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Deconstructing the Narratives of Latina STEM Educators

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LOYOLA MARYMOUNT UNIVERSITY

Deconstructing the Narratives of Latina STEM Educators

A Research Paper

Presented to

the Faculty of the School of Education

Department of Specialized Programs in Urban Education

In partial fulfillment

of the requirements for the degree

Master of Arts in Education

(Urban Education, Language and Culture Concentration)

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April 4, 2021

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This research paper written by Mellisa Alvarez and Sabrina Cordero is approved and accepted by the faculty of the Department of Specialized Programs in Urban Education, in partial fulfillment of the requirements for the degree of Master of Arts in Education.

April 4, 2021

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Abstract

Latina women face several obstacles in their journey to higher education in the Science, Technology, Engineering, and Mathematics (STEM) field. This study explores the narratives of Latina women in STEM education who have obtained an undergraduate degree in STEM. These narratives are deconstructed in order to understand the obstacles these women faced and how they overcame them. The two researchers, Latina STEM teachers, focused on the narratives of Latinas in STEM and used the data collection method of *platicas* which consisted of having authentic conversations instead of structured interviews. *Platicas* allowed for both the researcher and the participant to engage in real emotional conversations about the trauma they have experienced throughout their educational journeys. Through these *platicas,* the researchers discovered four major parallels in the narratives: navigational capital, familial and cultural norms, self-identity, and belonging. The goal of this study is to analyze how these women successfully obtained their degrees through their varied but similar experiences in order to provide insight and guidance to future generations of Latinas in STEM.

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Chapter 1

Statement of the Problem

Latina women in the United States often struggle to find success in higher education; only 4% of Latinas have a graduate degree (Mellander, 2011). Furthermore, Latinas are underrepresented in higher education, but they are even more underrepresented when it comes to professional science, technology, engineering, and mathematics (STEM) careers. Latinas often struggle finding the necessary resources and the necessary support to be successful in the field of science. This issue stems from a variety of factors that will be examined in this study. The first issue at hand is the lack of representation in higher education. Very few Latinas go into rigorous science careers, and it is difficult for young Latinas to find the community they need to succeed. This lack of representation is not surprising when you analyze the challenges that Latina women face in the United States. Latinas face a multitude of challenges from having to live up to family expectations, balancing the responsibilities of life and school, and not having equitable access to resources. The root of the issue of underrepresentation of Latinas in STEM is not something that can be easily explained or worked out. It is difficult to understand the issue when Latinas who have succeeded and achieved professional STEM careers are not given platforms to share their narratives to provide insight on their journey. Younger women need to have access to the stories of those who have overcome the obstacles and have achieved their academic goals. The lack of representation is dangerous to young Latinas who wish to pursue prestigious STEM careers; this is because young Latinas feel like they are doing everything on their own and without support. They feel as if they do not have access to the necessary resources for success. This takes a toll on mental health and on academic success. If representation is a priority and there is a desire to see more women in labs, hospitals, or in the field studying science, there needs to be a way to let

them know they are not alone, and they can accomplish anything with the appropriate resources and support. Currently, young Latinas do not have access to the narratives of those that have succeeded, and the lack of Latina narratives being shared further deepens the issue of underrepresentation.

Purpose of the study

This study will begin to form a bridge between the experiences of Latina STEM educators and break down their experiences to understand how identity plays a role in access to a STEM teaching career. This study will focus on bringing the stories of the Latinas who have been successful in STEM careers. This will be done by examining individual narratives and experiences of Latinas who excel in science, pursued higher education, and have become STEM educators. *Platicas* will be the main research methodology used and the researchers will engage in *platicas* with several Latina STEM educators.

This study will begin with the researchers engaging in a *platica* with each other. The researchers will tell their narratives and the narratives of their fellow Latina STEM educators with a focus on three major categories that will help in understanding what it means to be a Latina in science: (a) academic self-identity, (b) aspirations, and (c) navigational capital. This study will present, debrief, and analyze the stories of these women and explain them through a critical race feminist lens. The goal of the study is to examine how the lack of representation has shaped their self-identity, and how they perceive themselves in terms of their academic success. The aim of this study is to bring light to the challenges that Latinas face when trying to accomplish academic success. The study seeks to find parallels between these women to offer a more comprehensive approach to the issue at hand.

Significance of the Study

This section discusses the importance of understanding the underrepresentation of Latinas in science. With such low numbers of Latinas enrolled in higher education, it is crucial that the climate of higher-level institutions that are low in diversity are examined, and how they affect the success of Latinas. Latinas take a double hit when it comes to representation. One, there is a low number of women who pursue STEM in general, but there is an even lower number of Latinas who pursue STEM; a study done by Ong et al. (2011), shows the level of marginalization on the basis of race, gender, and discipline that women of color (WOC) encounter in STEM. It was found that the climate at universities has been referred to as "chilly climate" (Banda et al., 2018). This refers to unwelcoming racial climates of feelings of exclusion, isolation, and marginality, and a "chilly climate" on the basis of gender (Banda et al., 2018). This affects the level of achievement from Latinas because it prompts them to feel uncomfortable and unwelcomed in the academic space.

By examining the literature and the narratives collected, there is an understanding that underrepresentation does not only occur because of a single factor. It must take into consideration that there are many factors that affect the success rate of Latinas. Life outside of the classroom must be taken into consideration as well as the responsibilities and familial load that tends to hinder the participation or the success of Latinas in higher education. The impacts of these factors are clearly outlined in a study by Gallard et al. (2019) where specific challenges that Latinas faced in STEM fields are examined as part of their journey in higher education.

Another aspect of the Latina STEM experience that is crucial to success is resiliency. Resiliency is not directly built in the educational setting, so teachers are not fostering resiliency in their Latina students. Instead, Latinas build this resiliency elsewhere. As the researchers

engaged in *platicas* with their fellow Latina STEM educators, they wanted to bring attention to the role of their former STEM teachers and how they impacted their career trajectories as well as how they plan on impacting their current students. It is crucial that the researchers examine their own journeys in becoming STEM educators and how they are either perpetuating this issue or trying to resolve it.

This study begins by examining narratives through the research method known as *platicas*. In Latinx cultures, knowledge is passed down generationally through storytelling and conversation in the form of a *platica*. This methodology stems from the work of Fierros and Bernal (2016). This was the chosen methodology for this study as *platicas* are central to passing down knowledge and stories in Latinx communities. Therefore, by engaging in *platicas* with Latina STEM educators, their narratives are given priority and are culturally contextualized.

Another approach to understanding why there is an underrepresentation of Latinas in STEM is self-identity. It is important to examine how Latinas view their achievement in obtaining a degree. An important aspect to the experience of a Latina in science is pursuing higher education to earn a degree. Many times, Latinas view their success as not only an individual accomplishment, but as a collective accomplishment on the behalf of their families which tend to be predominantly immigrant families. In a study by Pérez Huber et al. (2018), they realized that immigrant families refer to college degrees as *papelitos* which hold major significance as hard work and "making it" in the United States. Immigrant parents see their dreams lived out through their children when they accomplish their *papelitos* and it becomes a generational accomplishment.

Moreover, earning a college degree is a priority for many Latinas in science, but they face the dangers of predatory for-profit colleges that bait young Latinas by promising a quick

path to financial stability. In Dache-Gerbino et al. (2018), the study explored the path of proprietary college choice for Latina high school students. They found that family expectations play a major role in the type of colleges that Latinas attend, and that Latinas may be more interested in for-profit institutions that promise quick paths to a degree and job security.

The structures present in the schooling system in America is a crucial aspect of how the research on young girls and women in science is approached. It is evident that women and girls have encountered several obstacles in achieving and overachieving in academic settings- particularly in science. In Annemarie Vaccaro's work, she explains how women are constantly overlooked in educational settings and must have support from educators in order to succeed (2017). Allowing girls to have a voice in the classroom from an early age will allow them to explore their level of comfort, while participating in their own learning experiences. This will help them build confidence and allow them to feel safe participating in discussions when they reach higher education.

Based on the available research, there is an overwhelming lack of storytelling and narrative-building for Latina STEM educators. When research is available about Latinas as STEM educators, it is data-heavy and does not take a critical lens in understanding the data. Through this study, the gap between the data and the narratives of Latinas will close in by using *platicas* as a way to showcase the narrative of Latina STEM educators and their journeys to where they are now.

Research Questions

1. How do cultural norms influence Latinas in their pursuit of a STEM career?
2. How do familial roles and expectations influence Latinas in their pursuit of a STEM career?

3. What is the relationship between navigational capital and the self-identity of Latinas in STEM?

Definition of Terms

Narratives- The stories and unique aspects of experiences of Latinas in STEM (Amon, 2017)

Navigational Capital- Skills and abilities that help Latinas navigate education (Doran, 2020)

Contextual Mitigating Factors (CMFs)- A theoretical construct to help understand how Latinas who demonstrated success in STEM pipelines navigated various contexts throughout their lives (Gallard et al., 2019)

Latina- Term often used interchangeably with Hispanic for a self-identified woman born in a Latin American country or having Latin American descent (Banda, 2018)

Latinx- Gender neutral and inclusive way of referring to Latino/a community (Salinas, 2020)

Papelito- Signifies the college degree earned by Latinx children as a result of the hard work and sacrifices immigrant parents made for them (Pérez Huber et al., 2018)

Platica- Research methodology for storytelling and narrative building in Latinx communities (Fierros and Bernal, 2016)

Self-identity- The concept one holds on themselves in terms of efficacy and motivation in their particular career (Franks and Capraro, 2019)

Summary

This study will explore how and why Latinas are underrepresented in STEM to bridge the gap of knowledge, so that more visibility comes to Latinas in these academic communities. Understanding why Latinas are underrepresented in STEM and more specifically in the field of STEM education is the major focus of this study, and the aim is to engage in *platicas* with Latinas STEM educators. Latina STEM educator narratives are unknown and have not been

prioritized in educational research. This study focuses on what is the root of the issue of the lack of representation of Latinas in STEM careers. By focusing the *platicas* on three major categories (academic self-identity, aspirations, and navigational capital) this study will be able to uncover the systemic issues that are withholding Latinas from pursuing STEM careers. In the following chapter, conceptual framework and literature review will center the work that has been done to try to understand the factors that impact the success of Latina STEM educators. The literature will provide crucial information necessary to perform the narrative collection and analysis that will be done by the researchers. The themes of academic self-identity, aspirations, and navigational capital as factors in success of Latinas in STEM will be explored in the literature.

Chapter 2

Conceptual Framework

Throughout the literature, there were a few methodologies, theories, and frameworks that were grounding for this study. As narrative research is the focus of the study, a transformative methodology aids in incorporating major themes such as marginalization, power structures, and its impacts on Latina science, technology, engineering, and mathematics (STEM) educators throughout their educational journeys. This goes to show how their narratives and success in STEM are underrepresented due to their marginalization. Conducting research through this paradigm allows the researchers to examine the lives and experiences of the Latina STEM educators. Apart from investigating this issue of underrepresentation under a transformative lens, there are a few other theories that will be used in this research: (a) Chicana/Latina feminist theory, (b) psycho-sociocultural theory, (c) social cognitive career theory, and (d) Latino critical race theory.

Fierros and Bernal (2016), propose using the Chicana/Latina feminist methodology in conversations, known as *platicas*, as a research methodology. *Platicando* is the predominant way of receiving cultural knowledge in Latinx households. These *platicas* tend to take place around a table where members of the community exchange knowledge. Fierros and Bernal found that *platicas* provided a space where data, the lived experience of young Latinas, is theorized and that *platicas* built connections between everyday lived experiences and the research inquiry. *Platica* methodology provides a potential space for healing whereas a traditional interview does not. Using *platicas*, a two-way conversation, as the main form of data collection allows the researchers to connect with Latina STEM educators in a form that is familiar and more personal

as opposed to the traditional interview that is a one-way conversation. This will allow for true exchange of narratives between the two individuals.

Moreover, to deconstruct the narratives collected and understand the experiences of Latina STEM educators throughout their educational journeys as marginalized peoples, the psychosociocultural framework provides tools for breaking down factors that influence Latinas college experiences. Gloria and Rodriguez (2000) introduced this framework as an approach to counseling Latinx students, but this framework can also be applied to Latinas who have accomplished a career in STEM education. This framework takes into account the "psychological (individual self-beliefs and perceptions), social (e.g., environments, networks, and mentors), and cultural (e.g., value validation) factors that influence [Latinas] educational experiences and outcomes" (Castellanos, 2018).

Furthermore, some factors that influence the journey of Latina STEM educators also played a role in their career choice as STEM educators. The social-cognitive career theory (SCCT) as proposed by Lent et al. (2013), is described as comprehensive in understanding educational and occupational decisions. Castellanos (2018) explains that SCCT is guided by two major assumptions that "people have the capacity to exercise some degree of agency and individuals contend with several factors that strengthen, weaken, or override personal agency" (p.531). Additionally, self-efficacy, beliefs, outcome expectations, and personal goals are other factors that influence SCCT (Castellanos, 2018). Many gender roles and norms in society result in marginalization such as women being significantly underrepresented in STEM and even more underrepresented as Latinas. The Latina science educators that will participate in this study have faced marginalization based on the intersectionality of their marginalized identities such as being women, first-generation college students, Latinas, and more. Historically, these identities have

been underrepresented in science careers; therefore, this study is essential in understanding what it takes for Latinas to succeed in STEM despite their marginalization.

Ethnicity plays a major role in underrepresentation of Latinas in STEM fields. Therefore, Latino Critical Race Theory is a branch under the Critical Race Theory which emerged in the mid-1970s and originated along with the Civil Rights Movement of the 1960s. Khan (2016) describes it as three main concepts or ideas:

> 1. The role of law in dispensing and upholding/ending racial discrimination at the judicial and civil levels. 2. The intersectionality of race, gender, sexuality, and class. 3. The use of fiction, non-fiction, and autobiographical narratives used for showing racial oppression, discrimination, self-reflection, and suggestive methods for possible solutions aiming at achievable and sustainable equality. (p.2)

For this study, the main concept of focus is intersectionality since the narratives and struggles of Latinas in their journey to becoming STEM educators is centered on the intersection of their identities as educators, women, Latinas, daughters, first-generation college students, low-income, etc.

All of these theories inform this research and provide the framework for breaking down the narratives that are collected through *platicas.* The conceptual frameworks are crucial for understanding how Latinas navigate their college education, and how their experiences shape their success. Many Latinas struggle with navigating the social systems created by dominant culture. This leads Latinas to find ways to overcome the obstacles in order to achieve their goals; this means turning to family, mentors, and other systems of support. Next, the literature review will provide empirical findings as it relates to this area of study.

Review of Literature

Latinas are highly underrepresented in Science, Engineering, Technology, and Mathematics (STEM); although “Latinas are 8% of our national population, in 2012 they

accounted for less than 1.5% of master's degrees awarded in the physical sciences, mathematics, engineering, and computer science" (Stevenson et al., 2019, p.3). This issue is multifaceted and needs to be addressed from several perspectives in order to gain a greater understanding of how the system prevents Latinas from being represented in STEM. The Latinx community is largely rooted in family, culture, perseverance, strength, and resilience. This contributes to the success of Latinas who decide to pursue higher education. For example, their culture's emphasis on family helps them overcome the obstacles they face within the system because it offers them a support system while navigating college.

Latinas must learn to navigate the system; this often includes finding faculty that align with their culture or ethnicity. Students tend to feel more comfortable when they are represented within the classroom. However, it is not enough to have representation inside of the classroom. Students must also feel a sense of belonging outside of the classroom (Bello, 2018). This means interacting with faculty and staff members outside of the classroom as well; many Latinas find great value in participating in extracurricular activities and sticking with the same faculty members throughout the years. This creates a safety net for students who are often underrepresented. Students must also learn to navigate new friendships, and this often results in creating friendships with people who look and behave similarly. This creates a sense of belonging inside and outside of the classroom with their peers (Bello, 2018). Latinas must also find their identity and how they fit into the college community. Many struggle with feeling like they belong because their classes tend to be male dominated. These women are often consumed with anxiety because they do not feel safe in the environment. They must learn to overcome subtle racism and sexism inside of their core content classes. Understanding how these different

struggles play a role in STEM achievement for Latinas is crucial for moving forward and bridging the gap for Latina women in STEM careers.

This study is designed to explore and explain the different factors that play a role in the lack of diversity and representation in STEM careers; familial and cultural roles will be examined in order to explain the role of family in achievement of STEM degrees. This study will also explain the perception that Latinas have in their sense of belonging at institutions of higher education and how they learn to navigate the different challenges. Lastly, this study will explore how educators can make a difference in the academic lives of these underrepresented women.

Familial and Cultural Norms in the Latinx Community

As previously mentioned, family is seen as a major support system for Latinas. Family plays a significant role in how young Latinas view their competence, and their worth in education. Pérez Huber et al. (2018) argue how Latinas are often encouraged to attend college and obtain a degree because it is a significant accomplishment that symbolizes a shared struggle that immigrant parents faced in order to give their children a better future and opportunities in a new country. The earned degree carries a greater sense of pride and accomplishment because it is about a collective struggle and accomplishment that goes beyond the student and reflects on the family as a whole (Pérez Huber et al., 2018). In addition, Contreras Aguirre et al. (2020) explain how the Latinx community places a large emphasis on completing higher education, and when it is completed, it is almost as if the entire family accomplished the degree together; and it is not just the graduate who is getting the degree because she would not have been able to accomplish it without the support and sacrifices of her family. Family plays a fundamental role in Latinas' lives throughout college, since Latinx culture holds strong values in family encouragement; when Latinas feel supported by their family members, their own expectations related to their

academic performance are high. Ultimately, Contreras Aguirre et al. (2020) argue that family interactions and unity foster support systems and encourage success and resiliency in STEM education. Although family plays a crucial role in encouraging and supporting Latinas in college, it is also important to recognize that some Latinas struggle with separating familial/cultural norms from their academic journey. Some Latinas struggle with having to break the stereotype of being a main caregiver and having to stay at home to care for the family (Rodriguez et al., 2019). For some Latinas, Contreras Aguirre et al. (2020) explain how going to college means becoming the role model of the family, especially for Latinas who have younger siblings. Some Latinas are motivated by inspiring others, and this helps them obtain a sense of accomplishment and helps them reach their academic goals. However, for some Latinas the idea of being the role model is stressful, and it places an extra layer of stress in their journey. This section will describe the importance of a familial support and will explain the role the family plays in accomplishing a college education.

First, it is important to point out that Latinas carry the weight of taking care of their family. Many young Latinas pursue education as a means to take care of their parents, themselves, and their future family. Contreras Aguirre et al. (2020) describe how many Latinas firmly believe that their college education not only benefits them but could lead to major benefits and opportunities for all members of their family. The motivation for many Latinas is the idea that they will be able to provide some financial relief to their struggling families. This leads to the consideration of several roads to success. The role of the family also extends within the classroom, and helps young women navigate through the system that presents discrimination, sexism, and microaggressions within the STEM field; this leads to cases of anxiety and sometimes low academic performance, but positive reinforcements from the family makes a

difference in how they perceive themselves, and how they approach conflict and barriers. Some educational programs target Latinas who cannot “afford tuition, and this contributes to maintaining racist, classist, and sexist hierarchies" (Dache-Garbino, 2018, p. 30). Some Latinas try to find the most convenient and expedited program that will help them achieve success in a short amount of time. This is usually because of the notion that they are responsible for the financial assistance of their families. The vocational programs market immediate employment opportunities, and convenience. This places young Latinas at a crossroads and forces them to choose between fast-track options and extensive debt. If a Latina does not choose to participate in these predatory programs, she is likely encouraged by her family to pursue college, regardless of familial obligations.

Lastly, it is important to recognize that educators have a key role in bridging the gap between Latina women and other persons. Educators should be willing to educate themselves on how family and culture plays a role in obtaining a college education (Serrano et al., 2017). The Latinx community is built on resilience and determination. Immigrating to a whole new country is not for the faint hearted and will require great determination and strength. The values of resilience, determination, strength, and perseverance are taught through stories, and through experiences to the younger generations, most Latinas are introduced to these values at a young age, and they carry the values throughout their lives. This requires educators to understand the “array of complexity of sociocultural factors [that influence their students] (Gallard et al., 2019, p.19). Gallard et al. (2019) suggest that this can improve the students' performance in STEM. Understanding the sociocultural aspects of this population is crucial as these aspects are integrated into their everyday lives (Gallard et al., 2019). Educators must assume the role of advocate and must be willing to educate themselves on the issues at hand. Serrano et al. (2017)

describe the importance of *conocimiento* and how the path of becoming aware and expanding your learning will be a "path as messy, often painful, but also transformative when one opens up all senses and inhibits the body to new understandings" (p.3). An effective learning environment requires an educator to step out of their comfort zone and learn how they can create the safest and most welcoming environment for all their students, but specifically for students of color. It is important to understand that familial roles play a role in determining the path a young woman is taking, leading them to fight for their goals, and strive for greatness; because of how the system is structured, Latinas will need their professors and their mentors to step up to the plate and meet them halfway. When these young women feel supported and heard from their educators, they will be able to navigate their journey more effectively. Understanding the influence of familial and cultural norms is crucial to the study since this factor can be tied to the success of the Latina STEM educators involved in the study.

Navigational Capital

The ability of knowing how to navigate a social institution comes largely from personal background and personal experience prior to being enrolled in that social institution. Those who are introduced to the structure of social systems prior to enrolling in a four-year college, might do better while in college compared to first-generation college students. It is important to understand the reasons why there seems to be a disconnect between young Latinx students and their White counterparts. Doran et al. (2020) defines navigational capital as the "ability to navigate social systems and, [ability to navigate different] processes and institutions (e.g., applying for financial aid, understanding the structure of a community college)" (p.6). The way Latinx students perform in college—particularly Latinas in STEM—plays an important role in understanding the reason there are fewer Latinas in STEM. Social institutions in the United

States are predominantly White, and students of color have a difficult time integrating themselves into the culture. Rendón's work on validation (as cited by Doran et al., 2020) started with the premise that students of color often feel disconnected from their campus because they do not see themselves reflected in a space created for the predominant White culture. When students feel underrepresented in their institutions, they feel less comfortable and less capable of accomplishing their academic goals in comparison to their White counterparts. According to Vaccarro (2017), women's voices are often silenced by the intersecting systems of oppression that exist in the classroom. For instance, gender, class, and wealth often play a significant role in silencing women and other marginalized groups of students. When women feel silenced in their field, it creates frustration and makes them feel invalidated (Vaccaro, 2017). In this study, the researchers consider how predominantly White social systems play a role in how Latinas navigate through their college experience. Navigational capital is extremely important as the system is set up against WOC. Latinas must learn to overcome and navigate the challenges that are presented in the system. It has been discovered that WOC are often silenced, and ignored in a male dominated field, such as STEM. This silencing often comes from the message that female students in STEM "experience social exclusion, disrespectful behavior, or biased decision making in STEM majors" (Bello, 2018, p. 15). Women are aware of the attitudes towards them that include sexism and overall negative attitudes, and this leads to a significant "decrease in women's self-efficacy in STEM majors, particularly in underrepresented majors [within STEM]" (Bello, 2018, p.15). This creates a large barrier that must be addressed and overcome if they want to obtain their STEM degree; this leads women to find ways to navigate and cope with a predominantly White and Male system that is not designed for them.

Mechanisms for coping and navigating in this system are not only helpful, but they are crucial for success in the STEM field. According to Bello (2018), young Latina students rely and benefit from positive messages and encouragement from their mentors and family members; Latina students benefited from positive messages regarding their abilities and capacity for growth needed to find success in STEM. The importance of mentorship and encouragement for Latinas helps foster a sense of accomplishment and belief in their own capacity. The positivity that is fostered through encouragement is essential for facing challenges and overcoming negative attitudes that are rooted in systems of oppression.

It is also crucial that Latinas find a mentor within their institution. Mentors are typically faculty, and their support and relationship foster a sense of community, belonging, and representation for the students. This tactic for navigational capital helps the students feel welcomed; however, it is not only important to these women that they have mentors within the classroom, but they also need interactions outside of the classroom. Lundberg (as cited by Doran et al. 2020) found that frequent, extracurricular interactions with faculty improved community college student outcomes across racial/ethnic groups (p.5). Extracurricular interactions include off campus events, connecting with faculty during breaks to continue their learning, and sticking with the faculty member for more than one semester. The connection between the faculty member and the student will help the student create a support network that will guide and help navigate the journey of pursuing a STEM career. Mental health is also crucial to understand how Latinas navigate the system of college. Latinas (though not limited to Latinas) “often report feeling physically and emotionally drained as a result of constant coping and defending against perpetrators of racial microaggressions” (Hernández & Villodas, 2019, p.4). Hernández and Villodas (2019) propose that the racial battle fatigue (RBF) framework demonstrates “various

forms of mental, emotional, and physical strain caused by cumulative environmental racial stress" (p.4). This highlights the importance of creating healthy psychological techniques, such as a reflective technique, that allows students to recognize and appropriately defend themselves against microaggressions inside and outside of the classroom. One last technique that should be discussed within navigational capital, is the ability to create personal systems of efficacy that are functional for each individual. For example, something as simple as creating a schedule or having a planner plays a crucial role in the academic success of many Latinas (Doran et al., 2020). Many are not exposed to systems of organization in high school, and they struggle when they get to college; this encourages and forces them to find a system that works for their academic success. Many young Latinas have mentioned that in high school, there was no need for the same level of organization (Doran et al., 2020). However, once they set up a system that helped them navigate through their academic difficulties, they found themselves more efficient and confident in their journey. Learning to create organization for themselves also opened up other opportunities for success. Many Latinas mention that maintaining an organized schedule opened up time for learning and applying other information that is given to them by mentors and counselors.

Navigating the college system is extremely important, but also extremely difficult. Many Latinas have aspirational capital and are determined to achieve their goals, but the harsh reality of a White college system, sets them up for failure. Latinas must learn to seek mentors, use positive reinforcement, and create systems of organization that will guide them for years of success. This study intends to examine the navigational capital that the Latina STEM educators gained throughout their journey to success. In deconstructing their narratives, the Latina STEM experience will become more visible and the struggles Latinas face will be highlighted in hopes

to inform future generations of Latinas to come and encourage reflection of other Latinas who have found success in STEM.

Belonging and Self-Identity

The experiences of Latina STEM educators and their journeys would not be fully understood without examining the ideas of belonging and self-identity. For Latinas, especially those at predominantly white institutions (PWI), it is difficult to find a sense of belonging when imposter syndrome is constantly a feeling in STEM. The literature has shown that Latina students face certain factors that lead to lower retention rates in STEM fields and these factors include belonging and self-identity (Bello, 2018).

In a study conducted by Bello (2018), the researcher recruited four incoming first-year Latina STEM college students as participants for the study. These participants had undergone an intensive search for community to promote a sense of belonging at their college. The researchers collected qualitative data on their experiences. Bello found that Latina students found success when they received positive feedback and affirmations regarding their skills. An additional finding showed that these Latinas in STEM all shared a desire to improve and overcome challenges which built resilience. The participants in the study felt that their motivations were the strongest components in their education.

Ultimately, Bello (2018) found that for all four Latina STEM students, the "sense of belonging was a salient issue for the participants as predicted in the literature" (p.121). All of the participant narratives highlighted the issue of belonging and the factors that influenced their interactions with peers/faculty, student involvement on campus, support in academics and socially, and their experiences in the STEM classroom. For these Latinas, feeling unwelcome in these environments led to insecurity about their capabilities in STEM which reinforces the idea

of a “chilly climate” across STEM classrooms. Furthermore, Bello found that these Latinas were also affected by negative stereotypes of Latinas in STEM by their peers who inflicted microaggressions upon them and at times found it difficult to continue due to the lack of representation of peers who reflected Latina identities. Although this study examined the narratives of Latinas in STEM, it did not follow through with them once they had accomplished a career in STEM. For this study, the goal is to understand the barriers Latinas in STEM education faced and pushed through; however, the study conducted by Bello (2018) only focused on Latinas in STEM that are still continuing their education.

Another piece of research that is critical to understanding a sense of belonging among Latinas in STEM is the counter-storytelling narrative. Herrera et al. (2020) explains the experience of a Latina physics major, employing a counter-storytelling framework which challenges common social views and ideas in STEM. More particularly highlighting the need for changes in the current physics culture. Ultimately, the Latina’s voice was silenced and was not valued or heard in STEM classes. This led to a feeling of not being welcomed in that academic environment. They also explain how women felt excluded from STEM, specifically in the physics community. However, when you add the intersectionality of being a woman of color the feeling was even deeper. Herrera et al. explain how being a Latina in physics made the student feel both objectified and expected to perform masculinity and felt themselves lose and hide their feminine identity because they wanted to fit in with the STEM culture that is dominated by White men. This research brings an interesting perspective to the overall goal of this study which focuses on Latina STEM educators since it examines one branch of STEM, science, and breaks down the individual experience of a Latina.

The lack of a sense of belonging was also examined by Vaccaro (2017) via a case study with six women of color (WOC) and four White women. Although Vaccaro's study was not focused on Latinas, Vaccaro found that "those who study women in educational settings have argued that girls and women are often ignored, overlooked, and hence silenced" (p.28). Vaccaro highlights that it "was clear that students were not afraid to "speak up" or "talk" in class; however, they restricted their contributions to opinions and academic analyses of course materials" (p.35). Data presented in the study show that students were hesitant to tell stories about their personal lives, including their experiences with privilege and oppression. Women did not feel encouraged to speak up in their classes and ultimately resulted in their silence from a lack of safe spaces or hierarchies that exist among students and teachers. Vaccaro (2017) found that for WOC to engage in discussion they must have a positive academic environment whereas their White counterparts do not; however, this was not always the type of environments they had which led to the silence of students who are not socially comfortable with the environment of the classroom. In particular, it is crucial for educators to create safe space for young Latinas. This is important when examining the narratives of Latina STEM educators in understanding how their academic experiences impacted their views and ultimately their decisions to become educators.

Apart from finding a sense of belonging and determining whether or not the environment was safe for them, Latinas in STEM eventually develop a self-identity in STEM that led to their success. In a study conducted by Rodriguez et al. (2019), the researchers performed a qualitative study exploring how 17 Latina undergraduate STEM majors developed their STEM identities. Through their work, they discovered that recognition played a major role in identity development for Latinas in STEM (Rodriguez et al., 2019). Latina STEM students were able to develop a

STEM identity similar to that of a research scientist and they did so through persistence and success in their STEM disciplines (Rodriguez et al., 2019). Another interesting aspect of their study was that Latinas in STEM worried about potentially losing their cultural identities as they moved forward in their careers (Rodriguez et al., 2019). This relates to this study because Latina STEM educators may have encountered this same fear of losing their own selves along their journeys to accomplishing their career goals. Another important finding from the Rodriguez et al. (2019) study was that Latinas in STEM found peer recognition as highly important in the development of their identities since it meant that having recognition from peers in the same STEM discipline provided more of a community factor to their experience. Apart from peer recognition, Latinas STEM students found faculty recognition to be influential (Rodriguez et al., 2017). Overall, Latinas hold intersectional identities which play an important role in their self-identity and belonging in the STEM field. For the Latina STEM educators that will be a part of this study, it will be crucial to understand how their experiences differ from Latinas pursuing STEM in college since they are well into their careers. This will bring a different perspective to the conversation of Latinas in STEM and the various factors that mold their experiences.

Summary

The main purpose of this study is to research, learn, and deconstruct the narratives of Latinas in STEM. The literature highlights that Latinas are highly underrepresented in STEM careers, and very few possess a Master's degree in STEM related fields. Through a variety of lenses, this study aims to examine the narratives of Latinas and how their individual journeys affect their career choices and development. Deconstructing and understanding Latina narratives requires an in-depth view of predominantly white institutions (PWIs), Latinx familial roles, gender roles, belonging and navigational capital. The primary method of collecting narratives is

through the framework of *platicas. Platicas* are an extremely valuable tool that is used in the Latinx community that allows for intimate conversations with friends and family. Family is extremely important to the Latinx community, and literature shows that many young women are driven by the familial norms and responsibilities of their culture. Success from a Latina is success for the whole family. However, Latinas still face pressure to build a family and choose between family and career.

The frameworks discussed and utilized include: (a) Chicana/Latina feminist methodology, (b) psychosociocultural framework, (c) social cognitive career theory, and (d) Latino critical race theory. These frameworks provide a foundation for understanding the collective struggle and collective experiences of the participants, and how they have shaped their academic success. The literature presented in this section explains the importance of understanding the academic climate/dynamics of an institution and how Latinas navigate this system. The narratives of these Latinas are collected via *platicas* and the exact methodology will be discussed in the next section of the study. The methodology section will discuss the data collection, limitations, and how the researchers established trustworthiness.

Chapter 3

Latina STEM educators were interviewed using *platicas* (unstructured intimate conversations specific to the Latinx community) which allowed the researchers to explore the familial and cultural norms in the Latinx community, navigational capital, belonging and self-identity that have shaped their experiences in accomplishing the careers they have now. The study focuses on women who have a Latin American background and have successfully achieved careers in STEM education.

The study was conducted through Zoom meetings due to the ongoing COVID-19 pandemic, which were meant to resemble in-person conversations. The data was collected through a series of unstructured interviews, that allowed the participants and researchers to engage in meaningful conversations seeking to answer the following questions:

1. How do cultural norms influence Latinas in their pursuit of a STEM career?
2. How do familial roles and expectations influence Latinas in their pursuit of a STEM career?
3. What is the relationship between navigational capital and the self-identity of Latinas in STEM?

Data Collection

In order to understand the experience of Latinas who pursued and accomplished a STEM career in education, the researchers conducted unstructured interviews that focused on the three major topics: (a) familial and cultural norms in the Latinx community, (b) navigational capital, and (c) belonging and self-identity. There was a total of four participants in the study, all of which were Latina STEM teachers that the researchers had a pre-existing relationship with. A Latina STEM educator is defined as someone who is either from a Latin American country or

has a Latin American background and has accomplished a teaching career in a STEM subject and is currently teaching. Each researcher chose two Latina STEM educators they had a close relationship with to engage in *platicas*. The participants were recruited by a personal phone call or text message from the researcher since they share a close relationship. The researchers, Latina STEM educators, also engaged in a *platica* with each other to share their own narratives. This study collected a total of six narratives from Latina STEM educators.

Each interview lasted roughly about an hour and took the form of a *platica,* as modeled by Fierros and Bernal (2016). These *platicas* were an unstructured two-way conversation that differs from a typical one-way interview. The three topics (familial and cultural norms in the Latinx community, navigational capital, belonging and self-identity) of the study were used as conversation topics, but no questions were drafted prior to the *platicas* in order to maintain the structure of a natural conversation between the researcher and participant. The *platicas* took place through a Zoom meeting and the *platicas* were recorded. Note-taking was avoided to maintain the authenticity of an unstructured and in-depth interview.

Data Analysis

Platicas, unstructured and intimate conversations, were the main form of data collection for the study and they were implemented in order to reach trust, and confidentiality. This method allowed researchers to collect authentic and extensive data which would not have been as accessible with a typical one-way interview. Following data collection, the researchers analyzed the data using thematic analysis. This method of analysis was used to gain a further understanding of how different themes play a role in the narratives of the participants. It is important to understand that thematic analysis is “viewed as ongoing, organic, and iterative [process] , and the researcher needs to be reflective and reflexive” (Swain, 2018, p. 2). It is

crucial that the researchers worked with organic narratives that allowed them to refer back and make connections to other participants, and their personal narratives. It is also important to recognize that thematic analysis is a

> method or process, for identifying and encoding patterns of meaning in primary qualitative research; it pinpoints and organizes the themes [present in the collected data] which the analyst deems to be important in the description of the phenomenon under study and are often associated with a specific research question (Swain, 2018 p. 5).

The goal of this data analysis is to make connections and parallels between the participants' narratives in order to further understand how they navigate the higher educational system, and how they form their identities in the STEM field. Due to the fact that the study aimed to examine the role of Latinas who teach STEM, the researchers recognized that the qualitative methods used provided a source of 'well-grounded, rich descriptions and explanations of [the] processes" (Castleberry, 2018 p. 807). It is known that there are very few Latinas who pursue higher education, and the use of qualitative analysis is more effective because "qualitative research gives a meaning to the phenomena beyond numbers" (Castleberry, 2018 p. 807). Qualitative research methods allow the researcher to explore " beliefs, values, and motives that explain why the behaviors [and phenomena] occur" (Castleberry, 2018 p. 807). Using thematic analysis to draw parallels between participants allowed the researcher to gain a better understanding of the phenomenon because the narratives were collected from " those who have directly experienced the phenomenon" (Castleberry, 2018 p. 807), and then compared with other participants who share the same identity and similar stories.

Limitations

Throughout this study, the researchers encountered a few limitations. One of the limitations was that there was a limited perspective. The researchers recognized that the information about the successful Latina STEM educators was filtered through the views of the

participants and the researchers and does not encompass the experience of every Latina that has succeeded in STEM. Additionally, only six narratives were collected and analyzed which does not accurately reflect the larger group. The *platicas* also took place at a designated time and through Zoom which opposes the natural setting that *platicas* tend to take place in. Moreover, the researchers being part of the *platicas* and engaging in *platicas* with each other may have caused a bias in responses and since the *platicas* were unstructured, the ideas and thoughts of the researchers may have influenced the narrative sharing of the participant.

Trustworthiness

Establishing trustworthiness of the study was done through a few different methods that allowed the researchers to ensure that the participants were accurately represented. Given that there were limitations to this study, the researchers needed to ensure that the narratives of the participants were portrayed accurately and effectively. This led to the researchers conducting member checks. This gave the researchers the opportunity to gain the approval of the participants. Participants were allowed to read the transcripts of the *platicas* as well as the findings that were concluded. This was done to ensure the participants gave consent to the portrayal of their narratives. This is a crucial step for trustworthiness because it ensures the participants are voicing their opinions, concerns, and approval for the way they are being represented in the research. The final step the researchers took towards ensuring trustworthiness was by understanding their research positionalities and subjectivity. Both researchers identify as Latinas and are both STEM educators. They also identify the major themes of familial and cultural norms in the Latinx community, navigational capital, belonging and self-identity as crucial parts of their narratives. Both researchers hold undergraduate degrees in Biological Sciences and are pursuing a Master of Art Education. These shared backgrounds provide the

researchers with a unique perspective in understanding their own narratives and the narratives of the participants.

Though the study aims to find parallels and commonalities between the participants, the researchers are aware that these narratives and findings will not resonate with all Latinas in STEM. Some Latinas may not find common ground with the struggles that are presented in this study, and the researchers are aware that this study is not one-size fits all. Interpretations, and experiences are different, but the researchers worked closely with the participants to ensure their stories are true and authentic. Because it is understood that narratives and stories are unique to each participant, input will be required from all participants to gain their approval of how their narratives are being interpreted.

Setting

Due to the ongoing COVID-19 pandemic, the *platicas* had to be conducted through face-to-face Zoom sessions which were recorded. The Zoom sessions took place with videos turned on to mimic a personal face-to-face interview where both individuals (participant and researcher) would be able to engage in a private and meaningful conversation. Each researcher conducted two *platicas*, each of which were with their fellow Latinas STEM teachers (one participant per *platica)*. The researchers also engaged in a *platica* with each other which was conducted through a face-to-face Zoom interview. This session was also recorded and analyzed as part of the data analysis.

Participants

The study focused on exploring the narratives of the participants who are Latina STEM educators. The study analyzed their cultural identity and how their experiences as Latinas in STEM shape their academic identity. The women of the study have proven to be successful in

their academic careers. Given that the research is focused on women who are of Latin American origin, the researchers took into account the fact that the English could be a second language, or that Spanish is also a prominent language in their culture and can play a role in finding their identity in academic circles. Participants were encouraged to share experiences in the language of their choice or move fluidly between English and Spanish. The researchers examined how these women navigated their identity as Latinas in PWIs and spaces. The researchers were aware that the women who participated in the study had an undergraduate educational experience in the United States. Lastly, the participants had a common profession that allows them to find common ground. The participants are all educators in the K-12 setting and are passionate about creating spaces for young women to excel in science.

Summary

This study focuses on Latina STEM educators; this is a label given to women who identify as someone who is either from a Latin American country or has a Latin American background and has accomplished a teaching career in a STEM subject and is currently teaching. The study focuses on gathering the narratives of women who have been successful in accomplishing their academic goals. The primary method of data collection was through the framework of *platicas*. Upon completing *platicas* and hearing the narratives of the women, the narratives were analyzed through thematic analysis. This is a process that identifies similarities and differences in the narratives. This method of data collection did present some limitations. The researchers recognize that the narratives presented in this study do not present the experiences of all Latinas, and they are not universal experiences. The researchers also recognize that engaging in *platicas* with participants whom they have relationships with may have allowed

for bias in the conversation. The acknowledgement of limitations led to member checks, which allowed participants to approve of the analysis done by the researchers.

Lastly, it is important to mention that this study was conducted remotely through the video platform Zoom. The study was conducted in this manner because of the ongoing COVID-19 pandemic. The inability for researchers to conduct the *platicas* in person did not bear any significant challenges to the study. The findings presented in the next chapter will address the parallels in the narratives and explain how the collective experience as a Latina in STEM guided their specific success, and their identity in the field. The findings will also showcase the collective struggle of a Latina in a field that is dominated by White individuals. The findings were analyzed through several different lenses and were approved by the participants themselves.

Chapter 4

The researchers conducted several platicas with a total of six participants (including the researchers). All of the women are STEM educators and identify with the latinx community. Upon analyzing the platicas, several patterns were identified. Some of the patterns in the data were academic self-identity, belonging, navigational capital, and family and cultural norms.

Academic Self-Identity

The first pattern that was noted was how these women perceived their success and how their academic self-identity was shaped. Both researchers identified themselves as gifted individuals. Identifying as gifted individuals, having positive reinforcement and praise from teachers and other adults in their life was a major influence for their success in academics. This first pattern is also evident in the literature. According to Bello (2018), young Latina students rely and benefit from positive messages and encouragement from their mentors and family members.

For participant C, a Latina middle school and high school dual language science teacher, she first realized her abilities when she was in kindergarten. She entered kindergarten speaking Spanish only and by the end of the school year, she was at the top of her class, earned student of the month, and excelled in learning English because her teacher believed in her. participant A, a Latina high school science teacher, shared a similar experience, where she was able to overcome the language barrier early in her education, and eventually mastered the English language. participant D, a Latina high school math teacher, was also identified as gifted throughout her upbringing in Paraguay. Participant D excelled in all academics and joined various career programs which eventually led her to learning English in high school. She went from knowing no English to mastering the language during her high school career. The academic journey and

success of these women reflected the positive reinforcement and rigorous expectations that were set by teachers. Similarly, participant F shares that her grade school education was not particularly difficult. She identified with the gifted community early in elementary school and she remembers feeling challenged by her teachers; however, this faded as she continued in middle school and high school. Once she reached high school, she did not feel the need to take higher level courses or difficult courses, because she enjoyed the level of ease that came from other courses. She recalls dropping out of course in high school because she felt it was too rigorous. She mentions how she regrets this decision because it could have been more beneficial to have a teacher who pushed her beyond her comfort zone, and provided that positive reinforcement in order to shape her self-identity and set her up for success in college. Participant F says the following regarding this topic:

> [In high school] I wasn't used to that challenge … and I unfortunately left [the challenging] class, and I wish I would have stayed because I would have been more prepared for when I went to college. I don't feel like my high school prepared me for the science courses in university. High school was a bag of everything, but the high school itself did not focus on being rigorous.

These women described the need for challenging teachers who provided positive reinforcement, positive feedback, in order to shape their confidence and self-identity much beyond the grade school education. The common struggle shared among the participants showed the researchers that rigorous and positive reinforcement is crucial for student success. Participants A and F share the same passion for ensuring that students are challenged and pushed beyond their comfort zone, so they can succeed in their future endeavors. Similarly, all the educators mentioned the passion they have to ensure their students are successful in their future endeavors.

Academic self-identity is not only rooted in the internal struggles of the women, but it is also rooted in the external struggles faced by the women. The findings from Banda et al., (2018) refers to the "chilly climate" of universities and how they can have a negative effect on students--particularly women of color. The chilly climate refers to an academic climate that is not always warm and welcoming to students of color, especially women. Participants A and B noted this in their predominantly white institution. They often felt like the outsider who did not belong there. The struggles of facing a chilly academic climate results in self-doubt and becoming hypercritical of their academic work. Furthermore, it is equally important to note that a chilly academic climate can also result in building strength and community with other people who face the same issues. Participant F shares her experience at a predominantly latinx/black institution and how it shaped her self-identity and her success differently because of the community she was able to build inside and outside of the classroom.

> The school that I chose was so diverse … and the white people were the minority. This eased lots of anxiety because if I would have seen more around and I'm the only one that looks a particular way, I could see why that would make me see things [and feel] a certain way.

Academic interests also played a role in how these women constructed their self-identity in science. A majority of the women expressed their love for science as something that defined them early in their education. Some wanted to be doctors, while others were simply fascinated with the discipline. However, their self-identity led them down a different path. As these women explored their true identity and passions during their academic journey, there was a massive shift in career aspirations. How they viewed themselves within the classroom and within the discipline shaped their path into becoming educators. For example, participant D was always drawn to science and wanted to study marine biology but living in a landlocked country made that future seem impossible. Eventually, she shifted her focus to mathematics and quickly mastered very

complex concepts and even when she succeeded in her most rigorous math courses in college, she did not consider herself a mathematician, so she shifted her focus to education. During the *platica,* participant D shared her feelings about self-identity in STEM:

> I studied math all four years of college and knew I liked it. Like I wanna teach this subject because I really care about this, but there is a part of me also always thinks like maybe I was never like a mathematician or anything 'cause I never thought I could be. So, it was like OK then, the closest thing I can do is be a math teacher.

Participant D was not the only participant who shared feelings of choosing STEM education over a different STEM career because of their lack of belonging. Many participants share their experience with imposter syndrome which, like participant D, led them to pursue education over a career directly involved in STEM. These experiences are tied to a sense of belonging as part of the Latina STEM experience.

Belonging

Throughout the *platicas,* there was another common theme of belonging among the participants. In this study, many participants shared their experiences with imposter syndrome and how this challenged their sense of belonging in STEM during college and current careers. For participant D, she felt like an imposter in her math major during her undergraduate career because she did not feel confident in her skills to identify as a mathematician. For participant B, she did not feel like a biologist until her senior year in her undergraduate program. She explains:

> It until I was a senior [in college] and [not seeing myself as a scientist] changed for me because I actually did research, and I was presenting research. I think it shouldn't just be like “Oh yeah, you did research so now you're a scientist.” You become a scientist or a mathematician when you learn things in that field and can teach it to others. It all comes down to being an educator in your field.

For Latinas, especially those at predominantly white institutions (PWI), it is difficult to find a sense of belonging when imposter syndrome is constantly a feeling in STEM. Imposter syndrome is the feeling of being inadequate in the field of study or career due to feelings of

being less-skilled and less-intelligent than peers in the field regardless of their actual potential which ultimately leads the individual to feel like an imposter in their field (Rodriguez and Blaney, 2020). For participants B and D, they were constantly questioning their abilities in their majors because of the lack of representation in their majors. Participant D was the only Latina in her higher-level math classes and participant B was the only Latina who completed and presented an honors thesis in marine biology during her senior year in undergrad. There were many times when they questioned their choices and felt as though they had to work harder than their white counterparts just to pursue their major and they came close to leaving. The literature has shown that Latina students face certain factors that lead to lower retention rates in STEM fields and these factors include belonging and self-identity (Bello, 2018). If it hadn't been for their navigational capital, they would not have been able to make it through and find success.

Navigational Capital

Latinas in science often find it difficult to find people or find a community that truly understands the struggles and the ambition that they hold. Finding other Latina women who are similarly struggling is a beautiful and powerful thing because it creates a sense of community and comfort. This community provides safety, encouragement and positive reinforcement for growth and success within the higher education institution that these women would otherwise not have. Bello (2018) highlights that young Latina students rely and benefit from positive messages and encouragement from their mentors and family members; This message can also be applied to the relationships with their peers and friends. Latina students benefit from positive messages regarding their abilities, and this helps them grow in the STEM field.

These women soon realized that it was difficult to thrive in situations that are not created for them. Participants A, B, C, E, and F all mentioned how high school was not particularly

difficult; however, they significantly struggled with college level courses because they did not know how to navigate the system. For example, participants A and F mention how they did not feel prepared because they did not have a strong background in science. Participant F states that her background in science was often tainted because she did not have the same resources available as her peers. She mentioned that her affluent peers had access to private tutoring and private teachers that taught them to take tests and succeed at examinations. Participant F did not feel that she had the same background, and that set her at a disadvantage. However, she mentions that she is grateful that she was not taught in the same way as her more affluent peers. She is grateful for learning to work with her hands and learning to critically analyze situations. These skills greatly benefitted her in college because although she struggled from time to time, she was able to overcome the hardships that college threw at her by problem solving and reaching out for help. This is something she learned from her teachers, and something she wishes to continue to integrate into her classroom. Participant E also struggled with finding people to share and support her dream. She ended up quitting her career because she lacked connections with successful people that would encourage and grow with her. However, both of these teachers found community within themselves, and with other teachers of color in the field.

There was a similarity among all of our shared stories. We had a shared struggle of being first-generation college students and Latinas. We were self-conscious of our academic abilities because of the lack of resources we had compared to our more privileged peers. They state that they felt behind, even though they had just begun their journey. Often this was a result of socioeconomic status and lack of resources. Success looked different for these women because they had no accessibility to resources that their more affluent peers had. These women had to carve their own paths to success, which included learning how to navigate courses that were

intentionally meant to get rid of "weaker students". Participants A, B, and C felt the pressure as first-generation students when taking introductory science courses that were considered "weeder" courses. This meant that the courses were intentionally difficult in order to push people away from the discipline and "weed out the weak". The women discuss that this tactic can be especially harmful to first-generation college students because they are already struggling with navigating the experience itself. Participant A greatly struggled with the material and had to often seek out help, however, she did not always feel comfortable and safe seeking out help. She was afraid that her professors would scold her or tell her to change her career plans. She later found a community with two professors that shared a similar struggle. The two professors knew the struggle of being a person of color in STEM; because participant A was at a predominantly white institution, she found great value in her professors who understood her struggle and took the time to guide and mentor her instead of pushing her to find a different career path. The findings in the literature from Lundberg (as cited by Doran et al. 2020) state that frequent, extracurricular interactions with faculty improved community college student outcomes across racial/ethnic groups. Participant A attributes much or her success to the amazing relationships she was able to formulate with a few of her professors.

Both participants B and C began college as pre-health majors and consistently had to seek tutoring available on campus and had to sacrifice mealtimes and calling home to go to tutoring to get help. Most students seeking help were other first-generation students of color. Through the *platicas*, participants revisited traumatic experiences they had faced as first-generation students who ultimately dropped out of the pre-health track and majored in Biology. This led the researchers to discover another parallel in the narratives of these women. It was evident that these women were struggling to decide between pursuing and accomplishing their true interest

or finding a more realistic path that leads to success and financial stability. For example, participants E and F talk about how their true interest was working in the healthcare field, and how they were passionate about health, but they did not continue for several reasons. They did not feel as if they had the appropriate tools in order to pursue their true calling. Participant F talks about how she wanted to continue her education and obtain her Doctorate in Medicine (MD), but neither she nor her parents could afford the cost of medical school in the United States. Once she graduated, she felt obligated to help her family and obtaining her MD eventually became a lost dream. Similarly, participant E showed passion for chiropractic, but her lack of connections with other successful doctors led to her leaving the profession and finding teaching. They were unable to continue their education in their desired field because of factors beyond their control. This led the researchers to conclude that initial desire does not always bring success, and adjustments must be made to reach success through teaching. The women realized that their new path led them to more opportunities that satisfied more than one of their aspirations. With teaching, a few science teachers who engaged in *platicas* agreed that being a science teacher gave them a sense of motherhood. Although all of them want children and want to be mothers, they struggle with balancing that desire and their career aspiration. So, being a teacher satisfies that aspiration in a way because they act as mothers to their students through mentoring, guiding, and nurturing their students.

Ultimately, all women that took part in our study wanted to leave a positive legacy behind. Similar to the findings in Pérez et al. (2018), they all realized that social responsibility and advocacy, or the desire to give back to one's community by helping others is considered their priority when it comes to their legacy. They all want to be remembered by their social responsibility in providing access and guidance to their students, friends, and loved ones. They

feel responsible in creating safe spaces for others, advocating for others, and being available for each other. They all came to the conclusion that their legacy has already begun, and they have created this among themselves. All women are connecting through the experiences they share and community they have created in their schools and classrooms.

The last parallel that is important to discuss in this study is how the participants navigate their classroom and how identities play a role in how they encourage and push students into being better and more successful people. It was evident that as professionals, teachers struggle to create academic boundaries with students. All participants discuss how they want their students to learn to advocate and push themselves beyond their comfort zone. They want their students to know and understand that they are capable of anything if they set their mind to it. However, they do not want to become a "crutch" for their students. They want to find a balance between being available to help students and becoming a student crutch. Teachers always want to be available for students, but it is difficult for them to learn to create boundaries so that students are learning to push themselves to become the best version of themselves. Participant A weighs in on this subject by stating:

> As I reflect on my role as science teacher, I often ask myself how I can be more rigorous without automatically turning students off. I often struggle finding the balance of how to be more academically challenging, while still keeping the material accessible to all students, and not discouraging students from learning. It is a tightrope that educators have to follow, and it is challenging. I am hoping that with time, I can learn to do this more effectively.

The thoughts shared by participant A are echoed by all other participants. There is a fine line between 'too challenging' and 'not challenging enough'. All participants want to ensure they are guiding their students towards success by allowing them to develop their strengths and independence.

Familial and Cultural Norms

Family and cultural norms are a large part of this study because they often shape how young women view themselves and their academic achievements. The *platicas* surrounding familial roles and cultures revealed some patterns that shape the identity, career, and achievements. All participants mention how important family values are, and how familial roles played a role in pursuing their high education.

Though family and culture encourage young women to pursue education to ensure a better life in the United States, some familial roles are still extremely prominent in the lives of these women. Two major values in the latinx community include career and family. Some participants describe their desire for returning to school but are unsure how it affects their other life goals: such as having a family. The platicas shared between participants A and B brought up questions about next steps and where they would go after teaching; both knew the future held more for them. Participant A's original goal was to pursue an education in medicine, and participant B wishes to continue her education and obtain her Ph.D. in marine biology. However, they see this posing an issue with their life aspirations, including having kids or getting married.

This issue was also a concern for participant C. They all agreed that they had to make sacrifices and choose between career aspirations or life aspirations. They often worry that choosing a lengthy career will eliminate the possibility of having children or getting married; because one major life aspiration they share is to one day become a mother and have a family, they want to wrestle with having children later in life, or not pursuing their career. For some reason, the two cannot coexist. This reason may be a way of thinking that was passed on from generation to generation, and education is seen as something that will not only benefit us, but it will help us care for our future children. The findings from Contreras Aguirre et al. (2020)

describe how many Latinas firmly believe that their college education not only benefits them but could lead to major benefits and opportunities for all members of their family. This increases the pressure of meeting cultural norms to have children. Participant B feels like her two options for having children is for her to reach her career goals and have a child or not have a child at all. Older women in her family who don't have children are always seen as the "odd" one or "gay" one. Having children in her family validates adulthood. This idea stems from Latinas inheriting the role as "caregiver" from their families. In the findings of Rodriguez et al. (2019), it was discovered that some Latinas struggle with having to break the stereotype of being a main caregiver and having to stay at home to care for the family. Becoming a caregiver in Latinx families also means sacrificing personal wants and needs for the people you are caring for, and this includes career aspirations.

Participants A, B, and C all recognized that this norm stems from centuries of familial values, but they find themselves wrestling with these norms, and asking themselves if they truly want children, or if it is something that their families have pressured into their heads. The latinx culture really pushes and normalizes having children at a young age, and it often becomes a culture pressure that some women feel they have to meet. Unfortunately, this cultural norm impacts women more than it does men, and it places them in an extremely difficult situation. Latinas are responsible for creating families and raising children, and they are not typically seen as "breadwinners" nor are they expected to be so; however, those of us born from immigrant parents are also given academic expectations of going to college and earning more money than our parents to help out with necessities. This trend is also seen in the literature form Contreras Aguirre et al. (2020), where they state that "the motivation for many Latinas is the idea that they will be able to provide some financial relief to their struggling families." The *papelito* becomes

much more than their own future; it also includes her family, and her future family. Therefore, there is a noticeable dilemma that appears for the Latina pursuing a STEM career. On one hand, she is expected to be a caregiver and eventually have children, but on the other hand she is also expected to pursue a career and achieve a higher education. This results in Latinas carrying the heavy burden of expectations.

Latinas carry a lot of expectations on their shoulders, and they are given the expectation to be successful career women, mothers, and caring children that provide for their parents, all while building our own family and career. When most people are young, they aspire to become doctors, lawyers, and other professionals that have high-earning careers. They aspire to become these types of professionals because it provides financial stability and security to our families. All Latinas that engaged in these *platicas* agreed that their aspirations are founded on the desire to help their parents financially. Participants A and B became teachers rather than going to graduate school or medical school because it provided quick financial stability that they desired ever since they were little girls. For participant C, becoming a teacher was also not a decision she made until she was a senior in college just like participants A and B. All three agreed that teaching was somehow the profession that brought them happiness and financial stability right out of college. Participant F also mentions that she initially wanted to pursue the medical field, and although her parents were supportive, they were unable to provide the financial support needed to pursue an MD in the states. She shares her route to becoming a teacher as something that she found towards the end of her college career. She mentioned that although she was unable to pursue such a prestigious career, she was still able to help her parents, who supported her throughout her journey.

Another crucial aspect of this study is familial support during higher education. Participants A, B, D, and F all shared how their family played a crucial role in motivation and support for completing their college education. All four women discuss how their parents made tremendous sacrifices to ensure that they were able to finish their education. This is important because the women described that having that support from parents, and family members was a crucial safety net in case of failure or hardships, and they are thankful that their family valued higher education enough to allow them and thoroughly support them in the academic journey. Neither of them was expected to carry out any other responsibilities while they were in school, their family made it clear that their main responsibility was to succeed and bring home the *papelito*. This finding is inconsistent with the literature of Rodriguez et al., (2019), who states that in some Latinas struggle with having to break the stereotype of being a main caregiver and having to stay at home to care for the family. Some of the participants on this student experienced the opposite narrative and did not have to worry about breaking or upholding this expectation. Participant F shares her experiences about the support she received from her parents, stating:

> My parents did not go to college, and my sister went to trade school, so I did have some support [in terms of how to succeed in college] but my family was supportive in the way that allowed me to not worry about anything else, and only worry about education, and it does help to know that you have that support from your family just in case anything [happens].

Similarly, participant D had tremendous support from her parents to pursue her dreams of becoming a math teacher, but this support and aspiration was fueled from her upbringing. Participant D is the youngest out of five children. Growing up, she saw the aftermath of her older brothers' lack of direction in their career paths. They constantly caused stress for her parents and she grew tired of seeing how their actions affected her parents. She had to grow up really quickly

and decide that her future would not like that of her brothers. Instead, she actively sought to be what they weren't and that is how she started to get more involved with extracurricular programs that eventually allowed her to study in the United States for undergrad and become a teacher in Boston, MA. Throughout her academic journey, her parents always supported her and encouraged her to do everything in her power to achieve her dreams. Participant was not only motivated by her brothers' decisions, but she was motivated by her family's support. Family is not only a part of life for these women, but it is often their main source of motivation. The dedication they have for their education often stems from their love and the honor/respect they have for their family and familial success. This finding is consistent with the literature from Contreras et al., (2020) that states that family interactions and unity foster support systems and encourage success and resiliency in STEM education. Similarly, Perez et al., (2018), makes the same claim that families support their students because their achievement symbolizes the collective struggle of immigrant parents and their children.

Summary

The findings from the *platicas* found several parallels between the narratives of the women and the literature. It is evident that many Latinas in STEM share similar experiences. The idea that Latinas struggle in higher education stems from the oppressive systems set in place that tend to favor white men. It is evident that Latinas have to overcome obstacles in order to accomplish their goal. When discussing self-identity, it is important to understand that many Latinas struggle with feeling unwelcome, incompetent, and unintelligent which leads them to struggle with imposter syndrome. Latinas have to turn to out-of-classroom communities in order to receive the positive reinforcement that they need in order to succeed in STEM.

A majority of the participants in the study explain how the lack of rigorous instruction and the lack of academic growth led to a struggle in college. The participants explain how they wished their high schools were more mindful of the academic rigor because they were taken aback when they reached college, and everything was increasingly difficult. The literature points out that this lack of confidence and lack of structure can lead the women to experience a chilly climate. Educators can aim to prevent this phenomenon by finding a way to incorporate the challenges they may face in higher education while maintaining high expectations for their students.

Reflecting and analyzing the college experience allows teachers to further improve their practice. The findings of this paper provide a small window into the field of STEM and education. It is evident that the background and experiences of these teachers play a crucial role in their pedagogy, and they must continue to reflect and improve their practice if they want to dismantle the oppressive systems that want to see them fail. In order to contextualize these findings and provide future implication for research, the following chapter provides a few questions that higher education STEM spaces may seek to address in order to encourage success among Latinas in STEM.

Chapter 5

In this study, researchers conducted several platicas with six Latina STEM teachers in order to understand the different obstacles that stand in the way of success for Latinas pursuing a STEM career. To fully understand the context of their success and what they had to do to get to where they are now, the researchers focused on the following questions during their platicas:

1. How do cultural norms influence Latinas in their pursuit of a STEM career?
2. How do familial roles and expectations influence Latinas in their pursuit of a STEM career?
3. What is the relationship between navigational capital and the self-identity of Latinas in STEM?

Learnings from the study

Following these platicas, the researchers discovered three major patterns in the narratives shared by all six Latina STEM teachers which were academic self-identity, belonging, navigational capital, and family and cultural norms. Although the participants grew up in different places (one participant grew up in a different country), went to different universities, and had unique experiences, their narratives shared many parallels which confirms that the obstacles that stand in the way of the success of Latinas in STEM might be universal.

All of the findings from the study support major conclusions about the success of Latina STEM teachers. Latinas pursuing STEM careers tend to be first-generation students, who carry lots of responsibility. These women have to sacrifice personal desires in order to ensure financial stability for themselves and their families. Although many universities tend to create chilly climates, these women are still able to find success by forming their own path through familial support, fostering communities at their universities, and being resilient through the entire

process. Accomplishing their bachelor's degree and securing a professional career in teaching science is not only a personal accomplishment, but it is an accomplishment for their families. Ultimately, by becoming teachers, Latina STEM educators can provide support and insight to their students as they begin to develop their dreams for their futures.

Through this study, the researchers were able to gain a clearer understanding of what obstacles exist for these women. They were also able to provide a space for healing and connection by engaging in *platicas* where participants shared their stories and were able to form stronger relationships with the researchers themselves through the study. As educators, and the researchers and participants realized how little information is available to young people interested in pursuing STEM careers.

The findings from this study may teach other educators in the field about the existing obstacles that may challenge their students as they pursue higher education. These findings are especially important for educators who work with low-income communities of color. Most of the time, students from these communities are encouraged to attend four-year colleges and universities. However, schools tend to focus on the pre-college journey, and they do not teach students how to survive and accomplish a bachelor's degree. This leads to higher dropout rates for students of color compared to their white counterparts. As first-generation college students who are also students of color, they may find themselves feeling imposter syndrome and might question their belonging during their undergraduate careers. If these students are unable to find their communities on their college campuses, find support in their field, and push through obstacles, they might not find success. This study provides tools for these students by raising awareness to the issues that may come up during college. Educators can use these findings to prepare their students for the hidden curriculum of college and universities. Unfortunately, low-

income students of color are often consumed by the idea of applying and getting into college, but they are not given the opportunity to explore and understand the tools necessary to succeed throughout their time in college. It is time to disrupt the cycle and shed light to what they may experience and prepare them for success so that they can achieve their degrees at the end of their four years.

Future implications

Much of the literature that exists on Latinas in STEM focuses on their challenges in accomplishing their bachelor's degrees but does not explain how they find success in their field. This study focused on both the obstacles Latinas in STEM face and how they overcame them. Through these narratives, the hostility of STEM spaces at undergraduate universities were exposed. Similar to Rodriguez and Blaney (2020), this exposure calls for a focus on STEM environments in higher education as well as K-12 education. Fostering a positive environment in this field from a young age will allow students to develop their STEM identity early and will provide them with the needed support to start and finish a STEM degree. The findings of the study unveil the challenges Latinas face in STEM and how they continue to be marginalized in spaces that do not foster community. Universities need to refocus their work on belonging in STEM spaces and aim to produce healthy, positive, and warm environments where all students, regardless of identity, can find success without having to forge their own paths. Some questions that universities may use to inform their work include:

1. What identity-based organizations exist on our campus that support students of color and encourage them to succeed in their studies?
2. How can STEM spaces be more inclusive to marginalized students (i.e., race, and gender)?

3. How can majority group students (i.e., white male students) foster positive relationships with marginalized students in STEM spaces?
4. What can professors do to nurture belonging and success in marginalized students, and more specifically, in Latina students?

Institutions may use this study to encourage university faculty in STEM to build relationships with students and take time to make these connections to facilitate a stronger sense of belonging and relationship with their students. STEM departments should also actively engage in diversity, equity, and inclusion workshops and professional development opportunities to understand the challenges students may face. These departments should also aim to hire more people of color and women of color to create a more inclusive and diverse environment for all.

Concluding thoughts

This study served as a window into the experiences of Latina STEM educators and their success in STEM. Through this study, a sense of belonging and community that was built that allowed participants shared past trauma and found healing in sharing their narratives because it allowed their narratives to be validated; they also realized that this validation is extremely important in their professional careers. As marginalized people, Latinas face many obstacles created by a patriarchal and oppressive system, but this study allowed for participants to leave with a stronger self-understanding, validation, and friendships that will last a lifetime.

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