed her "choice" as wrapped up in family obligations; in other words, agreeing with what her brother told her to do allowed her to "fit" with the rest of her engineering family. Adela represented the decision to study engineering as practically a given, as her father and brothers were all engineers. In her case, not unlike the cases of Cristian, Mario, and Eleazer presented above, the figured world of engineering was inseparable from the figured world of family; she was "recruited" not only into engineering generally by her engineer father and brothers, but also into civil engineering specifically by her older brother, who she positions as a relative authority having influence over her choices.

Amelia, who completed her entire K-12 schooling in México before coming to the United States as an undergraduate college student, had initially wanted to study a business-related field. Before moving to the United States, she had planned to pursue a business major at a university in México; however, upon reflection, she said that she could not imagine herself in a business field 10 years down the road. Once she decided on engineering, she said she consulted her father about choosing a subfield. In talking with him about which major to choose, she said, "we ended up in industrial. That is the one that is more like administration and all and covers many areas and I like what industrial engineers do." In this case, Amelia represented her father, who was a mechanical engineer, as playing a pivotal role in her decision to pursue industrial engineering. Within the figured world of family/figured world of engineering, Amelia's father helped "recruit" her into industrial engineering by helping her assess the similarities between that field and business.

In all six of these cases, the students pinpointed key figures in their families who influenced their decision to study engineering. In all of the cases, the key figures were men—most often the father. And in all of the cases, the male figures, whether fathers, brothers, or cousins, were engineers themselves. In this way, the students were "recruited" into engineering from a young age in part by virtue of being part of a family comprised of engineers, and in part by being positioned by family members as potentially good at engineering, as in the case of Eleazer. As stated by Holland et al. (1998),

> identities form in . . .figured worlds through the day-to-day activities undertaken in their name. Neophytes are recruited into and gain perspective on such practices and come to identify themselves as actors of more or less influence, more or less privilege, and more or less power in these worlds. (p. 60)

For some of these students, the figured world of family exerted a greater influence over their "choice" to study engineering, where students represented their duty to the family (especially to their fathers and brothers) as having greater significance than personal autonomy in choosing engineering, or a particular field of engineering, as a pathway.

Family-Based Childhood Activities and Engineering Aspirations

Closely connected to students' discursive representations of the key role of family figures, especially fathers, in shaping their pathways into engineering are their representations of childhood activities as sites of engineering preparation. Students frequently highlighted the role of childhood activities in influencing their decisions to pursue engineering. Civil engineering major Cristian (described above), whose father was also a civil engineer, reminisced about visiting his father at work. Cristian said, "[My dad] had his own company and he would take me to the field to see how they constructed houses and buildings and I really enjoyed watching a building appeared from the ground up," as illustrated in Figure 1.

In this quote, Cristian outlines the kinds of activities he participated in with his father and represents these activities as central to his pathway to civil engineering.

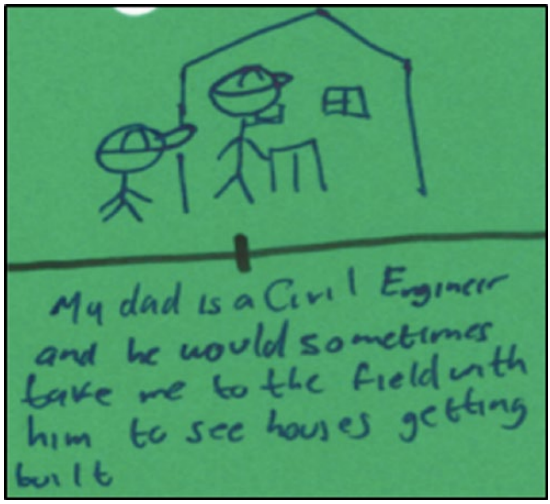

Figure 1. Excerpt from Cristian's timeline.

Other students did not have family members in engineering but still described being involved in hands-on problem-solving practices alongside their fathers. For example, Donna, whose father had a hobby of building computers, remarked, "I remember my dad would always give me, like, computer parts and then he would let me take them apart." Pablo, who was the first in his family to attend college, also talked about helping his dad, who was a mechanic, fix cars at his workshop: "I would help my dad fixing cars and I was always between the oil and the wrenches. I always loved being there working with my dad." Another student, Monica, described being involved in mealtime activities with her father, who was a physics teacher; she talked about her father teaching her fractions using pieces of fruit:

> So he would take, like, apples . . . and he would start, "Okay, so this is a whole apple, right? It's not pieces of an apple." I'm like "Yeah, yes dad!" And then, like, he would take a knife and cut it in half and be like, "How many halves do I have?" "Like 2." "You know fractions now, yay!"

Monica's account illustrates an introduction into the figured world of mathematics from an early age through participation in the family activity of mealtime. The key figure in her account is her father, who she positioned as expert and teacher within the context of describing her early engineering influences.

In all of these instances, students emphasized the ways in which participation in certain hands-on activities with family members shaped their decision to become engineers. Involvement in childhood engineering activities thus served as a form of

apprenticeship (Lave & Wenger, 1991) that influenced their engineering learning and identity. Notably, for the participants, the "expert" or mentor in each of these apprenticeship examples was the father.

Discourses About Teacher Support to Become an Engineer

In addition to the family, "teacher support" emerged as another important set of discourses in some students' accounts of how they decided to pursue engineering. Pablo (mentioned above), who grew up in primarily in the United States and whose father was a mechanic, described wanting to become a mechanic himself until being encouraged by teachers to pursue engineering: "Many teachers told me, 'look, you're too smart to do that kind of thing . . . instead of fixing them [cars], make it [a car].'" In his timeline, Pablo wrote that a fourth-grade teacher told him that he "could be a great engineer"; in the same timeline, he also referenced a high school physics teacher who talked to him about attending the local university to study engineering. In this way, Pablo was positioned as "smart" and potentially good at engineering from a young age by institutional authority figures such as teachers.

Another student, Donna, whose entire schooling took place in the United States, attributed her decision to pursue mechanical engineering to one high school teacher, Ms. M:

> She is the one who advised me to pursue mechanical engineering, which is the major, the degree, that I'm about to earn in a couple of weeks, and she's the one that really opened my eyes that if I were to go into mechanical I could still work into aerospace industry or I could work doing systems . . .

Like Pablo and Donna, Karina, a materials and metallurgical engineering major who was the first in her family to attend college, recounted the strong support she received from one of her high school teachers, Mr. T, to go into a STEM field:

> Initially I wasn't sure what I wanted to do and what I wanted once I graduated . . . and he [Mr. T] kind of pinpointed me out and said, "You know, you're really good at math. I think you should consider some field in either sciences or some type of engineering." And so I hadn't considered, I guess, before that what I was really going to do until he asked me. (November 19, 2013)

In this quote, Karina notes that she did not know what career pathway she wanted to pursue until she was positioned by a teacher as "good at math" and therefore qualified for a career in a STEM field. From a Vygotskian perspective, the teacher represented a more knowledgeable other (Vygotsky, 1978) who identified this student as having potential in a STEM field; he also potentially took on a gatekeeper status, which likely added significance to his recommendation that she pursue science or engineering.

Being positioned by teachers as "good at math" also played a role in Leonardo's decision-making process. The first in his family to study engineering, Leonardo

described being identified by his sixth-grade teacher as having strong math skills and, in turn, being recommended to test into a Gifted and Talented strand of math and science. In his interview, Leonardo went on to ascribe a particular significance to this sixth-grade teacher in light of his family:

> I guess since my parents never pushed me in a certain direction, I guess that's why my 6th grade teacher made such an impact, cuz she was one of the first people to tell me, "Go the math route, you have a lot of opportunities."

Like Karina, Leonardo represents his teacher as playing a critical role in shaping his decision to pursue mathematics and later engineering. Importantly, in his account, the significance of his teacher's influence was connected to the limited influence of his parents who he represents as not encouraging him to pursue a particular pathway. Leonardo's account stands in contrast to those of the six students presented in the first section, all of whom reported receiving direct messages and support from their families, especially their fathers, to pursue engineering.

Importantly, in nearly all of these cases, the students described being positioned as "good at math" by gatekeepers, in this case, teachers, all of whom were male except one (Ms. M). Being positioned in such a way led to concrete activities that impacted the students' trajectories, such as being selected for Gifted and Talented (as in the case of Leonardo, who went on to attend an engineering magnet high school) and being exposed to engineering programs at the local university (as seen in the cases of Karina and Pablo). These cases illustrate the ways in which figured worlds—in this case recruitment into the figured world of engineering—represent "social encounters in which participants' positions matter" (Holland et al., 1998, p. 41). For these students, who de-emphasized the influence of their families in shaping their decisions to pursue engineering, middle and high school teachers took on a greater significance in positioning them as suitable for engineering and thus recruiting them into the figured world of engineering.

Discussion

Drawing on a sociocultural framework of identity understood as "figured worlds" (Holland et al., 1998), we show how students were differentially recruited into the figured world of engineering, depending on their family and school contexts. In the cases of students whose parents (all fathers) were engineers, the students were involved in engineering talk and activities from a very young age. In their accounts of how they decided to become engineers, these students experienced "thickened" forms of recruitment, where the figured world of family became almost synonymous with the figured world of engineering. While these students can be seen as "privileged" to be exposed to engineering from a young age, this form of privilege also carried a sense of obligation, as seen especially in the cases of Cristian, Eleazer, and Adela, who represented their duty to their family as overriding their own sense of autonomy in deciding to become an engineer.

Other students experienced "thinner" forms of recruitment, where families played a more limited role in modeling engineering identities and practices. In the cases of Karina and Leonardo, they described the limited role of their families in influencing their decisions to become engineers. Instead, they attributed much greater significance to secondary teachers who identified them as being "good at math" and therefore apt for studying in a STEM field. In our analyses, in the cases of students who experienced thin recruitment, school-based teachers and mentors emerged to play a larger role in shaping students' pathway to engineering.

Some of the students in our study reported mixed forms of recruitment into engineering. While their parents may not have been engineers, parents (especially fathers) still involved them in engineering-like activities from a young age. Donna, for example, described being involved in putting together a computer at a young age, which was her father's hobby, whereas Pablo talked about working side-by-side with his mechanic father at his shop. In the case of Pablo, the decision to study engineering did not come directly from these experiences but rather came from his school-based experiences, where two teachers—one in elementary and the other in high school—identified him as having potential for engineering.

Our analysis thus revealed a continuum of levels of intensity of recruitment into the figured world of engineering for Mexican-origin students. In this way, the study provides a more nuanced understanding of the role of family in shaping Latinx students' academic and career aspirations and identities than earlier studies on family involvement, where family is frequently treated as an isolated variable. In this study, the role of family was complex and at times contradictory: for some students, family represented a source of positive encouragement and a means of participating in engineering-oriented activities from a young age; for others, it connoted a sense of duty to become an engineer, limiting students' own personal autonomy. In particular, this study highlights the critical role of the father in influencing some students' pathways to engineering. In addition, in its focus on how Mexican-origin students are positioned as engineers by family, teachers, and other institutional authorities, the study shows the "double-sided process" of constructing an engineering identity (Stevens et al., 2008), where students are positioned as future engineer by others, especially institutional gatekeepers. On the whole, the study underscores the ways in which Mexican-origin students' pathways to engineering are socially constructed, in this case primarily within the contexts of family and school (Gee, 2005).

Conclusion

With the National Academies of Sciences, Engineering, and Medicine (2011) having issued the urgent call for expanding minority participation in STEM, the underrepresentation of Latinx in engineering is a pressing issue of national importance. This article contributes to the understanding how underrepresented students in engineering, in this case Mexican-origin students, are recruited into the field. We found that families where the father was an engineer played a pivotal role in influencing students' choice to become an engineer. In the absence of a parental engineering figure, school-based teachers and mentors took on greater significance in recruiting these students into engineering fields.

The findings of this study have several implications for both research and practice. First, the diverse experiences of the Mexican-origin students in this study speak to the need for more diversity in the methods of investigation and analysis in understanding the recruitment and retention of underrepresented students into engineering. Although large-scale experimental design studies expose important trends in the field, there is also a need for studies that capture the complexity of human experience in order help us better understand and respond to those needs and experiences. Ethnography is particularly well positioned to provide methodological and analytical insights into the experiences of underrepresented students in engineering; such approaches can also contribute to expanding our understanding of the social practices of engineering—practices that may contribute to continued inequities in the participation of students from diverse ethnic, gendered, and class-based backgrounds. On a practical level, this study points to the ways in which resources can be targeted to support the recruitment of underrepresented students, especially first-generation Latinx students, into engineering. Our findings show that positive school-based support, especially in the form of teachers and mentors, can play a pivotal role in helping guide first-generation Latinx students into engineering when they might otherwise choose another profession. This study ultimately draws attention to the complexities of family and school influences on Latinx engineering identity formation and also highlights some strategic pathways for expanding recruitment of Latinx students into the discipline and profession.

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