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**Narratives of Perseverance by Latina Women Paving Their Way to Success in Science,
Technology, Engineering, Art, and Math (STEAM) Higher Education**

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Doctoral Program in Teaching & Learning: Curriculum, Advocacy, and Policy

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NARRATIVES OF PERSEVERANCE BY LATINA WOMEN PAVING THEIR WAY TO
SUCCESS IN SCIENCE, TECHNOLOGY, ENGINEERING, ART, AND MATH (STEAM)
HIGHER EDUCATION

Toni Lynn Carmichael

Doctor of Education in Curriculum, Policy and Advocacy

Submitted in partial fulfillment
of the requirements of
Doctor of Education

National College of Education

National Louis University

June, 2023

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ABSTRACT

The purpose of this narrative study was to understand the experiences of successful Latina women attaining higher education in Science, Technology, Engineering, Art, and Mathematics (STEAM) and the challenges they have overcome along the way. Additionally, I sought to examine ways in which these students challenged the stigma of invisibility often attached to Latino communities. Representatives from Brazil, Ecuador, El Salvador, and Mexico, the participants of this study were seven women employed in various areas of STEAM with higher education degrees.

Cultural Capital and Feminist Cultural Studies provided the theoretical framework for this study. The three-dimensional narrative design was applied to data analysis that resulted in identification of the following meaningful themes: (a) “Latina Women’s Path to Success in STEAM;” (b) “Persevering through Stereotypes and Invisibility;” and (c) “Cultural Traditions and Ancestral Voices.” The participants’ narratives conveyed the path to success that was both unique and common experience of overcoming multiple barriers and persevering toward educational and professional accomplishments. Strong cultural traditions, familial values, and networks of support were among the main influences in the participants’ lives. The role of the *bisabuelas* (great-grandmothers), *abuelas* (grandmothers), and *madres* (mothers) was particularly important in the participants’ path to success.

This study encourages educational professionals and policy makers to create better opportunities for Latina students striving to succeed in STEAM through a variety of incentives, programs, policies, and environments conducive to more inclusive and equitable practices.

ACKNOWLEDGEMENTS

First and foremost, I give honor and glory to God for the journey that has been placed before me and the struggles and victories that I have experienced along the way. I have defied the odds and overcame the struggles of a young Latina girl with a dream and I never allowed for anyone to deter my path to fulfill my dreams. Thank you, Jesus for the amazing strength you have given me and the perseverance to achieve my goals.

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To Dr. Lukenchuk, Dr. Price, and Dr. Efron, thank you for your guidance and support as I began this journey along with the numerous opportunities given to me as a student. The amount of knowledge that I have gained from your classes and discussions were valued more than you know or that I could ever dreamed of. I could never fully express or share my gratitude for your guidance but my love for the two of you is honestly something I will treasure for all of my life. I look forward to sharing my space with you both as I pursue more opportunities to provide inspirations to future Latina scientists.

To Carlos Alviero, Writing Specialist at National Louis University, thank you for being a critical eye during this dissertation process for the CLAVE Fellowship recipients. The story of my abuela and madre was able to be clearly articulated because you took the time during our CLAVE meetings to review the work I needed to complete. Thank you for being my friend and cheerleader through this process and giving me the courage to believe that I can accomplish anything in my life. I could never fully express my gratitude, but I pray for many successful journeys for you, my friend.

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I would like to dedicate this dissertation to the following people who have been instrumental to my growth as a Latina woman, mother, grandmother, wife, daughter, and sister:

To my mom, Irma, and mi abuela, Mena, thank you for being my original warriors and inspiring me to be my best authentic self! You both taught me to live out my passion and inspire others to be their very best! I hear your voice every day and I hear you telling me that I am talented and valued! This dissertation is dedicated to you both and while you are not on this earth anymore, your spirit lives in my life! Every ofrenda is a dedication to your strength, sacrifice, and genuine love for others! Las quiero muchísimo a las dos; mi vida no es igual sin ustedes.

To my husband, Rob, you are my rock and best friend! Thank you for being the best husband and father our family could have asked for! Your love for science is inspiring and I am thankful that you guided me to love science. Thank you for sharing your passion for science and all the animals from around the world. I would never be where I am today without your love and support! You saw from the beginning of our marriage, my aspirations to teach and your encouragement was priceless. I value it so much! Without your belief in my dream, it would have been just that cloud in the sky but you made sure that I would rise to the occasion and be everything I was meant to be. I love you more than you know or could ever express!

To my grandson, Malcolm, thank you for keeping me sharp by giving me a well-deserved break to dance at the children's museum or take walks to the zoo. You have inspired me to be a better representation for our future generation. I love you with everything I have in me!

To my daughters, Ofelia and Carolina, this dissertation is also dedicated to you both! My mom and my great-grandmother, Mena started this journey of creating a strong woman, and I, in

turn, have created the two most powerful women under the grace of God! Please remember the voices of our ancestors and know that we are always with you, through every struggle and victory! I will always be there for Malcolm and all the children born or adopted by you both! Creating strong children is a strength in our family and we treasure every gift from above! Thank you for your love, encouragement, and belief in my journey!

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To my brother, Ronald, and his life-long partner, Matt, thank you for continuing to challenge me to be my very best! Thank you for your stories of our ancestors and the remembrance of their passion for the community. Your love and encouragement are valued and imprinted on my heart! I love you both more than you know or I could ever express.

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I pray that you all understand the impact that you have had on my life and it is a testament of your love, mercy, and inspiration that I am able to achieve all of my goals and dreams because I have had you all by my side. I am forever grateful and I will always be your loudest cheerleader!

Love always, your daughter, sister, Nini, and mother, Toni

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CHAPTER ONE: INTRODUCTION

“Two Mothers Remembered”

By Joann Snow Duncanson

[REDACTED]

Where Does My Story Begin? Positionality Statement

As a child, I had a dream to become the first woman president of the United States and compete on the USA Olympic Track and Field team. My mother would express that I can do and be anything I want to be if I worked hard and followed my dreams. When I was in the 3rd grade,

I witnessed a tragedy that affected my life and my future in education. At the age of eight years old, I witnessed the murder of my uncle. He was shot in the chest, and I tried to stop the bleeding, but I was unsuccessful. My uncle passed away while I was there with him. At school, teachers would make judgmental comments about the path of my future. The comments were not kind or positive about the future of my education. When I was a young child, the teacher would say, “sticks and stones may break my bones, but words will never hurt me.” The negative comments about the trauma I had experienced from people of power (teachers, administrators, and social workers) created a drive to succeed and accomplish my educational dreams. These dreams were encouraged by my mother and abuela (grandmother).

During my intermediate and middle school years, my mother continued to instill a strong work ethic and encouraged my success in school. Success in academics and athletics became a reality, due to the positivity received from my mother and grandmother. Due to my athletic success in basketball, softball, and track, I had the opportunity to compete at the collegiate level so academic excellence would be required to achieve the goal I had set for my future. I had two teachers who were instrumental to the success of my educational journey -- my math teacher and my science teacher. These two gentlemen echoed the positive message that was expressed by my mother and abuela -- anything is possible with hard work and desire.

Strong Women Inspire

My mother and grandmother knew that I was a passionate young lady and due to the pain I had felt from my childhood, they encouraged me to dance to share my passion and work through the pain of my past. Modern dance was added in high school along with athletics and academics. This was the change I needed to overcome barriers and succeed. A math teacher,

science teacher, and a dance teacher had the opportunity to help a passionate young lady transition into the educational realm of science, math, and arts that would quickly evolve into a career in Science, Technology, Engineering, Arts, and Mathematics (STEAM). Educationally I struggled, but the love and mercy from my mother and abuela continued to encourage my journey into STEAM and helped me overcome those struggles.

The words from my teachers in grade school, “sticks and stones will break my bones, but words will never hurt me” are words that have stuck with me. The reality is that sticks and stones could break my bones, but the negative words hurt even more. Feelings of unfulfilled potential plagued my journey, but somehow God always placed the right people in my life to help me succeed.

Along with my mother and abuela, I met a man named Rob Carmichael. I am thankful God brought him into my life. Rob is similar to my mother. He’s encouraging and he challenged me to finish my college degree. We married and I gave birth to two amazing girls. Rob encouraged me to stay home, raise our girls and go back to school to earn my degree in education. Earning a bachelor’s degree led to a master’s degree and a successful career as a science teacher for the past twenty-four years, and now I’m in a doctoral program because of the support I have received from my husband and two daughters.

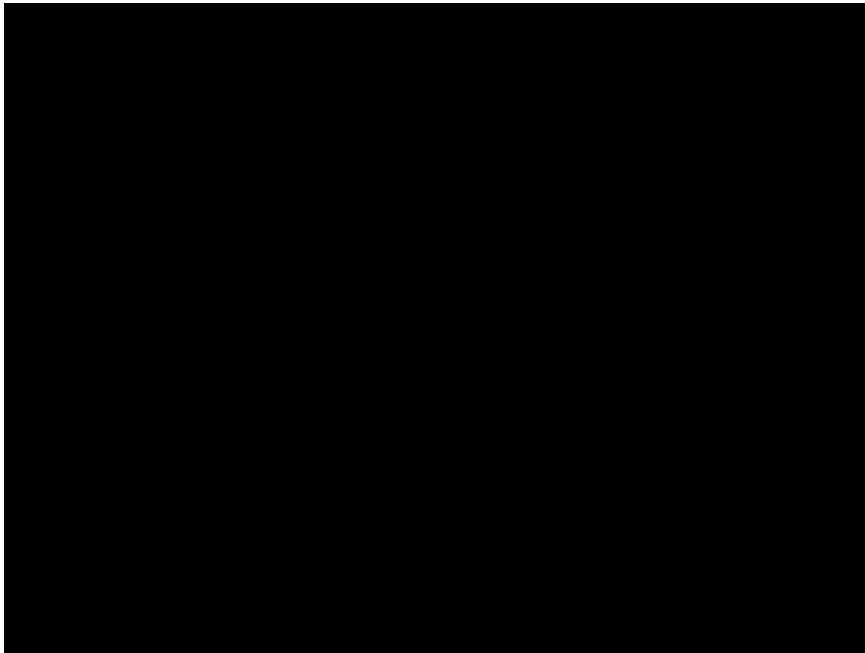
My daughters were successful academically and athletically throughout their childhood, in high school and college. They were NCAA Division I All-American athletes and All-American in academics. They have been encouraged and challenged their entire lives. How can I provide this experience for other female students, especially Latinas? How can I encourage these students to overcome obstacles and become scientists?

Irma and Filomena

My mother was born a year before the end of World War II. During this time, women in World War II were a pivotal part of the success and eventual victory for the United States. Inspired by the vision of Rosie the Riveter, my mother was raised by her grandmother, Filomena. Mena, as we fondly called her, was my abuela.

Figure 1

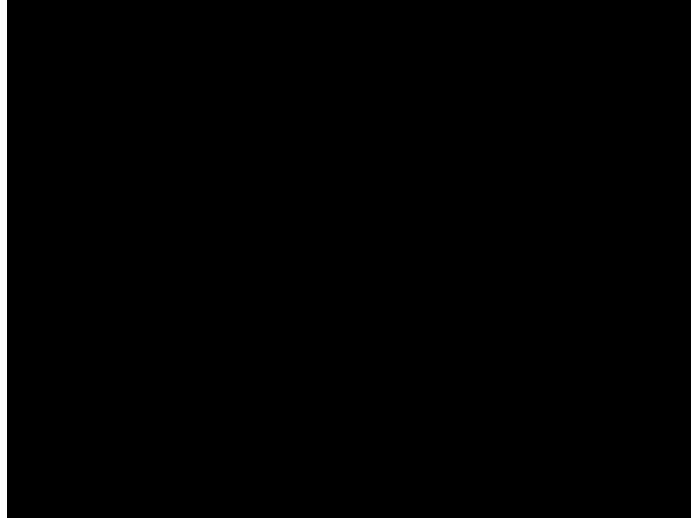
Mena and All Her Children



Note. Mena (my grandmother) with all her children including Irma (my mother). The dedication of my grandmother to provide opportunities for her children is a legacy that most Latina women would desire for their families.

Figure 2

Irma and Hector



Note. This picture of Irma (my mother) and her brother, Hector, is during their First Communion.

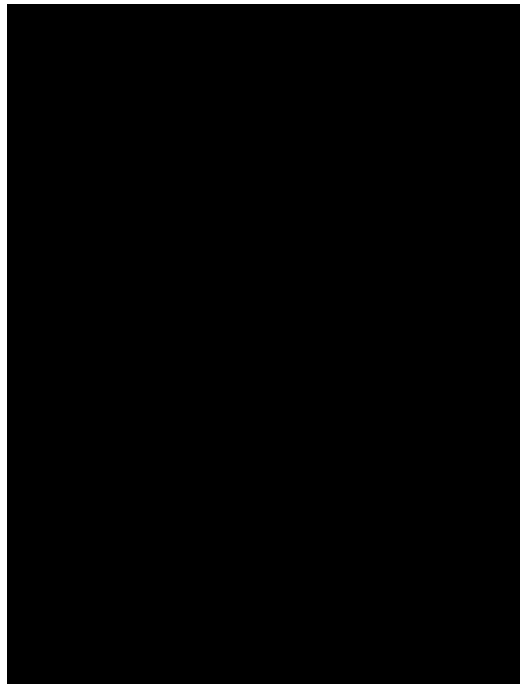


Figure 3

Mena and Aunt Lupe

Note. Picture of Mena (my grandmother) with my Aunt Lupe who cared for Mena during her final days on this earth.

The success of our family laid heavy on the heart of Mena. Her family has appreciated her efforts as the feminista she was. Mena was an incredibly strong woman, and she ran the household with confidence and strength. Mena was a woman of strength, passion and wisdom. Mena was a hard-working woman and demanded excellence from everyone around her. She was an incredibly forgiving woman to anyone that harmed her or her family. She would often say, “Mija, no te preocupes cuando la gente es mala contigo o hacen cosas desagradables. Dios los juzgará y no es tu trabajo preocuparte.” (Translation: Darling, don’t worry when people are mean to you or do unkind things. God will judge and it is not your job to worry about it.)

Mena would always demand that we work as hard as we can in everything we did in life. Her foresight into the needs of her granddaughter was years ahead and I am so thankful for her guidance for my mother’s education. This guidance provided a way for my mother to not only graduate from high school but to learn how to become a cosmetologist.

During this time, my mother was very stern about our education and she instilled lessons about having a strong work ethic that she learned from my grandmother, Mena. My mother earned her bachelor’s degree while she was fighting to overcome breast cancer. I am blessed to have a mother that encouraged and believed that I could accomplish more than I ever thought I could.

I am here today because of the strength of my mother and my abuela. During a sermon, a pastor I trust and who inspires me, asked a question, “is it worth the fight and was it a good fight?” (Evans, 2020). I believe that my abuela would agree that this is worth the fight to have a better life for my mother. My mother would say that it was worth the fight to improve my life

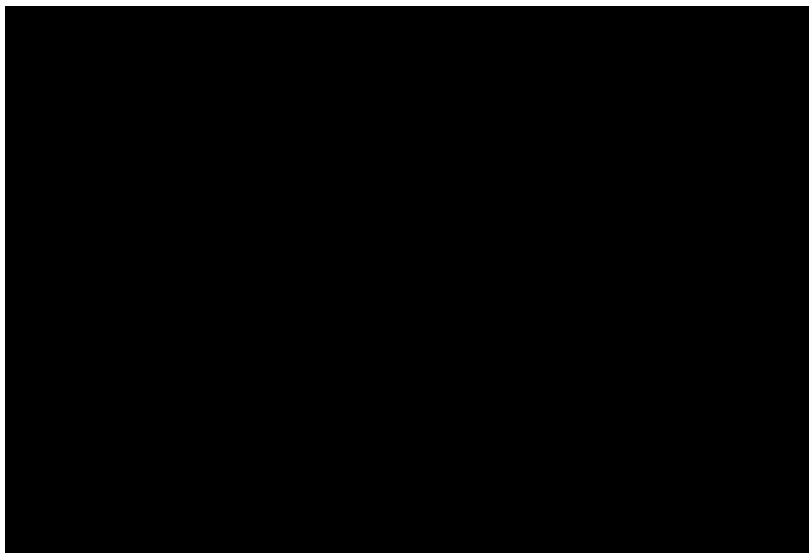
and the life of my daughters. Now, it is my turn to fight the good fight for the future of education for our Latina students.

The stories of my abuela and mother are narratives of empowerment that helped them overcome obstacles that caused feelings of invisibility and isolation. These narratives have inspired me to take a more proactive role in becoming a stronger community leader. The stories of Filomena and Irma are a legacy to their daughters, granddaughters, and great-granddaughters to overcome all adversities they may experience while working to attaining higher education goals.

The pictures below portray the inspiration that Irma and Filomena have provided for the children that have been part of their lives. The inspiration to be heard and seen, to achieve the goals in their professional and educational career, and to be the best version of themselves due to the guidance from Filomena and Irma.

Figure 4

Ronald, Irma, and Toni Photo by Shew Design



Note. The legacy of Irma’s children, Ronald and Toni, are exhibited in this picture. Irma would strive for excellence for Ronald and Toni in their pursuit of attaining a higher education degree.

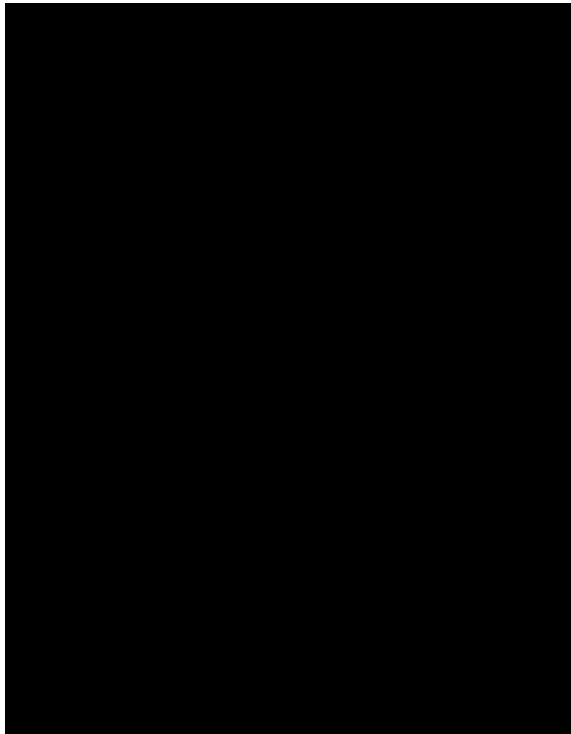


Figure 5

Grandchildren

Note: The legacy of Irma's influence on her grandchildren and their achievement of their master's degrees from their universities.

Overcoming the odds for four generations is an example of God's favor for the blessing of higher education to the children, their children, and their children's children. Mena would strive for her daughter, Irma, to attain a college degree. Irma would strive for her daughter, Toni, to attain a higher education degree. Toni would strive for her daughters to earn their master's degrees. There are four generations of higher education all due to the dedication of one woman, Mena, the grandmother, and matriarch of the family.

Problem Statement

Many Latina students can be inspired by the stories of their ancestors, it is not uncommon for students to struggle with confidence and self-esteem when it comes to their academic abilities (Solórzano & Yosso, 2002). It is essential to support Latina students in building their confidence and self-esteem, and to help them recognize their full potential as intelligent, capable women. For Latina women, it's a battle to persevere and pursue STEAM higher education as a profession. Villenas (2014, p. 217) states that Latinas in her study are challenged with educational success and this will ultimately take a toll on their community. Latina women deal with the challenge of invisibility among their peers. More importantly, Latina students pave their path to higher education and discover the barriers that prevent them from higher educational pursuits. Educators can meet the needs of the Latina population without challenging them so much that the motivation to excel is becoming too great of a burden (Solórzano & Yosso, 2002). The need for this study will center around the perseverance of Latina women in STEAM fields to understand the unique challenges they face, and the strategies used to overcome those challenges. The challenges that will be exploring the stereotypes and invisibility that Latina women in STEAM may experience.

The stigma of invisibility of Latina students in STEAM higher education programs is an area that has been highlighted in a research study about this phenomenon. Katz-Buonincontro (2018) states the interests in Science, Technology, Engineering, Arts, and Mathematics (STEAM) in schools has created a growing interest in scholarship to ensure that all students can be offered these types of academics. Latina students in higher education would need to have expected outcomes in their education classes to develop STEAM experiences at their school.

These understandings of STEAM education would create more well-developed projects in classes to prepare them for the workforce beyond college.

The STEAM phenomenon has been a focus for the federal government for the Latina student. Sabochik (2010) shared in a blog from former President Barack Obama, and the quote from the September 16, 2010 speech about STEM/STEAM education reads as:

Our nation's success depends on strengthening America's role as the world's engine of discovery and innovation... CEOs... understand that their company's future depends on their ability to harness the creativity and dynamism and insight of a new generation. And that leadership tomorrow depends on how we educate our students today - especially in science, technology, engineering, and math. (paras. 3-4)

President Obama's powerful speech about the importance of STEAM programs in higher education is an important component for Latina students to be successful and develop strategies to a successful path of discovery in the areas of STEAM education.

Katz-Buonincontro (2018) states the interests in Science, Technology, Engineering, Arts, and Mathematics in schools has created a growing interest in scholarship to ensure that all students can have these types of academics in their studies. Latina students in higher education would need to have expected outcomes in their education classes to develop STEAM experiences. These understandings of STEAM education would create more well-developed projects to prepare them for the workforce beyond college (p. 73). Katz-Buonincontro (2018) quoted the goal of The Congressional STEAM Caucus in 2014 as "to change the vocabulary of education to recognize the benefits of both the arts and sciences - and their intersections - to our

country's future generations." Teachers would need to change the educational outcomes for their students to provide these opportunities for these students (p. 73).

The journey to understand the experiences of our Latina students in STEAM education programs is the reason for this study. Yuen, Bonner, and Arreguín-Anderson's (2018) research on Latinas in STEAM suggests that Latinas may struggle with establishing an identity in STEAM due to their motivations as students (pp. xiv). The researchers indicated that Latinas tend to be motivated by a desire which may not align with the motivations that are often needed to have success in STEAM fields.

Research Purpose Statement and Research Questions

The purpose of this narrative study was to understand the experiences of successful Latina students attaining higher education in Science, Technology, Engineering, Art, and Mathematics (STEAM) and the challenges they have overcome along the way. Additionally, I sought to examine ways in which these students challenge the stigma of invisibility often attached to Latino communities.

Invisibility is the concept derived from Hsieh (2007) who defines invisibility as "cultural homogeneity" and there could be experiences where Latinas are conforming to a more dominant culture. These cultural norms could be "homogeneity, ethnic and racial minority" based. Hsieh, (2007), Mena and Vaccaro (2017) have defined invisibility as subtle forms of racial or gender oppression. Their study has exposed "three manifestations" (p. 301) of environmental microaggressions within the campus, disciplinary or professions, and community invisibility that could affect the profession and leadership skills due to this invisibility.

I appropriate this definition for this study in that STEAM “is a process for awakening creativity” (Sousa & Pilecki, 2018) in the areas of Science, Technology, Engineering, Arts, and Mathematics.

The following research questions guide this study:

- How do Latina women narrate their stories of perseverance in gaining higher education in STEAM?
- How do these women experience “invisibility” and stereotypes, if at all, when overcoming barriers on the path to success?
- What is the relevance, if any, of cultural capital to these women’s success?

Cultural Capital as defined by Bourdieu (Claussen & Osborne, 2012) as “a ‘habitus’ as a set of social and cultural practices, values, and dispositions that are characterized by the ways of social groups interact with their members” (p. 60). This cultural capital has the potential to influence Latina students with the concept of science education through the elders of Latinas, similar to mi Abuela, Mena and mi madre, Irma. For many of the Latina students in the STEAM field, there are generations of barriers that have been overcome to successfully earn the distinction of not only earning a degree in the STEAM field but having a professional position in the field. The successes and challenges for students of color in the areas of STEM/STEAM education have been riddled with barriers that need to be overcome by Latina students. This study endeavored to trace the contours of several Latinas’ lives as they overcame multiple barriers to pave their path to success in STEAM.

CHAPTER TWO: LITERATURE REVIEW

Latina women paving their way to success in Science, Technology, Engineering, Art, and Mathematics can be a difficult progression. Latina women in science adapt to multiple cultures on their way to success. What is considered success? Lee and Johnson (2020) describe the criteria for success as having a clear understanding of what is required of the student and having a specific task to accomplish (p. 66). It is similar to how women may feel about becoming a mestiza in the Mexican culture (Anzaldua, 1990, p. 379), adapting to the multiple responsibilities for women without abandoning their heritage. Anzaldua (1990) describes a mestiza as a woman of mixed cultural heritage, often including Mexican, Mexican Native American, and Anglo (white) cultures (p. 379). Anzaldúa's work is important in Chicana Feminist theory because she argued that the mestiza identity shared the experience of living between multiple cultural worlds, and this experience could be empowering if embraced properly. The need for successful strategies for Latina women in higher education has been a struggle and Latina women have been able to overcome the oppressive behavior experienced in order to achieve their goal (Smith, 1990, as cited in Anzaldua, 1990, pp. 25-27). The journey to achieve success begins with the discovery of women in the STEAM professional occupations.

The review of literature pertaining to the context of this study is organized around the following main themes: (a) Latina women pursuing higher education in science, technology, engineering, art, and math (STEAM); (b) the voices of women within Latina culture: challenging invisibility and stereotypes; and (c) conceptualizing the experiences of Latina women in higher education.

Latina Women Pursuing Higher Education in Science, Technology, Engineering, Art, and Math (STEAM)

There is a record of studies that address Latina women's success in higher education (e.g., Ocasio, 2014). Most of these studies focus on the necessity to employ Latinas as teachers to have a cultural representation in a diverse student population (Ocasio, 2014 as cited in Frankenberg, 2009; Gomez & Rodriguez, 2011; Sakash & Chou, 2007, p.245). The pursuit of a higher education and making connections to succeed is a cause of many Latina women that have accomplished their goal.

Latina women can draw inspiration from prominent people whom they can relate to culturally. For instance, during an interview with the Albany Law School, Supreme Court Justice Sotomayor stated in 2017 "Learning how to be assertive means, first, that you have to understand your own position... but equally understand the positions of your adversary" (p. 732). This comment from Supreme Court Justice Sotomayor is a feeling that Latinas are having to overcome to have the belief that their goals are valid. Supreme Court Justice Sotomayor described her journey to success by sharing her vulnerabilities, struggles, and discussing how imposter syndrome can derail Latina students in higher education (Albany Law, 2017, p. 726).

The importance of education is eloquently expressed by President Eisenhower in his Centennial Celebration Banquet of the National Education Association on April 4, 1953: "Teachers need our active support and encouragement. They are doing one of the most necessary and exacting jobs in the land. They are developing our most precious national resource: our children, our future citizens" (National Archives, 2022). Supporting Latina students with Latina teachers to achieve a difficult task among women, specifically Latina women, will be the plight

for many years to come. This statement from President Eisenhower in 1957, demonstrates the necessity to support all teachers and administrators to bring success to our students and future citizens.

Gonzalez (2015) refers to three such lessons for the success of Latina students as: (a) positive self-efficacy, (b) expanded social, emotional, and cognitive capabilities, and (c) a healthier lived context for Mexican/Latina-American children and families. These lessons can provide a safe place for Latina students in the classroom and can help Latina students to use their voice for educational advancement (Solórzano & Yosso, 2002). Latina students are encouraged to have positive self-efficacy and live a mentally healthy lifestyle to believe in themselves in the STEAM world. These lessons can lead to a more positive mindset with their social, emotional, and cognitive abilities.

Latina Women and STEAM

Gess (2017) defines STEM as an approach that integrates the practices of Science, Technology, Engineering, and Mathematics in their education programs. Using Art is an essential component to STEAM. The “A” was added to the STEM terminology to embrace and celebrate the necessity to have art as a part of the Science, Technology, Engineering, and Math, and to encourage artists to become involved in science (Gess, 2017).

The goal of STEAM is to be integrative and intentional from the students and professionals in the STEAM learning environment (Gess, 2017). The importance of creativity in the workplace is in demand. Could a STEAM educated student in higher education play a larger role in the workplace? Katz-Buonincontro (2018) states that the painter-mathematician-scientist Leonardo DaVinci (1442-1519) integrated arts into all inventions. As science teachers, students are required to make detailed observations in their lab notebooks when the students are

conducting some type of experiment (p. 74). Katz-Buonincontro (2018) promotes the necessity of using these observations with drawings in the student's laboratory journals in middle, high school, and college science classes.

Copeland et al. (2018) examines the importance of the need to provide an opportunity for students to have a multidirectional approach to their learning. This learning would be for the purpose of having groups of students, such as Latinas, who have been underrepresented in the past to be prepared for STEAM fields. Ortiz et al. (2019) indicates that the issues among students in STEAM programs are hindering their ability to progress at the same level as other students in their institutions. These challenges can be due to a variety of factors, including lack of preparedness, limited resources, and inadequate support systems. Ortiz et al. (2019) states it is encouraged by teachers to provide a cultivated and supportive environment for black and Latina students to acquire a STEAM identity (p. 311). If the students lack the foundational skills or have gaps in their knowledge in STEAM subjects, they may experience difficulties in understanding new concepts and keeping up with the coursework. By addressing these issues from an educator perspective, the schools create an atmosphere of opportunity and goals for students' future careers.

Quiqley and Herro (2016) describes how modern-day teachers have many opportunities to integrate groundbreaking methods in the classroom where the successes and challenges of a STEAM education are provided to Latina students (p. 411). The groundbreaking methods could be a multidisciplinary approach where the expertise of many disciplines could solve the problem presented in a STEAM learning environment (Quiqley & Herro, 2016, p. 412).

Across the United States, there is a need for teachers of color, specifically Latina women to be in the classroom for our students. Tootie et al. (2019) conducts a study for "Under-

represented minorities” in the STEAM field and they described the students as experiencing barriers to accomplishing their goals and becoming representatives in the STEAM field (p. 44).

Tootie et al. (2019) indicates some of the beneficial experiences for Latina students (i.e., mentorship, internships) that may increase retention in STEAM majors, create positive graduation outcomes for undergraduates, and the likelihood for “under-represented minorities” such as Latina students to pursue graduate school would increase (Barloro & Villarejo, 2004; Jones et al., 2010; Palmer et al., 2011 as cited in Tootie et al., 2019).

The percentages from the National Science Foundation and the National Center for Education Statistics have indicated rates of barriers Latinas and higher-level education (Copeland et al., 2018). There is a 21% difference between non-Latinas versus Latinas in higher education and this barrier could be one of the culprits of decreasing the income potential for the Latina community (Menchaca et al., 2016).

Ocasio (2014) states that Latina teachers have a 6% population among public schools in the United States. Latina teachers “bring knowledge, insights, and perspectives” (p. 245) for the success of Latina student in higher education. When Latina students enter higher education programs, there is the potential for an income increase for this group of students. Menchaca et al. (2016) reported that while the college attendance rate for Latinas is 31.3% versus the college attendance rate among Caucasian women at 45.8%, the graduation rate among Latinas is listed at 7.4% and it is still lagging behind Caucasian women at 16%.

In STEAM fields, Latina students graduate at a rate of 3% where Caucasian women have a 24% graduation rate in science areas (Menchaca, 2016). The negative percentages for Latina STEAM professions matter because the Latina/o population in the United States is calculated to be 18.3% of the population in the United States (US Census, 2019). Lapayese (2014, p. 228)

calculates the Latina/o population is 14.8%, based on the 2006 Census Report. This is a 3.5% increase and Latinas/os continue to be the largest minority group in the United States. To become a force in the United States and globally, Latina students are encouraged to enter STEAM programs.

Wetzel and Debure (2018) describes the application process to obtain scholarships from the National Science Foundation for STEAM students who could be experiencing struggles in science classes. Ortiz et al. (2019) points out the need to ensure that the life experiences of these students are highlighted. As researchers, the need to record the experiences of these students and the impact of the science classes should include a STEAM program for a successful future. STEAM educational programs encouraged differentiated learning for all students to utilize their talents in education, thus providing opportunities for Latina women in STEAM higher education.

The National Science Foundation and NCES (Ramirez, 2011) indicates the percentages of Latinas in STEAM are at low levels, around $\cong 5.7\%$, which is a small percentage in comparison with the total student population in the United States. In the teaching profession, Latinas are calculated to be around $\cong 6\%$ of the public-school teachers in the nation (Ocasio, 2014). Ocasio emphasizes the need for a diverse STEAM teaching staff for Latina students to be successful because the Latina/o community brings a different lens of understanding for the Latina students. Latina/o teachers can bring a different lens of understanding and cultural knowledge that can help make STEAM subjects more accessible and relevant to Latina students. Ocasio's statement echoed what Solórzano and Yosso (2002) states that education has multiple layers where oppression and resistance will be present. Ocasio notes that having a diverse teaching staff can help challenge stereotypes that may be held by non-Latina/o teachers creating an environment of resistance among the students. The cultural factors are unique and may impact

the Latina students' learning. The necessity of Latina teachers for Latina students will need to be observed for Latina students to overcome this oppression and enter higher education programs.

Gess (2017) claims that countries which have recruiting agencies for STEAM professionals recognize that one of the skills needed by companies is the ability to speak other languages and global languages like Spanish. Anzaldua (1990) echoed the challenge to speak multiple languages by stating we come from all colors and classes, the need to connect and achieve our educational goals is vital to success (p. 383). Ortiz et al. (2019) claims that preparation for STEAM education is most effective in "formal and informal elementary and secondary education" (p. 312) and this recruitment plays a vital role for global STEAM success for higher education students.

Latina students entering higher education programs experience uncertainty, intimidation and/or feelings of belonging due to their lack of knowledge of having the ability to enter STEAM higher education programs. Educators at the elementary, secondary, and higher education levels will need to provide a positive and realistic expectation to be successful in the STEAM higher education program. Ocasio's (2014) research demonstrates how to prepare Latina university students to become teachers to make an impact in the classrooms.

Ocasio (2014) quotes research that revealed an extension of Huber's (as cited in Huber et al, 2006, p. 247) study demonstrating the possible reasons for the lack of Latina STEAM teachers in the district classrooms and it led to the lack of education by Latinas to earn a teaching degree and attain a teaching position.

Latinas are falling behind academically, and it appeared to begin as early as elementary school. In this regard, it is important to consider how teachers view Latina students with the dangers of the perception of the "single story" as explained by Adichie's (2009) Ted Talk

explaining the perils of demonstrating the effects of marginalizing behavior toward any group of people. The single story as described by Adichie is to never look at the cover of a book and determine what the story is inside based on the cover alone. Adichie argues that the “single story” is a narrative that reduces a group of people to a single, one-dimensional stereotype and that it can be dangerous because it limits our understanding of their experiences and perspectives. For example, if a teacher holds a “single story” view of Latina students as being academically inferior or disinterested in STEAM subjects, this may lead them to underestimate the abilities of their Latina students or provide them with fewer opportunities to succeed. The danger of assuming the life of an individual based on the color of their skin is a struggle that is tragic to the individual that is experiencing that judgment (Adichie, 2009). Latina students need a shift in the perception of how they are viewed to achieve the goals they have set for themselves. Having the opportunity to achieve a higher education degree in a field such as STEAM can become a vital method to overcome the barriers that are faced by Latina students.

Providing opportunities for Latina women in higher education reveals the experiences women are battling to become more involved in the STEAM programs. The path to success in higher education for Latina students can be riddled with challenges. To determine how to overcome the barriers, the question should be asked, what are the barriers that are experienced by the Latina student in higher education?

Achinstein (2015) quotes an administrator who carried a positive message to his Latina students: “The powerful impact of the administrator’s affirming message to students, noting how he told them: You are up here, you are passing tests. You are breaking a stereotype. The odds are against you, but you’re showing you can do it” (p. 324). By sharing with the students that they are capable of breaking stereotypes and succeeding despite the odds against them, he was able to

encourage the students to believe in themselves and their abilities. This sense of belonging and support creates a more inclusive and uplifting learning environment to warrant success among the students.

This message echoed the techniques of Jaime Escalante, a math teacher in Los Angeles featured in the movie “Stand and Deliver,” who was well-known for his ability to inspire and motivate his students to achieve success even in the face of significant challenges and obstacles. In the movie, “Stand and Deliver,” which is based on the life of Jaime Escalante and his work, there is positive messaging similar to the example provided by the administrator in Achinstein’s (2015) article. By believing in his students and encouraging them to believe in themselves, he was able to create a culture of success and achievement in his classroom. Escalante’s story is a powerful example of the impact that dedicated and passionate educators can have on their students. By using positive messaging and a variety of teaching strategies, he was able to help his students achieve academic success and overcome the barriers that had previously held them back. One example of his positive message was the cultural pride he used as a tool to motivate and encourage students to embrace their cultural heritage and to connect with and enjoy math. By highlighting the contribution Mayan people, their ancestors, had in the field of math, he provided a sense of pride and ownership to allow math to be more meaningful.

Achinstein et al. (2015) discusses having the “ganas or desire” to succeed in all academic subjects and this is evident in the movie “Stand and Deliver.” The impact of Latina teachers on Latina students is a vital component for the success into a higher education program.

The family and personal responsibilities of Latina students tend to overwhelm them with the requirements to provide student aid and funding for college programs (Bernal et al., 2008). For Latina students, external and personal obligations cause academic issues because of the need

to be accepted and acknowledged in their culture and among their peers in school. The question that could be asked to our Latina students is do they have a clear identity with their family, culture, and in their educational spaces? By incorporating a multi-cultural and multi-curricular approach to a science program, this could ensure that Latina students going into a higher education program are more prepared to be productive citizens and reduce the barriers that could hinder their success.

Barrier to Success

The barriers to success for the Latina student have been a significant concern of scholars and practitioners of education (Bernal et al., 2008), and this concern is no less significant in today's socio-cultural, political, and educational contexts. Even though successful women report their educational journey in a positive manner (Ocasio, 2014); they also testify to several challenges that they have to confront when pursuing goals for higher education, and STEAM specifically. One of the issues can be traced to high dropout rates of Latina high school students (Lypayese, 2014). Latina female students' voices express the battles needed to overcome barriers to be successful and reduce the feelings of invisibility in higher education programs.

Ramirez (2011) states that Latinas are the most marginalized group in U.S. history. Across the United States, there is a need for teachers of color, specifically Latina women to be in the classroom for our students. Baca-Zinn, Cannon, Higginbotham, and Dill (1990) states the "critical perspectives about how black, brown (Latinas), and working-class women must fight through stereotypes" (p. 29) on their educational journey that are blocking advancement to their potential. Increasing opportunities for Latina students is the goal of the study. Baca-Zinn, Cannon, Higginbotham, and Dill (1990, p.35) states that the income gap could

become wider if these “hierarchies of inequality” continue to create barriers for Latina students and reduce their confidence to succeed.

Gonzalez (2018) describes barriers experienced by Latina students including segregation, oppressive isolation, and the feeling that they are falling through the cracks (p. 252). Gonzalez (2018) describes the path of her success in comparison to her brother’s educational journey. Her brother’s educational journey would be considered difficult because he was marginalized for his appearance and the lack of talent he displayed in his community. Gonzalez (2018) portrays her journey in school as “programs that should have taught students how to be admitted into a college, how to get into a college, complete financial aid applications, provide resources to take college entrance tests and waivers. College was attainable because of these programs” (p. 255).

Herman, Greene, Hahn, Mestre, Tomkin, and West (2018) states that Latina students would benefit from a stronger mindset training from their professors instead of the “traditional” instruction in most colleges (Herman et al.; Beach et al., 2012; Brownell & Tanner, 2012; Finelli, Richardson, & Millunchick, 2013; Henderson & Dancy, 2007; Siddiqui & Adams, 2013). Differentiating instruction can be an effective way to motivate Latina students and encourage them to persevere in their STEAM education. By differentiating instructions for Latina students, teachers can provide them with learning experiences that are challenging and engaging, while also being appropriate to their unique abilities and learning style. Some of the challenges that Latina students face are educational barriers that would be broken if they were able to celebrate the talents that other students are able to experience in the classroom. Some of the benefits of having an educational mentor is it could reveal a state of vulnerability that is uncomfortable for Latina students, and then they can find a way to overcome those barriers (Wetzel, 2018, p. 44). By displaying a belief that a low achieving student will never advance academically, this causes

harm to that student through dictating a path that could create a barrier to their success (Solórzano & Yosso, 2001a). This barrier could lead to the process of academic resistance.

Murphy et al. (2018) states that there are three sets of factors that are blocking the success of our Latina students. These factors include academic experiences, demographic and family characteristics, and cultural factors.

Latina students are at a disadvantage when applying for college programs because they do not know how to apply for admission, scholarships, or financial aid. J.P. Murphy and S.A. Murphy (2018) state that Latina students may experience barriers to obtain financial aid because the requirements to receive financial aid include the student being in school full time. Many Latina students need to be employed while attending a college program, so full-time studies may create a barrier for these students needing financial assistance.

Some of the barriers in college programs that are often experienced by Latina students are academic confidence in the process to attend college, knowledge about funding that is available through scholarships, racial/ethnic discrimination, and support from family members and peers or intergenerational conflict (Calzada et al., 2021). To overcome these barriers, Latina students can learn how to manage the demands of the higher educational financial process. Latina students can reach out to an educational mentor to receive support, and receive familial support, which is important and relevant to the educational success in their lives (Bernal et al., 2008).

When professors believe that marginalized students could have the opportunity to have an educational mentor to develop confidence, Latina students can then become a mentor for other students after they have been mentored as well (Wetzel & Debure, 2018, p. 42). This will allow Latina students to increase their academic grades, obtain the academic requirements to have

funding for their collegiate education and overcome the barriers to reach their potential in higher education (Solórzano & Yosso, 2002).

This state of vulnerability is to acknowledge the feelings of shortcomings that Latina students may feel or this lack of confidence to believe they can attend a higher education facility so that challenges can be overcome. The belief of the educator for Latina students can develop and strengthen these skills to provide a more productive life for success. Positive influences in the lives of Latina students can forge the path for them towards the future to reach their potential (Brock & Hundley, 2017). Wetzl and Deburne (2018) states that if there are any gaps in the academic learning for the Latina student, some programs can be provided such as study hall, advisory, tutoring, or summer school. This could fulfill the educational requirements. These programs could influence success and demonstrate the need for education to their families, and barriers can be broken when we celebrate their talents (Wetzl & Deburne, 2018, p. 44).

By meeting the needs of the students through Maslow and Bloom philosophies we could address the issues made by O'Shea (2016) of "first-in family" students who are portrayed as difficult or challenging and will not complete their education as many students are choosing to leave their college programs. Latina students who are the first in their families to pursue higher education and careers in STEAM fields face a unique set of challenges. Some of the challenges include a lack of support, financial barriers, language barriers, cultural expectations, and imposter syndrome. Despite the challenges, however, first-generation Latina students have shown resilience and determination in pursuing their goals.

Menchaca et al. (2016) discovers that when women in leadership roles experienced barriers, these women relied on the strong women in their lives to overcome the stereotypes that could be present. They needed to know the methods to overcome these significant barriers and

become leaders in their community. As teachers, Latina women need to ensure the cultural capital of their fellow students are celebrating the talents required to be successful in all trades (Solórzano & Yosso, 2001a). Cultural capital is defined by Harding et al. (2015) as the set of “preferences and behaviors” to receive validation by members in society that have the power to uplift its members (p. 66). Harding et al. (2015) as quoted by Bourdieu, 1986 and Laureau, 2011, referred to the collection of cultural knowledge, skills, and abilities that individuals acquire through their upbringing and experiences within their cultural context. Bourdieu shared that individuals with a strong cultural capital may be more likely to succeed in academic and professional settings (p.66). Latina students needed the love and support from their teachers/professors to have the courage to overcome the issues that may plague them in their quest to higher education. Hinton (2015) states “through love, moves from one person to another, it is not thereby reduced. Instead, it multiplies, and irreversible changes. Love sustains us in the face of trauma and loss.”

Some examples for Latina student success could be for the health of the students and to ease their fears; could blended or online classes fulfill these requirements to receive funding and student-aid, instead of striking fear of yet another loss in their academic life? Many students have experienced success with online classes because Latina students have been able to manage their familial and personal duties by having the ability to complete the tasks necessary to reach their potential by overcoming the barriers set before them (Solórzano & Yosso, 2001a). Demonstrating this level of persistence will allow Latinas to reach their potential and share their challenges with the strong women in their lives.

When educators focus on breaking barriers to provide the opportunity for Latina students to succeed, as Murphy et al. (2018) states from the U.S Bureau of Labor, there could be an

increase in the employment of Latina students. By empowering Latina students to succeed academically and professionally, we can help to create a more diverse and equitable workforce, which benefits everyone. The Latina unemployment rate remains at 11.1%, where the U.S. rate overall was at 9%. The poverty rate for Latinas/os was 28.2% and this percentage is having a negative effect on the Latina/o community. Murphy et al. (2018) believes Latina students have a choice to either accept these barriers that could define them, or they must gather all their strength to overcome these obstacles and climb over them. The barriers to success for the Latina student have been of significant concern by scholars and practitioners of education (Bernal et al., 2008), and this concern is no less significant in today's socio-cultural, political, and educational contexts.

Gonzalez et al.'s (2003) study (as cited in Ramirez, 2011, p. 207) addresses barriers that Latina college students confront, and how the barriers can undermine students' opportunities for college attendance and could define the demise of the Latina student in higher education. This state of vulnerability is to acknowledge the feelings of shortcomings that Latina students may feel or the lack of confidence to believe they can attend a higher education facility so that challenges can be overcome. The belief of the educator for the Latina students can develop and strengthen these skills to provide a more productive life for success. Positive influences in the lives of Latina students can forge the path for them towards the future to reach their potential (Brock & Hundley, 2017). Wetzl and Debure (2018) state that if there are any gaps in academic learning for the Latina student, some programs that can be provided, such as study hall, advisory, tutoring, or summer school could fulfill the educational requirements. These programs could influence success and demonstrate the need for education to their families and barriers can be broken when we celebrate their talents (p. 44). Teachers and professors should be encouraging

our Latina students to not only build on their native language but to learn and gain another global language in addition to English (Solórzano & Yosso, 2002).

Anzaldúa (1990) encourages Latina students to not only develop their native language to its fullest academic potential, but to expand their knowledge for the future with other global languages to become a global scientist (p.386). Murphy and Murphy (2018) indicate that there are three sets of factors that are blocking the success of our Latina students. Educators and businesses could offer internships to allow Latina students to demonstrate the “three sets of individual factors: academic experience, demographic and family characteristics, and cultural factors” (p. 4) because the experiences of Latina students would provide insight into their talents in several areas including the science arena.

Murphy and Murphy (2018) describe how Latina students usually attend community colleges to acquire the knowledge to enter the professional work force in STEAM and assist their families, fulfilling their responsibilities to their community. Menchaca et al. (2016) discovered that when women in leadership roles experienced barriers, these women relied on the strong women in their lives to overcome the stereotypes that were present. These women needed to know the methods to overcome these significant barriers and become leaders in their community.

As teachers, Latina women need to ensure the cultural identity of their fellow students are celebrated, along with acknowledging the talents required to be successful in all trades (Solórzano & Yosso, 2001a). By acknowledging the unique strengths, experiences, and perspectives of Latina students, teachers can create a more inclusive and supportive learning environment that fosters academic and personal growth. Investment in Latina students will be a vital component to academic growth. Dr. Seuss has wise counsel for students -- teachers need to

be the world for that one Latina student in the classroom for academic success. It is like what Dr. Seuss (Goalcast, 2020) says, “To the world you may be one person; but to one person you may be the world” (p.1). Latina students believe their teachers are the very people who need to celebrate the students’ desire to own a business, develop a trade, or attend a university. Therefore, it is imperative that teachers encourage such beliefs in their students, especially Latina students (Herman et al., 2018, pp 34-35). Navigating the educational system to provide success for Latina students will require more testimonies of success from Latina students (Bernal et al, 2008).

Latina students need strong mentors to assist in expressing their desires to go into a field that is different from their families’ ideals (Bernal et al., 2008). Supporting and mentoring is an important way for Latina women to overcome barriers based on gender and racial stereotypes. For Latina students, having access to female mentors who understand the unique challenges and experiences of being a Latina woman can be very valuable. Latinas need to know that high expectations are the expectation, and Latina students should never be left out, even unknowingly, by teachers or professors (Solórzano & Yosso, 2002). By working together and supporting each other, women can help break down barriers and create inclusive and equitable opportunities.

Latina students working toward success can create conflict, as Anzaldua (1990) describes with how achieving success can be like winnowing and releasing the lies that hinder the educational process (pg. 381). When Latina students listen to their hearts and embrace the educational challenges set before them, it can provide a path of success with the support of the strong women in the cultural community.

The Voices of Women within the Latina Culture: Challenging Invisibility and Stereotypes

The voices of women within Latina culture can spark the difference between acceptance and success, to despair and failure in educational programs. A clash of values between the Latina student and the traditions of their culture can become apparent when the decision to attend a university becomes a reality (Alegria et al., 2004). Women in the Latina culture can experience stereotypes and expectations by their family and educational peers, and this can develop a class of cultural values.

Munter-Orabona (1990) explains the importance of an abuela (grandmother) in the life of a Latina student (p. 124). The cultural role of the mother in a Latina home is essential for growth, both personal and educational. The loss of a mother is a traumatizing event and can affect the path of the Latina student in the home. Munter-Orabona (1990) states how the tears of grief that weave throughout the life of a Latina can be like buried cities (p. 124). Munter-Orabona (1990) stated, “Mami, you were the thread reaching through me to the island, my vice on every visit, my memory, my reminder. I thought I could not return without you. But I am just finding my own way home” (p.130). Munter-Orabona explains why the Latina voices in a cultural context is important for the Latina student. The mother and abuela are the threads that weave through a Latina’s student life like a blanket of protection for her (p.124). Escamill (1990) describes the strength needed by the Latina student by stating, when the mother or abuela are no longer present in the life of the Latina student, she (the Latina student) will be required to become stronger than ever to proceed with her educational goals (p. 133).

The voices of the abuelas and madres of Latina students is a constant reminder to continue the traditions of these strong, cultural women in their lives, to pass down these strong traditions to their children. Solórzano and Yosso (2002) report that what ultimately matters in the

educational journey is ensuring that Latina students' success is making their voices heard (p. 32).

Calzada (2021) explains how Latina students can overcome the stereotypes from society and work to ensure their educators and/or professors are developing a school curriculum to provide an education for these students, and to ensure the voices of Latina students are being heard in their academic classes (14:45).

In an interview with Supreme Court justice Sonia Sotomayor (Albany Law, 2017), during the Albany Law Review presentation, Dean Duelllette, a student, asked a question about the vulnerabilities and struggles of Latina students in law school and Justice Sotomayor responded with and described the struggles she experienced as a Latina Law student and discussed how she struggled in the classroom (p. 726).

O'Connell et al. (2021) describes the voices of abuelas and mothers as fostering levels of fear of failure, fear of success, need for family expectations, and experiencing self-esteem necessary to succeed (p. 75). O'Connell et al. (2021) explains how providing a voice for Latina women in STEAM and a method to overcome the stereotypes to achieve success in higher education is the goal for Latina students (p. 76). During this workshop, O'Connell et al. (2021) discusses Latina women in STEAM classes as a need to increase their confidence, career advancement, and identity as exhibiting capable behavior in their academic programs (p. 80). Fortunately, students that experience academic success can accept the challenge to overcome the stereotypes experienced to enter a higher education program and have their voice heard in these classes (Solórzano & Yosso, 2002). Making these students' voices heard can ensure acceptance and success.

Sharing the vulnerabilities about how Justice Sotomayor was able to persevere through her law education classes was essential to the growth of the students and would be an impact that O'Connell et al. (2021) embraces to achieve success in school. Latina students desire to have the acknowledgement of the students in the classroom and, at the same time, the acknowledgement of families in the community. Anzaldua (1990) describes how Latina students can maintain dignity, hiding the wounds to achieve their education potential, and challenging themselves to continue the path of success while having a positive opinion of the personal growth necessary to better their future (p. 386).

Invisibility

The educational experiences of Latina students are riddled with struggles of invisibility and stereotypes on the journey to attain a degree in higher education. Hsieh (2007) asks the question, "what is invisibility?" Invisibility is defined as "social structures that make individuals voiceless and unseen" (p. 379). Invisibility is yet another issue that Latina students often confront in higher education. Mena and Vaccaro (2017) describe the concept of invisibility for Latina women as being present in a room but not being seen (p. 303). Invisibility can be a form of exclusion (Mena & Vaccaro, 2017). When invisible, students experience being "silenced and disempowered" (Hsieh, 2007, p. 380). Mena and Vaccaro (2017) describe the invisibility of experience as "subtle and overt discrimination in higher education" (p. 304). The path to success in higher education for Latina students can be riddled with challenges and the concept that Latina students are not seen or invisible, when they are in plain sight.

Invisibility affects the Latina student population because educational exposure may reveal an insecurity in their academics and personal attributes (Hsieh, 2007). Identifying the issues with invisibility can shed light on the quality of education for Latina students. Villenas

(2014) states, “Latinas who are marginalized in the larger part of society, undoubtedly run the risk of isolation and invisibility” (p. 215). Baca-Zinn, Cannon, Higginbotham, & Dill (1990) report that invisibility may cause Latina students to isolate themselves. However, when professors provide a sphere of safety in the classroom for the students to achieve success, Latina students become visible and heard (pp. 33-34).

Mena and Vaccaro (2017) describe how invisibility in higher education could affect Latina students in the areas of campus leadership, professional advancement, and community relations (p.303). Mena and Vaccaro (2017) also describe an environment to advance the intelligence of Latina students, to have the ability to resist the discrimination that may silence their voices by placing them into a situation where they feel powerful and valued (p. 302). Embracing the knowledge of the community where one lives and how to navigate the community is an asset for its citizens, especially Latina students, knowing one’s environment can be an asset for Latina students. When Latina students have a connection to their community, it creates an essential component to overcoming these barriers of invisibility (Hseih, 2007).

Menchaca et al. (2016) states how Latinas in education describe how they are treated in the classroom and this treatment makes them feel invisible in the academic setting (p. 97). Harris and Ordonia (1990) explain that when Latina students communicate with other women, especially other Latina students, they lift each other up and rise instead of feeling the differences that divide them (pp. 307-308). Providing a voice to the voiceless is the goal for professors in higher education, especially for the Latina students. Embracing the experiences from a Latina student’s life by remembering the past can be empowering for the students’ families. A portion of the 2020 “The Blessing” lyrics by Elevation Worship states:

“May His favor be upon you,

and a thousand generations,
And your family and your children
And their children, and their children.” (Jobe et al., 2020)

Latina students have an opportunity to provide a different life for their education and the education of future Latina scientists in the STEAM fields. Latina students can stand up for their educational future and construct a goal that has been paved by the community they are familiar with, their abuelas and mothers.

Voices that Guide

Recognizing and honoring the voices of ancestors of one’s culture can be instrumental to the generation of students eager to pursue higher education. Such ancestral voices have been part of the Latina culture. Escamill (1990) underscores the imagery of the heart of her ancestors that can be awe-inspiring for Latina students to overcome the obstacles on their life paths: “The light behind her tears were the raging monsoon storms thundering down sandy washing with the drumming of her heart” (pp. 135-136). This description portrays how difficult it can be for a Latina student (Calzada et al., 2021).

Indigenous women, such as Mayan women, like Latina abuelas (grandmothers), can adopt the symbol of corn that has gone through the process of crossbreeding, but the kernels are trying to cling to the cob to maintain their identity (Anzaldua, 1990, p. 380). These same Latina students can feel like a baker where, as Anzaldua (1990) states, they are kneaded into joining the culture of their education and maintaining their identity in the process.

Anzaldua (1990) describes the abuela’s garden and how the Latina student can reflectively look at the roses in their mother’s and abuela’s garden. The reflection about the roses in the garden of their mothers and abuela can serve as a symbolic narrative of success about

overcoming barriers to achieve the goal of completing an education program in college. As Latina students remember the struggles of growing roses in a garden, in any garden, as Anzaldua (1990) recalls how abuelas grow roses in tires and shoe boxes, Latina students could demonstrate that same persistence in forging through their educational journey (p. 388). Latina students can look at the roses in their abuela's garden, as every woman in every generation has grown roses, mothers and abuelas have forged through many adversarial struggles to grow these roses and Latina students should do the same in their educational journey (Anzaldua, 1990).

Escamill (1990) draws on her own experience of being seen as not "white enough" to support her arguments for Latina women's empowerment. Escamill goes on to say that Latina students often want to maintain their heritage but also want to be accepted by their "white" fellow students (p. 137). At times, standing alone, to achieve their education, can break the heart of a Latina student (Escamill, 1990, pp. 137-138). In other words, Latina women's path to education often represents heartache and mending its broken pieces together, while ultimately being rewarded like jewels in her eyes.

The experiences of Latina students can be better understood if their voices are being heard (Solórzano & Yosso, 2002). Murphy et al. (2018) discusses the personal challenges, such as a lack of confidence, lack of knowledge to complete the application, the scholarship process, or possible lack of support from their peers and family members that Latinas face by having a desire to attend a university or college. Menchaca et al. (2016) states that:

Latinas that have supportive mothers, relate stories about the strong influence of their mothers: Nothing was impossible for mother, whether it was making a dress or just being extraordinarily competent. My grandfather's desire to have an

education, there was never a question to get an education or achieve. Siempre fueron maestros. (p.103)

Anzaldua (1990) accurately describes how challenges affect the self-worth of the Latina student. Latina students need to have a positive opinion of themselves in the educational arena to demonstrate their ability to achieve their potential. When Latina students receive this acknowledgement from their families and community, their emotional attachments can become a feeling of support and empowerment (p. 386).

Solórzano and Yosso (2001a) encourages family members to notice this positive behavior of Latina students and recognize their talent for success (p. 477). Solórzano and Yosso go on to say that parents, abuelas, teachers, and aunts are important to the development of students, especially Latina students. Ramirez (2011) claims that motivation among Latina students begins with trust, or “confianza.” This trust among Latina students at school can increase their confidence to perform at exceeding levels in educational classes, to the point of completing an application for admission to a college program. Ocasio (2014) and Ramirez (2011) discusses the movie “Stand and Deliver” and how the need for higher education needs to be celebrated every day and the expectation for excellence needs to be present daily for all students.

In “Stand and Deliver,” the Los Angeles high school math teacher, Mr. Escalante doesn’t back down to students experiencing difficulties, but he develops a trustworthy relationship with his students. Mr. Escalante’s inspiration creates an opportunity to inspire the students to become a better version of themselves as a student and citizen. Teachers demonstrating high expectations for all students is providing a potential for Latina students to achieve their highest potential in higher education.

In analyzing “Stand and Deliver,” Ramirez (2011) claims that the AP exam the students took in the movie is similar to how the respondents in his study view the GRE as “hard,” “dehumanizing” and “intimidating” (p. 215). When Latina students are not prepared for the process to enter a college and/or university for higher education, these students can feel “lost and/or intimidated” (p. 210) by these processes. When educators and/or professors provide the methods in the classroom to allow Latina students to manage the process to enter the higher education realm, it can result in more positive results.

One of the most powerful voices in Latina culture is that of the abuela, which means “grandmother.” Abuela is a hard worker who commands respect from everyone around her. Strong abuela women represent a commanding voice in Latina culture. Gonzalez (2015) describes abuela as the tradition keeper, narrator of stories, and the cultural warrior in the life of the Latina student (p. 40). The narration from abuelas, typically but not always, takes place while cooking. Gonzalez (2015) emphasized the vital relationship with the daughters and granddaughters while cooking in the kitchen (p. 41). This narration builds connections through the generations of strong women in a family (Gonzalez, 2015, p. 41). A folktale of the Douglas spruce pine tree and the mouse is one of the depictions of such narration. When Latinas walk through the forest, the voice of the abuela can be heard in their minds and a remembrance of this folktale demonstrates the stories shared through the eyes of the abuela:

There was a little mouse. This mouse loved the forest. But the forest caught on fire and the mouse ran up a Douglas Spruce Pine tree. The Douglas Spruce Pine tree loved the mouse and she said that she would help the mouse. The mouse hid in the seed of the Douglas Spruce Pine tree. The Douglas Spruce Pine tree was so powerful that it was able to withstand the

heat of the fire and the little mouse survived the fire because she was allowed to hide in the seed. (Naturekids BC, 2000)

Figure 6

Douglas Spruce Pine Tree Seed



Note. This picture demonstrates what the spruce seed inside a pinecone resembles from the story from the folktale. The Latina could envision an abuela holding up a Douglas spruce pine tree seed in her hand and the seed that had the resemblance of a little mouse hiding in the seed. It doesn't matter how hot a forest fire will get; one can survive just like the little mouse in the Douglas spruce pine seed. To paraphrase this folktale, it does not matter how difficult it can be for Latina women to complete their education; they just have to believe in the power of a Douglas spruce tree seed (Gonzales, 2015). Such narratives can provide lessons for Latina students by giving them techniques to remember about their heritage and stand on the narration of their stories (Solórzano & Yosso, 2002).

For Latina women, having the opportunity to develop strong familial bonds, particularly with grandmothers, mothers, and aunts can provide the strength needed to accomplish goals that once would have been unattainable by sharing the sacrifices that were made by Latina elders to have a better life (Gonzalez, 2015, p. 52)

While Latina culture can be considered generally patriarchal, Latina women described their family as matriarchal, in which the abuela is the center of that family (Solórzano & Yosso, 2002). Commitment to informal and formal education from abuela and madres are at the heart of the message (Kayumova et al., 2015 as cited in Solórzano & Yosso, 2002). The voices of Latinas from the past and the present are the guiding light for women to pursue and attain their educational goals.

Conceptualizing the Experiences of Latina Women in Higher Education

Several theoretical perspectives inform this study in terms of conceptualizing Latina women's experiences in higher education: cultural capital, and feminist cultural studies, specifically. Harding et al. (2015) defines cultural capital as a "set of preferences and behaviors" that could be considered to better another individual (p. 66). Kayumova et al. (2015) refers to feminist cultural studies as ways of knowing and historically having cultural bodies of knowledge that are essential to the function and well-being among Latina women (p. 262). The aforementioned perspectives allow for a better understanding of the lives of Latina women pursuing STEAM fields in higher education.

Cultural Capital

Cultural capital is defined by Harding et al. (2015) as the set of "preferences and behaviors" to receive validation by members in society that have the power to uplift its members (p. 66). Cultural Capital can also be defined as the knowledge that is shared by family members and committee members that will display the development of the members of the family (Bourdieu & Passeron, 1970, as cited in Hinton, 2015, p. 303). In terms of cultural capital, Yosso

(2005) describes culture in how society is organized. Cultural capital can have a positive legacy where challenges can be overcome, or it can lead to a legacy of racial relations that can be negative to a Latina student.

Identifying the assets of cultural capital for Latina women can be instrumental to their success in higher education. It can also assist teachers in understanding the needs of Latina students and developing strategies to propel their academic success particularly in STEAM programs. Gonzalez (2015) identifies linguistic skills as one of the assets of cultural capital for Latina students. In other words, Latina students can comfortably embrace this cultural asset to share their cultural and linguistic skills in the classroom and beyond. Anzaldua (1990) described how “insecurity and indecisiveness” can cause emotional issues in the educational arena. Latina students can succeed academically by honoring their cultural heritage and maintaining their cultural identity.

To reiterate Bernal et al. (2008), for Latina women, knowing how to navigate the educational system and apply their cultural capital can enhance their opportunities for success in education and professional careers. Yosso (2005) states that Latinas have been marginalized to the point that they are forced to be silent about their heritage (p. 76). Latina students can often feel “cultureless.” Anzaldua (1990) describes the difficulty of maintaining the identity of a Latina student by “looking at the forces that placing her history through a sieve and winnowing out the lies” for her to obtain her identity in this educational journey (p. 386).

Luna and Martinez (2013) underscore the importance of cultural capital regarding to building and strengthening the relationships between Latina students and their instructors in K-12 and higher education. Finally, Hinton (2015) points to the fact that K-12 Latina students may have difficulty managing their cultural capital as they continue on the path to higher education.

Feminist Cultural Studies

Feminist cultural studies have emerged out of roles that emerge from the daughters of Latina mothers (Kayumova et al., 2015, p. 261). Kayumova et al (2015) defines feminist culture studies as the “ways of knowing” through the mother/daughter interactions regarding cultural, political, and linguistic educational experiences through a process to empower one another (p. 261). Kayumova et al. (2015) challenges Latina students to honor the desires from their female ancestors by gaining spaces for their educational and other social experiences that include celebrating their culture (p. 273). Creating a space for Latina students’ education that were created by their mothers was based on the injustices that were experienced and needed to be addressed to overcome any inequalities that would hinder their children’s education (Velazquez, 2017, p. 510).

Yosso’s (2013) framework is particularly important to outline the discourse of feminist cultural studies and lists the five tenets specifically for Latina studies. Yosso (2013) expresses these five tenets and the importance of each tenet to overcome the obstacles that are presented for Latina students (p. 7).

1. The Intercentricity of Race and Racism - Anzaldua (1990) challenges the reader to remember that “we come from all colors, all classes, all races and all time periods” and we need to connect to one another to achieve our educational goals (p. 383).
2. The Challenge to Dominant Ideology - Anzaldua (1990) states the importance of maintaining the level of education of women in a world where male dominance is a constant battle. The level of superiority among men is meant to demonstrate how they are culturally favored, and women need to rise above this struggle to achieve the ultimate goal of education. Latina students can feel “cultureless” as the author (Anzaldua, 1990)

describes how these students could be feminists but stuck in a culture with male domination that can make them feel powerless (p. 380).

3. The Commitment to Social Justice - Sandoval (1990, p. 67) impresses on the need to ensure there is a “positive perception of difference and not a divisiveness” among Latina students. Responding to racism in a personal way can provide power to demonstrate the need to stand up and be seen, instead of staying invisible in plain sight.
4. The Centrality of Experiential Knowledge - Mason & Chik (2020) suggests that participants provide pictorial representations to describe the timeline of their path of success in their fields. These life experiences could provide a history of strategies that could be employed in a study about the Latina students’ journey through a STEM/STEAM program (p. 1033).
5. The Interdisciplinary Perspective - Anzaldúa (1990) describes this perspective of Latina students as feeling like a baker where the student is like bread and are kneaded into joining the culture of their education and maintaining their identity in the process (p. 380).

The aforementioned Feminist Cultural Studies underscore the relevance of culture to Latina women’s experiences pursuing higher education while, simultaneously, raising the family on their own (Solórzano & Yosso, 2002). Latina women often confront the challenges of experiencing a sense of personal failure when pursuing education and professional careers.

Villenas’ (2014, p. 207) work adds considerably to feminist cultural studies. Villenas focused on how the four aspects grounded in Feminist Cultural Studies have revealed the stories of women and describe their struggle to become relevant in a culture that has not acknowledged the strength that most women have while raising a family on their own, and while earning a

higher education degree (Solórzano & Yosso, 2002). Latina women have a constant battle to re-frame their view of failure, education, and learning from all the perspectives of their history to the experiences of overcoming obstacles that block their path to success.

Bernal et al. (2008) shares four themes which reveal the premise of the feminist cultural studies ideals (p. 29), and these four themes can be enveloped into the lives of Latina students.

What are the four themes saying to the Latina student?

1. Negotiate sense of belonging - Belonging in the family, the community, and the classroom are important aspects to feel included as a student, female community member and family member. Trying to meet the needs of everyone including themselves is a difficult task (p. 29).
2. Affirming cultural experiences and identity - Latina students struggle with their identity in the family, especially when there are instances where the Latina student could be excluded from the community for wanting to expand on their education and strengthen their identity as a Latina student.
3. Teaching and learning citizen formation beyond the classroom - Smith (1990) emphasized the importance for all Latina students to express how racism affects their ability to learn and build a career for their future (p.26).
4. Connecting the educational sphere to citizenship struggle - developing partnerships between Latina students and professional scientists in their area of expertise is the goal to connect in this “educational sphere” (p.32).

Latina students have a remarkable opportunity to overcome and fulfill these listed tenets by Villenas. Utilizing these four themes can allow the Latina student to attain and deliver knowledge to her community to overcome more barriers that resist the ability to gain knowledge.

The experiences of many Latina women in higher education echo the tenets of cultural capital and cultural feminist studies (Kayumova et al., 2015; Bernal et al, 2008). In particular, Yosso's (2009) and Villenas' (2014) frameworks informs this study's research purposes, questions, data collection and analysis strategies that will be further addressed in chapter three.

Summary of Literature Review

Latina students have continued to struggle in the areas of higher education and STEAM fields (Bernal et al., 2008). Latina students' voices are often silenced in educational settings (Anzaldúa, 1990). Regardless of many obstacles they can confront on the way, Latina women have both passion and determination to pursue higher education, specifically in the STEAM fields (Copeland et al., 2018).

Invisibility and stereotypes are among the most common experiences that Latina students and women in particular have on their path to education (Hsieh, 2007). Staying attuned with their generational cultural voices can be both inspirational and effective for Latina women in their pursuit of higher education (Ocasio, 2014). In this regard, the abuela narratives are particularly compelling (Escamill, 1990). The voices that guide the Latina students' generation with the strong women that have paved the way to give strength and determination to reach their potential is the goal that Anzaldúa (1990) and Munter-Orabona (1990) describes with the narratives of other successful Latina women professionals in their field.

Accepting and honoring one's cultural identity is yet another empowering tool for Latina women in pursuit of higher education (Escamill, 1990). For instance, "insecurity and indecisiveness" can be overcome by the empowering view of oneself as a legitimate and equal voice in the educational discourse and beyond (Bernal et al., 2008).

Finally, cultural capital and cultural feminist studies are instrumental in framing the discourse on this study in that finding the determination through the narratives of other successful women written about from researchers such as Anzaldua (1990), Kayumova (2015), Solórzano (2001), and Yosso (2005) provides the reasoning to continue to find strategies to create an educational space for Latina students to guide them to their potential.

CHAPTER THREE: METHODOLOGY

As a Latina and a scientist, I felt compelled to convey the stories of success of Latina students pursuing higher education in STEAM. As stated in chapter one, the importance of narrative studies pertaining to Latinas in the field of STEAM can hardly be overestimated (e.g., Solorzano & Yosso, 2002; Villenas, 2014). Narrative is indispensable when it comes to relating to the individual lived experiences of the participants (Brinkmann & Kvale, 2015, p. 128). The purpose of this narrative study was to understand the experiences of successful Latina students attaining higher education in Science, Technology, Engineering, Art, and Mathematics (STEAM) and the challenges they have overcome along the path. The following research questions guided this study:

- How do Latina women narrate their stories of perseverance in gaining higher education in STEAM?
- How do these women experience “invisibility” and stereotypes, if at all, when overcoming barriers on the path to success?
- What is the relevance, if any, of cultural capital to these women’s success?

Theoretical Lens

Cultural Capital (Harding et al., 2015) and Feminist Cultural Studies (Yosso, 2013; Kayumova et al., 2015, as cited in Delgado-Gaitan, 2005; Espinoza-Herold, 2007) provided the theoretical lens through which this study can be conceptualized in terms of informing its research goals, research questions, data collection instrument, and data analysis procedures. In particular, the participants’ experiences can be analyzed and interpreted as the narratives ancestral or communal shared knowledge and empowerment (Bourdieu & Passeron, 1970, as cited in Hinton,

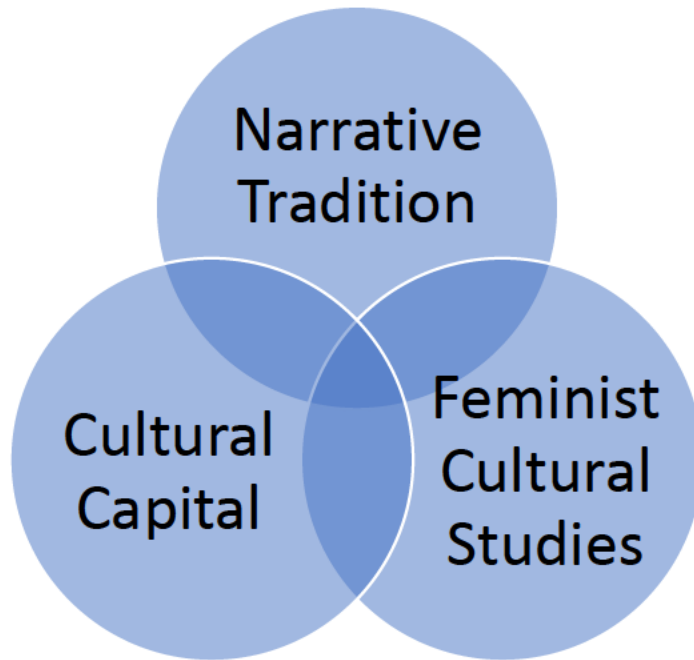
2015). On the other hand, the same experiences can be analyzed and interpreted as the stories of personal struggles, overcoming a variety of barriers to success, and raising consciousness of generations of Latina women to come (Kayumova et al., 2015, Villenas & Prieto, 2012; Yosso, 2013). The Latina advocates encourage the philosophies of Latina feminists to share their stories and testimonies for culturally relevant practices for future generations (Villenas & Prieto, 2012, as cited in Jackson, 2010; Ochoa, 2007; Prieto, 2009, p. 414). From a methodological standpoint, narrative tradition specifically allows for conveying powerful stories of perseverance of Latina women in STEAM.

Figure 7 below demonstrates the lens through which I examined the experiences of the participants. It integrates narrative tradition, cultural capital, and feminist cultural studies, which in turn, informed this study's purpose, research questions, and interviews.

Kayumova et al (2015) defined feminist culture studies as the “ways of knowing” through the mothers’/daughters’ interactions regarding cultural, political, and linguistic educational experiences through a process to empower one another (p. 261). Cultural Capital can also be defined as the knowledge that is shared by family members and committee members that will display the development by the members of the family (Bourdieu & Passeron, 1970, as cited in Hinton, 2015, p. 303). Hallqvist & Hyden (2013) state that “narration as a practice through which people negotiate meaning and make claims about their life history” would be an acceptable method to gather the type of information from participants in a study (p. 1).

Figure 7

Theoretical Lens: Integrating Narrative Tradition, Cultural Capital, and Feminist Cultural Studies



Saldaña (2021) points to the complexity of differentiating the barriers that are faced by Latina students in the STEAM field. Ensuring the representation of the voices of the Latina STEAM students are clearly heard in the narratives while the struggles are shared in their stories. The Venn Diagram represents the theoretical lens of the study (pp. 167-168).

Narrative as Tradition and Research Design

Saldaña (2015, p. 170) claims how narrative inquiry can reveal the life lessons of the research participants and their paths when we document their journey by telling their story. Saldaña urges researchers to “think narratively” when studying participants’ lived experiences. Exploring the narratives of Latina women pursuing STEAM professions can highlight the depth

and nuances of their experiences. Therefore, I attempted to think narratively throughout this study.

The need to tell the stories of the important figures in the lives of the participants in a narrative inquiry would be the reason for a narrative inquiry methodology. The historical information from the Latina participants would require a historical documentation of their journey through higher education and how the students have overcome these barriers through the interviews to hear their stories. This history of the narrative can be used in a variety of ways; however, the method of storytelling makes a connection to the voice of the participant and researcher. Riessman (2008, p.3) states that the story of the participant is similar to the “essential ingredients” of a recipe for success in storytelling. As a researcher, I benefited from the practice of listening to the participants and being a storyteller of the story (Riessman, 2008).

Saldaña (2015) suggested that the use of a narrative inquiry is a methodology that has much to offer regarding the representation of the individuals. The methodology of thinking with a narrative mind has many benefits for the researchers. Clandinin and Connelly (2000) encouraged researchers to utilize the three-dimensional space for telling the stories of the participants from the personal and social spaces (p. 70). The narrative method requires the researchers to be engaged in listening to be a storyteller for the participants.

I employed Clandinin and Connelly’s (2000) 3-D design to analyze the data. This design provided inquiry space that can be represented as personal/social interactions; past, present, and future resembling the continuity of the space; and the situation or the combined space for participants to tell their story (p.2). Expressing the needs of individuals is the center of narrative inquiries. The 3-D narrative inquiry shares the journey of the participants that focuses on their interaction with others on a personal and social level with their environment. As the participants

gain an understanding about their past experiences and how it has molded their desire to become the person they are in the present, their narrative could be expressed how this journey leads to their present space.

Site and Participants

The criteria for selection of the participants included the following: (a) that they are Latina; (b) that they have completed college degrees by the time of the interviews; and (c) that they were employed within the STEAM field. I turned to social media outlets (LinkedIn, Twitter, Instagram, and Facebook) and my personal contacts to recruit the participants. To diversify the group of participants, I employed variation sampling (Miles et al., 2020) that allowed me to recruit representatives that comprise all STEAM fields: science, technology, engineering, art, and mathematics. The recruitment process started in the home state and expanded, due to a small initial pool, to regional states. Ultimately, seven Latina women agreed to participate in this study. They were representatives of several Latin American countries including Brazil, Ecuador, El Salvador, and Mexico.

Sources of Data and Data Collection Strategies

There are several data collection strategies that I considered for this study: semi-structured interviews, researcher self-reflective notes, documents, artifacts, and visual materials.

Interviews

Semi-structured interviews provided main data for analysis. Brinkmann and Kvale (2015) state that the interview process can uncover the experiences that have taken place for the

participants, giving the opportunity for their point of view to be expressed (p. 3). Miles et al. (2020) suggests that while collecting data through interviews from participants, it is recommended to use a data accounting log from each participant (p. 120). These logs can be used to document the dates of the interview, especially if there are more than one interview that takes place for any of the participants.

An interview guide (Appendix C) was developed to conduct interviews with participants. The interview questions for this study are centered on their educational history, influences of their abuela (grandmother) and madre (mother), and barriers experienced in their educational and professional journey to the STEAM/STEM field. A consent form (Appendix B) was presented to the participants prior to the interview date. I conducted interviews via zoom. Interviews were transcribed verbatim and sent to the participants for verification of accuracy. All participants responded and confirmed the accuracy of the transcripts.

The journey to the STEAM field for the Latina women would need a climate to tell their story in a manner to create strategies for success for other Latina women. The participants in the narrative method would focus on Latina students in higher education in the STEAM fields. The stories from the journey could reveal the personal narratives described in the book written by Riessman. The past experiences to achieve the goals to become STEAM scientists will be vital information for the educational future of Latina students. The interviews were as follows:

Researcher's Field and Self-reflective Notes

Throughout the study, I have been keeping the journal of my observational and self-reflective notes. The researcher's notes are a vital piece of information for data analysis and a way that the data is collected and expressed from the experiences of the interviewee (Clandinin

& Connelly, 2000, p. 97). The journal of my notes included several memos taken after each interview and it also served as one of the criteria for validation for research findings. It allowed for my interpersonal conversations with the participants. Telling their stories in a manner that reflected the experiences of the interview participants is significant for the researcher to conduct this story with validity (Clandinin & Connelly, 2000, p. 195-196).

Documents, Artifacts, and Visual Materials

Using visual materials and artifacts can shed additional light on the experience of the participants. The use of visual materials can bring a point of view to the narrative that will share the story of the interviewee (Saldaña, 2021, p. 74). Clandinin and Connelly (2000) assert that using visual materials can take that one image or the moment in time and share a lifetime of memories from the viewpoint of the interviewee in the study (p. 84). The documents, artifacts, and visual materials that I collected for this study included the copies of the participants' diplomas and certificates testifying to their academic accomplishments, personal artifacts, and images about cultural traditions that the participants shared with me.

Data Analysis

Qualitative data analysis represents a complex and iterative process of coding that typically integrates various sources of data (Miles et al., 2020). Data analysis in this study included the analysis of the interview transcripts and supportive sources of data. I followed Miles, Huberman, and Saldaña's (2020) recommendations for coding, which consisted of data organization and several cycle of coding. I relied on Clandinin and Connelly's (2000) 3D approach, research questions, and theoretical framework as approaches to coding. Clandinin and

Connelly (2000) emphasized the need to work within the three-dimensional space to tell the stories of the participants (p. 70). Clandinin and Connelly's (2000) dimensions of "interactions" (personal and social); "continuity" (past, present, future); and "situation" (place) (cited in Creswell, 2012, p. 511) allowed me to identify several emergent categories, which further evolved into the main themes (see chapter four).

Narrative coding (Saldaña, 2021) resulted in the description of the elements of the participants' stories and re-storying a bigger picture of their life experiences and a variety of epiphanies that have brought them to become what they are, that is, successful Latina students and professionals.

Further, Saldaña (2021) refers to the following pattern characteristics of coding: similarity, differences, frequency, correspondence, and causation (p. 10). Coding the patterns of similarities from the participants displayed the events that have led them to a profession in the science or STEAM field. Additionally, differences and patterns emerging from the interview transcripts reflected unique pathways to success by the participants. All in all, several cycles and approaches to coding allowed me to identify the main themes that comprised the content of the thematic analysis in chapter four.

Validation Criteria and Ethical Considerations

The validation criteria for this study include the following: trustworthiness, reflexivity, rich and thick descriptions, and member checks. Trustworthiness among participants and researchers are vital in any study. Miles et al. (2020) underscores the importance of honesty and trust among the researcher and the participants. Throughout the study, my goal was to maintain

trustworthy relationships with my participants. I continuously adhered to the code of ethics to ensure the privacy, confidentiality, and anonymity of the participants.

Reflexivity allowed me to examine my own assumptions and potential biases when analyzing the data. Creswell and Guetterman (2019) describe the role of the researchers as an individual that is reflexive or having the ability to reflect on the bias, values, and assumptions throughout the study (p. 18). As mentioned earlier, I kept a journal of memos and my self-reflections throughout the process of data analysis, thus enacting reflexivity. The personal experiences of the researcher with the study should be tempered and controlled, having an unbiased approach to the collection of data throughout study and will strengthen the report among the researchers and participants.

Further, rich and thick descriptions (Creswell, 2013) allowed me to re-story the participants' narratives in great depth and detail by weaving the connections between the events and happenings in the lived experiences of the participants. Member check (Creswell, 2013) provided me with the opportunities to solicit participants' views on the accuracy of the interpretations of their lived experiences. The participants confirmed the accuracy of the transcripts, and they had access to the data analysis process.

Finally, prior to data analysis, I obtained the permission from the institutional IRB, and I abided by all standards of ethics to conduct research with human subjects.

CHAPTER FOUR: DATA ANALYSIS

*“Circumstances determine your past,
the present is embracing you,
and only you can define your future.”*
(Tabaka, 2016)

This chapter focuses on the analysis of experiences of successful Latina women in various fields of STEAM. Their first-hand accounts reveal long and winding roads of overcoming many barriers and persevering toward their professional goals and personal accomplishments. There are also the stories of confronting the stigma of invisibility and stereotypes often attributed to Latina women in STEAM fields. The participants of this study also candidly shared what they have achieved from being part of their cultural heritage. First, these are the participants of the narrative study.

Participant Introduction

The participants of this study represent a group of seven women employed in various areas of STEAM with higher education degrees. Table 1 below presents the general demographic information about the participants.

Participant Pseudonym	Age Range	Level of Education	STEAM Field	Country of Origin
Pamela	50s	BS, MS, Ph.D.	Engineering and Math	Mexico
Laura	30s	BS	Science	Mexico
Florence	30s	BS, MS, Ph.D.	Science	Brazil
Theresa	30s	BS	Technology	Brazil
Henrietta	30s	BS, MS	Law and Science	Brazil
Abby	30s	BA	Art	Ecuador
Sarah	30s	BS, MS, (earning Ph.D. & MD)	Science and Math	El Salvador

Table 1
Participants' Demographic Information

Pamela

Pamela is a Latina woman in her 50s and has advanced degrees in Engineering, Mathematics, and Education, including a Doctor of Philosophy in Curriculum and Instruction, a Bachelor of Science in Mechanical Engineering, and a research focus on Critical Mathematics Pedagogy. Pamela is a highly regarded Latina scientist who teaches at a college in the Midwest with a strong knowledge of science and mathematics. She excels in both Spanish and English communication and can make complex concepts understandable for her students. She is an engaging teacher with a passion for her subjects that shines through her teaching style. She is the sixth of seven siblings and lived with most of them, except for a younger sister and three others, during her childhood. Due to the divorce of her parents, when she was a young girl, her mother had to work to provide for the family. Pamela's mother moved the family to a middle-class

neighborhood, likely with the intention of improving their quality of life with access to better schools, safer neighborhoods, and increased economic opportunities. Moving to a neighborhood with a higher median income may also have been a way for her to provide a more stable home life for Pamela and her siblings.

Pamela was also raised by her grandmother as a child, who instilled in her the values of love and hard work. While Pamela's grandmother only spoke Spanish, her mother was bilingual, speaking both Spanish and English. Pamela's grandmother gave unconditional love as she raised Pamela and her siblings and supported them as much as she could when Pamela's mother had to work for the family's needs. Out of seven children in the family, Pamela was the only child who was striving to achieve academically in school. In Pamela's words, she was a "hodgepodge" in the family because her siblings chose a different path. For instance, one of the siblings became a high school dropout in order to raise her child, which caused distress to their mother. Pamela understood the significance of fulfilling her potential and did not want to cause worry for her mother.

During high school and college, Pamela developed a strong determination to excel academically. It was interesting to find out that, on occasion, Pamela would question her teachers who did not include her in many classes that were offered to other students with the same grades. There was an instance when she wanted to be in a higher Advanced Placement History class and she proved to the teacher that her classmates admitted into this class had the same grades as she had, thus making her eligible to be in the class she desired. Pamela's hard work led to her acceptance in advanced placement (AP) classes, where she performed exceptionally well. Pamela was excluded from the one AP class, but she became an advocate for her own academic path and this incident never repeated.

After graduation from college, she was able to gain her first assignment as a teacher in an alternative high school and this is where Pamela's passion thrived for students that needed additional assistance to graduate from high school. An alternative high school is a school where students that are having issues with education and behavior have the space made available to them for their success in a safe environment to thrive and grow into their potential. Eventually, Pamela gained employment as a college professor and continued to be an advocate for her students. Pamela continues her work with college students in the areas of mathematics, education, social justice education, and critical mathematics pedagogy. When commenting on her persistence, Pamela said:

I just refused to give up and refused to be that next statistic. I was like come hell or high water; I was going to succeed.

Pamela's resilience and persistence to succeed is an empowering story that was shared by other participants. The ability to share her story is an honor to give a voice to other Latina scientists in the future.

Laura

Laura is a scientist in her 30s who earned her Bachelor of Science in Biology and is currently employed by an Urban Nature Center in the Metropolitan area of the Midwest. Laura is from Mexico and has four siblings. Her parents have supported her pursuit of higher education and she and her siblings are the first in their family to attend college. As first-generation Latinos, English was a challenge for them, but they have mastered it along with keeping up with their Spanish-speaking skills. The family only spoke Spanish at home and learning English consisted of watching cartoons on Public Broadcast Service (PBS), like Barney (he was the talking dinosaur from a popular children's program to help with English speaking skills on PBS) and

other PBS shows to strengthen her English skills. Her parents always had to work several jobs to provide for the family and there were some guilty feelings about her mother for not always being present for her children at home. Laura's extended family is large with many cousins who lived in the area creating a family community. This family community provided a sense of security and comfort for all the cousins as they enjoyed their time together.

For Laura, being educated meant making a difference not only in the Spanish community, but for providing educational opportunities to all members of a community, regardless of their background, so that everyone has a chance to reach their full potential. Her father did not finish school because he had to work. He wanted better educational opportunities for his children. Laura struggled academically in school, but she was able to persevere by developing strategies to include a daily schedule and asking for help when she need it. She found this organizational practice rewarding and made progress in her studies to stay motivated. She was responsible for her own learning and was proactive in seeking out resources when she needed it. Laura had a positive mindset and needed positive reinforcement from her teachers and peers. She was able to stay focused and determined to reach her goals.

Mentors played an important role in Laura's education in high school and college in terms of her academic success. One of the challenges for Laura was not being able to understand the process of education. In school, she often felt out of place:

Being first generation Latinos in the United States was challenging. We had to learn to speak both languages. You really do not know, there is no one that has done things like that before and I did not really have any role models.

Her mentors were able to provide her with guidance and support on how to navigate the educational system and understand the expectations of the teachers and professors. After graduating from college, she obtained employment at the urban nature center, which was her

dream job in that she could apply her degree with a passion to help animals. While she did not have role models when she was younger, she is now a mentor and role model for co-workers. Laura considers it her mission to be a mentor, role model, and advocate for future female scientist who may look like her. She provides support and guidance to those who need it and is passionate about helping to diversify the field. She encourages her co-workers to take risks and never be afraid to pursue their goals. Laura is proud to be a female role model in the science field and is determined to keep fighting in order to make sure that the STEAM field becomes more inclusive and diverse.

Florence

Florence is a science professor in her 30s from Brazil, teaching at a university in the Midwest. She speaks Spanish and Portuguese and was born and raised in Brazil as the eldest of three sisters. She holds a Ph.D. in Biology and specializes in ecology and conservation research. She feels she did not grow up with a Latinx identity but when she came to the United States, she realized the potential of supporting fellow Latinx scientists. She is now embracing her Latinx identity and is passionate about uplifting her culture and community. She is involved in organizations that support Latinx scientist and is actively working to increase the presence of Latinx scientists in the STEAM field. Florence supports and endorses supporting other Latina women, especially in the sciences because it is important to guide women to reach their potential in the science professions such as STEAM.

Florence's grandmother, or Abuela in Spanish, was a force of nature and the main contributor to her support. Her abuela was a single mother with five children. She instilled in her children and grandchildren the importance of hard work, determination, and dedication to achieve her goals. Her abuela also taught them the importance of family, faith, and respect for

others. The most important lesson her abuela taught her was to never give up and to always strive for the best. Education was also valued in her family as it was a way to escape poverty in Brazil. Florence felt that one of the sources of strength for her was the Catholic heritage instilled on her as a young girl. Religion was a vital piece of the puzzle that provided confidence that their struggles would allow for growth in their future.

Florence's mother was the only sibling that attended college and she became a dentist, but her father did not complete high school. Her mother and father both instilled in her a strong work ethic and the importance of education. They encouraged her to pursue her dreams, this helped her to develop her academic and professional goals. Florence was motivated to pursue her educational dreams by her family's encouragement and the inspiration of a few teachers in Brazil who believed in her potential. She was determined to make the most of her education and use it to make a positive difference in the world. Florence strived to take advantage of every opportunity that came her way, no matter how difficult it may have been. She knew that with hard work and dedication, she could succeed in her dreams.

Florence's teachers supported her passion for science, especially with all the wildlife that was around her in Brazil. The biodiversity of the area with the plants and how the animals lived in those habitats created a love for ecology and the need to save their environment.

Florence had extraordinary role models in her life that inspired her goal and achievements throughout her educational career. This is what she said:

I wanted to be a scientist. I would say my role models were teachers in high school.

Florence shared how these teachers were able to demonstrate their belief that she had chosen the right path to success by supporting her dreams in science. The teachers demonstrated their support for Florence by actively engaging her in her scientific pursuits. They encouraged

her to participated in her science classes and provided her guidance with her education and career paths. These teachers provided her with emotional support and encouragement, which helped her to stay motivated and committed to her dreams. Through their support and guidance, they showed Florence that she could achieve goals and helped her to realize her potential. Her students are gaining experience from her abilities to overcome barriers that have created a successful environment.

Theresa

Theresa is a scientist from Brazil in her 30s who combined her passions for technology and the arts by obtaining a degree in Computer Science and Digital Arts. She believes in the interconnectedness of art and technology and how they can both be used to create both beauty and usefulness. Theresa moved to the United States as a child and attended school from elementary school to college. After graduation, Theresa pursued her dreams and was able to take advantage of the opportunities in the tech industry. She worked in various roles as a software engineer, designer, and project manager. Theresa's passion is about using technology and art to better the lives of people and the environment.

Theresa's mother worked hard to provide for her children and to keep them safe from the trauma she had witnessed. She put her children in a better position than she had been in, and this was her mission in life. She was determined to give them the best life possible, despite the limited resources at her disposal. She worked long hours and saved any money she could so her children could be provided with better opportunities than she had experienced. Theresa's mother was a source of strength and courage in her children's lives. Although she had witnessed a great deal of trauma, she refused to allow it to shape her children's future. She was determined to create a better life for them, no matter what it took. She taught them the value of hard work,

perseverance, and resilience, and instilled in them the belief that they could achieve anything they set their minds to. Theresa's mother was an inspiration and a role model for her children. She showed them that it is possible to overcome great adversity and create a better life for oneself. Her strength and determination provided the foundation for Theresa's success and inspired her to become the woman she is today.

Theresa is an advocate for children and believes that no child should have to experience the pain and suffering that she did as a child. She is passionate about providing a safe and secure environment for children to grow and develop. To achieve her dream, Theresa worked as an Au Pair for a few years to save up enough money to attend the school of her choice. Having the opportunity to have strong ties with her mother allowed Theresa to be resilient in her quest to become a graphic designer and tell her story about her journey to success in this area. This is what she said when commenting about her story:

Because of my story, where I came from, I fought for everything. It did not just come to me, I had to pursue it.

Theresa was inspired by her mother's resilience in attending school as a young, single mother. Theresa's desire to achieve success in school was motivated by her dreams to work in technology and art, using her graphic skills, even as a young girl. Her mother purchased a computer when Theresa was a teenager, and this is where her dreams were becoming a reality. Theresa began to blog and make designs in schools for her books and holiday cards. Theresa realized that a career in graphic design was a reality and while in college, she began to mentor other girls to realize their goals for a future in the STEAM fields. The future for Theresa looked bright as she has attained a position in a city government designing the logos for all the departments and using her creativity to develop a mission statement for each department.

Henrietta

Henrietta is a young scientist in her 30s from Brazil, born into a large family as a triplet. She and her siblings are fluent in Spanish, Portuguese, and English. One of her siblings, who was adopted, has special needs and Henrietta is an advocate for her sister. Due to her large family, they struggled financially but education was important for their future. The family would also interject their cultural heritage during their discussions about education, they felt that their heritage was as important as going to school. Henrietta attended public elementary schools in Brazil because they were free. As she entered high school, she needed to attend a private school but due to the cost of the private schools, her family sacrificed to make attending the private school a possibility. She worked hard to excel in her studies, which allowed her to continue her education.

Henrietta's grandparents were advocates of their education and during the financial struggles that were experienced by her family, they lived with her grandparents. Her paternal aunt was an inspiration to Henrietta because she was a doctor in microbiology. Her aunt was intelligent and successful, so Henrietta relied on her expertise to help her while she was on her path to fulfilling a career in science. Her aunt was a great source of support and inspiration for Henrietta, and her words of wisdom and encouragement were invaluable in helping her stay focused and motivated on her goals.

Henrietta was inspired by some of her teachers while in school. They recognized her talent for writing and science, and they encouraged her to continue with her studies. Having these mentors in her life was a necessity to achieve her goals. When commenting on her journey, Henrietta said:

This adventure makes me think that I have accomplished things that I never expected that I would accomplish.

Henrietta reflected on her journey to the United States from Brazil and was overcome with gratitude that anything is possible when you have a resilient heart to accomplish goals. The future for Henrietta revolves around being a mentor to other Latina women in the STEAM field and encouraging them to reach for their goals, even if they seem difficult. She aspires to help to provide resources to other Latina women so they can pursue their dreams in a safe and supportive environment.

Abby

Abby is a scientist and artist in her 30s from Ecuador who holds a degree in Biology and Art. She is fluent in Spanish and English and grew up in a single-child household with a large extended family of cousins, providing comfort to her mother as she went to work. Abby's mother had a sense of security knowing that her daughter would always be taken care of by a large extended family. Additionally, it ensured that her daughter would not suffer from loneliness, as she would always have her cousins to play and spend time with. Childcare was never an option as all the cousins stayed at her abuela's home while the parents worked.

Abby's Abuela was the person who supported her passion for animals and taught her how drawing them could lead to the profession that she has today. Abby's grandmother worked in a factory until she was able to become a teacher and a member of the school board in a large metropolitan city in the Midwest. Abby went to an elementary school and flourished under the encouragement of her mother and Abuela. Having the support of her mother and abuela (grandmother) gave her the strength and motivation to pursue her dreams. Their encouragement showed her that anything is possible with determination and hard work. Education was not only

supported but highly encouraged in order for them to be successful in their chosen professions. The support from her mother and abuela allowed Abby to do well in high school and she eventually went to college majoring in science and art. Abby worked through school and obtained internships to gain experience with animals and using her art skills to allow her to be highlighted for her talent. Abby commented on her motivation by saying:

I continue to push myself with every piece of artwork. I want to continue to grow as an artist and businesswomen.

Abby persevered in school and in her profession because it was a difficult path, but her desire to grow as an artist and businesswomen has been the motivation to succeed in STEAM fields. Despite facing challenges and feeling inadequate as a young girl, she discovered her passion for writing and drawing as a means of self-expression and finding her own path. Through persistence and hard work, she was able to overcome these limitations and pursue her dreams of becoming both a scientist and an artist. Her determination led to her success in both fields, with her scientific work being published and her artwork being shared through digital platforms.

Sarah

Sarah is a Latina student studying veterinary medicine and working towards her medical degree at a university in a large city in the Midwest. She is in her 30s and fluent in French, Spanish, Portuguese, and English. She was born in El Salvador and has a close connection to her family, including her parents, two sisters, and brother, who still reside there. Growing up, Sarah lived in France while her father and mother pursued their medical degrees in cardiology and physical medicine and rehabilitation, respectively. Education was highly valued in her family as it was seen as a means of achieving financial stability and success. This emphasis on education

played a significant role in shaping Sarah's own educational and career aspirations. Discussions about the future of medicine were common topics at the dinner table and it was an expectation to attend a school in higher education beyond high school. While education was at the heart of their future, religion was equally important in their Catholic faith. Sarah's family is the heart of her support, and she considers them to be the focal point of her community. Her grandfather was the person that supported her passion to become a veterinary doctor. Her father saw this support from his father, and her grandfather became an advocate for Sarah's path to conserving the environment for the animals in their habitats.

Sarah felt that it was important to share her narrative to increase the visibility of Latinas and STEAM along with the successful paths associated with the journey. Sarah's journey to veterinary medicine flourished due to the biodiversity that was found in El Salvador. Her passion for animals and their ecological health superseded the medical needs of humans. When she secured a job at the nature museum, she blossomed into a scientist with a passion for ecology, biology, and conservation. Along with her veterinary degree, she also became interested in biostatistics to assist in her quest to conserve nature in El Salvador. Sarah has seen the benefits and hardships of being a Latina scientist, but she feels that embracing her culture, along with a passion for animals in nature is the confidence that is needed in the community. Sarah felt that her persistence was needed to succeed in science and there wasn't anything that can stop Latinas when there is solidarity within the culture. This is how Sarah explained it:

I feel like there aren't a lot of studies with Latinos and minorities emphasizing women and STEAM majors. I wanted to be able to participate and to be part of a STEAM profession. I was always very resilient and persistent.

Sarah was aware of the academic requirements for success in STEAM fields, so her persistence was a motivation in her quest on her journey. Along with her academic studies, Sarah

also works or volunteers for local nature museums to enhance her skills in conservation ecology. Sarah also receives mentorship from her college professors; however, the women professors are the people that inspire her the most because she relates to the struggles they had to endure to secure their positions. Sarah's future is filled with aspirations to become a veterinarian and continue to work with conservation ecology.

The honor of hearing the stories from the participants about their successful journeys to the STEAM fields is inspiring. The courage and ability to withstand the pressure to become the young, empowering women in these fields is not taken for granted and sharing their stories for future generations can guide to even higher aspirations in the STEAM field.

Stories of Perseverance: Thematic Analysis

The data for this study was analyzed without the use of any computer software and the data was gathered manually using the method of a three-dimensional model (3-D). The analysis describes the path that was taken throughout the study. The path includes (a) the analysis of the chronology of the participants' experiences on their quest to success ("space"), which is part of a 3-D design offered by Clandinin and Connelly (2000); and (b) a thematic analysis of what Clandinin and Connelly (2000) identify as personal and social interactions and situations ("place").

As noted in chapter three, the data analysis went through several iterations of coding. I started with closed reading of each manuscript, during which I identified words, phrases, sentences, or entire paragraphs that convey the meaning of the participants experiences in general terms. The initial list of codes comprised of over 150 language units. Further, I started to sort out these codes by specific experiences, thus identifying emergent themes evolved into

larger categories that encompassed, simultaneously, the breadth, depth, and detail of the participants’ experiences, such as the challenges they faced, the strategies they used to manage difficulties, and the lessons they learned. The categories also highlighted the commonalities between participants, such as the importance of resilience, the need for support from others, and the value of learning from mistakes. The categories provided a framework for understanding how the individuals’ stories fit together to form a unified narrative.

The participants of this study shared their incredible stories of success and challenges they had to overcome to become STEAM professionals. All the participants shared important aspects of their educational journey and the inspiration to achieve their goals. Several cycles of coding have resulted in identification of the following main themes: (a) “Latina Women’s Path to Success in STEAM;” (b) “Persevering through Stereotypes and Invisibility;” and (c) “Cultural Traditions and Ancestral Voices.” Figure 1 below represents the titles of the main themes and subthemes.

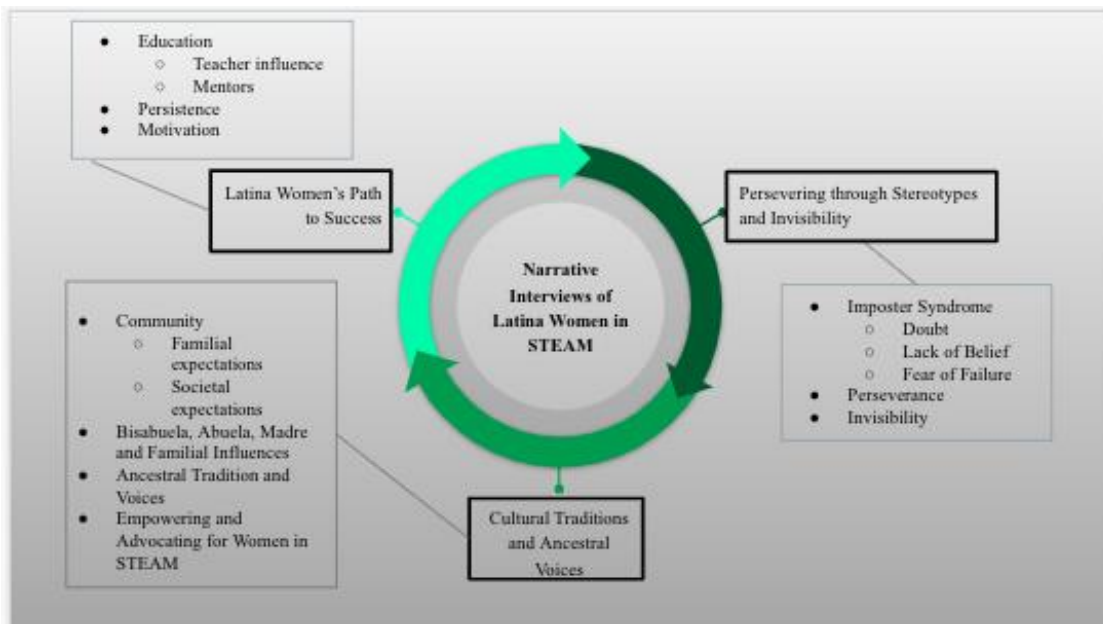


Figure 8

Representation of Main Themes and Subthemes

Latina Women's Paths to Success in STEAM

I understand the unique challenges and experiences of these individuals, and I want to use this research to explore their stories in more depth. By doing so, I hope to gain a better understanding of their individual journeys and use their stories to inspire and support others. Additionally, by exploring their stories, I hope to uncover trends and patterns that can be used to inform policy and practice to better serve this population. The quintessential questions I have been asking is, what makes a Latina woman successful in the STEAM field? The participants shared their experiences about overcoming the barriers on their journey to success in the STEAM field.

Education: Opportunities and Constraints

During a personal reflection of how education was important to my mother (madre) and grandmother (abuela), it makes me ponder about the importance of education in the families of the participants of this study. Financial constraints were a clear barrier as described in many of the stories where the financial struggle to become educated were apparent. The participants all admitted financial constraints as one of the challenges to get a higher education. For instance, Henrietta stated:

Our family did not have an easy financial situation at home. So, I grew up seeing my parents struggle to provide for us. My dad always prioritized our education.

Throughout the trials of providing for an education for the Latina women in the STEAM field, it was discussed how education was highly encouraged and a priority for the families. The research also revealed how Latina women had to face many obstacles when it came to getting an education in the STEAM fields. These included a lack of access to resources, limited financial

support, and a lack of role models or mentors. In addition, Latina women were often judged or looked down upon for pursuing a career in a male-dominated field like the STEAM field. The participants mentioned the difficulty of having to juggle two different customs, where their parents were still adjusting to the new culture and language, while the participants were absorbing the US culture and acclimating to their new surroundings. These transitions made it difficult for them to find a balance between the two cultures and understand their parents' expectations and their own aspirations in STEAM. First-generation scientists who have overcome the barriers of immigration and pursued careers in STEAM fields have a lot to offer in terms of inspiration and insight. The participants shared how they found inspiration from their families' determination to make a better life for them and their siblings. For instance, Laura said:

Education was always encouraged. It was something that my dad and mom wanted us to have. They came here looking like any immigrant who wanted a better life for their family. But education was something that I always looked for and I want to continue to educate myself because there is always so much more that we could learn.

Florence echoed:

Pursuing an education was important to my mom, she was the only one in her family to go to college, she became a dentist, and it lifted the whole family out of poverty when she got her degree, and it was the ticket for you to succeed in life. We went beyond that we could get the best education that was possible.

Abby referred to her mother when emphasizing the role of education:

My grandmother is very education oriented; my whole family is thinking that is the number one thing about living in this country. She wanted all her kids to be educated and it was important.

It is important to acknowledge and support individuals like Theresa in their academic and personal endeavors. Theresa shared how her barriers were shattered by stating:

The barriers coming my way, I would overcome them and continue in terms of studies when they got to school. The biggest barrier (for me) was being an immigrant.

All participants in this study were immigrants to the United States and had to work hard to accomplish their goals. One area where most of the participants initially struggled were with the standardized tests required by the American education system. The ACT and SAT are standardized tests that are commonly used in the United States as a part of the college admissions process. These tests are designed to assess a student's knowledge and readiness for college-level coursework. To be considered for admission to most colleges and universities in the United States, students typically need to score at least 21 on the ACT or 1400 on the SAT. However, it is important to note that requirements for test scores and admission may vary from school to school. Laura shared how her test anxiety really caused some academic barriers, but she was able to overcome this anxiety:

I really took an interest in college; I just related my love for animals and wanting to care for them. I wanted to be a vet. Test anxiety got the best of me and trying to know what I needed for each class, especially because teachers always say these tests for college are important.

It takes a great deal of hard work, dedication, and perseverance to be able to accomplish this. One must have a strong sense of dedication to your studies and a willingness to learn new things and adapt to different cultures. Sarah described the educational process in her family as follows:

I grew up in Latin America, walking from my house to the forest outside our home, I experienced the biodiversity of the forest, and I was always deeply passionate about animals and insects. Growing up with my family we always talked about patients and medicine. Being highly educated was important in our family.

The importance of education does not always end with the support of the participants' families. Many of them referred to their teachers and mentors as motivational forces in their

lives. The teachers and mentors were also important sources of support and encouragement while they were in school, providing guidance and direction to help them stay focused and reach their full potential.

Teachers and Mentors

The experiences shared by the participants about the importance of their teachers and mentors shed light on the necessity to provide more opportunities to be successful in the STEAM field. The participants revealed the importance of teachers and mentors to achieve their goals in education and STEAM professions. As a result, excellent teachers and mentors can have a tremendous impact on the success of their students. These educators can help motivate them to reach their goals, provide resources, and help build the student's self-confidence. In addition, teachers and mentors can also help students to build relationships with their peers, which can lead to strong friendships and valuable networks that can be beneficial in the future. Henrietta stated this regarding how mentors would have helped her in her journey:

I would mentor others by telling my story and encourage them to find solutions but also say that it is not easy, it's never easy, and find support in other people.

Having mentors who are Latina like the participants, would have provided a smoother transition to the educational process. These mentors who are Latina can help to create a sense of belonging for the participants, as they may be more likely to identify with the mentors and trust their advice. Florence described her mentor as "significant," the professor who spoke to her "like a colleague" when she was assisting her in the lab: "it was amazing how she lived her life, had a family, and an amazing career."

The need for role models was expressed by all the participants. Having Latina mentors can help to bridge the gap between the participants and the educational process, as they can

provide insight into the cultural and linguistic nuances that may be unfamiliar to the participants. All the participants emphasized the importance of and need for role models. Several of the participants revealed the need for mentors or coaches to guide them through the process in higher education. For instance, Laura stated:

Being the first-generation you really do not know anyone that has done things like that before. I did not really have any role models.

Florence emphasized:

We need mentors, and we need community, and you can't do it alone with no help, but you don't have to and it's important to live a happy life. I think it is important to look for places where you will have support.

Similarly, Sarah said:

Mentors are needed - I had an unpleasant experience when I came here with Latinas, there was a lot of envy and they would not help me and I was thinking you are a woman, you should treat me well and help me, not treat me badly. I do not like your competition; I just needed your help.

All the participants mentioned the need for mentors that look like them and they have made the commitment to offer their experiences to other students, especially as professors in their respective colleges, to offer insight for a successful journey in the STEAM programs.

Persistence: Determination and Overcoming Obstacles

The participants of this study revealed that persistence was what brought about success in their lives. Being first-generation immigrants and first-generation college students represented a particular challenge to the participants. Yet, as they stated, this also brought forth their persistence to succeed, no matter the challenges. For example, Henrietta shared how she would have to talk to herself about her goals and dreams in the STEAM field:

I would tell myself to stick to my dreams and dream big and persist. I do not know if I feel like I turned out better than I expected. I would say believe in yourself and work hard.

The necessity for persistence was paramount in the participants' experiences.

This is how Laura described her persistence as “stubbornness”:

Being the first Latinos during the year in the US was challenging and learning both languages. What got me there? I could say but I guess my stubbornness. Do not give up, keep trying. There is more out there. Be patient. It does not really come easy. You are going to have to work really, really, hard for it.

The participants were forthright and honest about the idea of the hard work that would be necessary to work in the areas of STEAM professions after college. The participants of this study demonstrated all over again how their persistence was forged by overcoming numerous obstacles on their path to success. For instance, Sarah said:

If you wanted to be in science, you needed a certain GPA to be able to be part of STEAM. I told myself I am just going to let them (the school) know that I am always very persistent and resilient. Family plays a significant role in my success. I am successful because I am persistent.

It was uplifting listening to the participants' motivation to be successful on this journey in the STEAM professions and how they would share the encouragement to continue this path. Sharing their motivation can also help to create a supportive environment for Latina scientists and encourage them to pursue their dreams. By discussing the challenges, how they overcame them, their successes, and the importance of their work, it can inspire future Latina scientists to stay motivated and work hard to achieve their goals.

Motivation: Persistence Towards Success

Resilience and persistency are features of character that are naturally intertwined with motivation on the quest to success in higher education and professional careers in the STEAM

fields. The participants of this study spoke eloquently about their motivation to succeed. Participants often referred to the influence from immediate family members or teachers who inspired their desire to study and achieve professional careers. For instance, Henrietta witnessed the behavior and attitude of some people toward her sister with special needs, which could be diminishing. However, she was ultimately inspired precisely by her sister:

My sister was my motivation because she was a special needs child and I witnessed the prejudice against her, so I wanted to bring awareness to society about autism.

Henrietta's response to speaking up about the behavior of her sister and advocating for her needs would ensure that her sister was being treated fairly. Allowing her sister to be treated with fairness and kindness is a trait that Latina scientists would like from all the individuals in their classes and profession. Bringing awareness to motivate future Latina students was important to the participants. The participants shared how the journey to succeed was dependent on the sacrifices that were experienced by their families and teachers. They discussed how difficult it was for their families to give up on certain dreams so that they could provide for their opportunity to pursue their dreams. It highlights how the journey to success is one that involves the whole family and community and that without the support of those around them, it would be much harder to achieve success. When discussing what success is and what it looks like,

Florence described success as follows:

My version of success is I have the job I want, I am happy with my job, I can do research and teach my classes, and work with amazing students. I consider myself successful and I am happy where I am.

Feeling successful as a motivation was also driven by the experiences of witnessing the sacrifices made by family members to pave their way to educational excellence and professional

success. This motivated the participants to work hard, persevere through difficult times, and reach for success. For Theresa, it was her mother who was her main motivation in life:

My mom always told us the importance of studies and the biggest example was seeing her for four years going to school even though she had two kids at home.

Florence shared her motivation to accomplish goals by stating:

Overcoming barriers and motivating me to accomplish my goals were that I liked my job, I graduated from school, and I was amazed that I could make a living working with animals.

The influences of family and teachers fueled the desire to excel in the STEAM professions for the participants. Family members provided support and encouragement, while teachers provided guidance and mentorship. They gave the participants the confidence to pursue their passions, providing a safe and encouraging environment to explore and grow. The participants felt supported in their pursuits and felt empowered to develop their skills in STEAM professions. Having the ability to persevere through all challenges, especially stereotypes and feelings of invisibility, was fundamental for the participants to succeed in reaching their goals.

Persevering through Stereotypes and Invisibility

The participants of this study expressed that as women, they had to confront many stereotypes especially in the science arena. They felt that they were often seen as not being as capable or knowledgeable as their male counterparts, which affected the way that their ideas and contributions were received. They reported feeling the need to prove themselves more than their male peers and that this additional pressure caused them to doubt their abilities and feel less confident in their work. Furthermore, they felt they were overlooked for opportunities and that they had to work harder to be taken seriously in their field. Additionally, they all experienced the feeling or actual experience of “not being seen,” or rather, “invisible,” in classrooms or

professional careers. Examples of “being invisible” ranged from not being acknowledged in a group or conversation, not being given the opportunity to voice an opinion or provide input or feeling ignored or not heard in a work environment. Some participants expressed the feelings of doubt in their capacity to succeed, especially as Latina women, in the areas of STEAM and how they could overcome these feelings to achieve the goals set for themselves.

Imposter Syndrome: Feeling Successful While Overcoming Insecurities

“Imposter Syndrome,” whether explicit or implicit, emerged as a common experience to all participants. Some participants expressed that they felt not quite qualified as scientists even though they have become professionals in their respective fields, which they attribute to their being Latina and first-generation immigrants and college students. In other words, the participants continued to have doubts about the quality of their education and their professional qualifications throughout their educational and professional experiences even when there had been no grounds for that. Finally, the participants discussed how their Imposter Syndrome was exacerbated by the fact that they often felt like they had to be “perfect” to be accepted into the scientific and professional culture. It is important to recognize the unique challenges these individuals face and to create support systems to help them overcome their internal struggles.

For instance, Theresa admitted:

The doubts I had was when I came to the US, I had graphic design still in my head while taking business classes. A lightbulb went off in my head, what am I doing? I am already here.

Theresa had to constantly remind herself that she was in the same business classes as her peers, and she was doing well in the classes. She shared that whenever imposter syndrome hit her

hard, it triggered the feelings of doubt in her abilities to succeed. Thus, Laura had to nurture her positive self-talk:

That was a barrier for me with that and it made me take it a couple of times, made me feel like, you know, I was not smart enough for college, I should just probably stop. So that was very discouraging. I still doubt myself, like, imposter syndrome, asking why should I be here? Do I belong? There is no one here that looks like me, but you must shut that voice. I want to sound overconfident; you have earned that you have done your best. You have done the work, you worked hard for this, and you deserve to be here.

For some of the participants that experienced imposter syndrome, the need for mentors that looked like them was an essential piece to their puzzle on their journey through the STEAM programs as students. Mentorship is a critical part of helping the participants overcome imposter syndrome and other issues they may face in their journey through STEAM programs. Mentors play an important role in providing guidance, emotional support, and helping to build confidence in a student's abilities. The imposter syndrome often prevented the participants in discussions or asking questions when in grade school or in college. For instance, Florence said:

I always feel like I did not know what I was doing. The imposter syndrome was always felt but I had felt that I should not be here, but I figured it out. I would tell my younger self to ask for help and get a mentor. And you should not be embarrassed about asking questions. My biggest mistake was to feel like I had to pretend I knew what I was doing.

Abby shared how the doubts would affect her confidence and that she needed to be strong and be satisfied with the process. These doubts may manifest as self-doubt, fear of failure, an inability to recognize one's own skills, or a sense of inadequacy. This is how she described her experience:

The way that I overcame my doubts, and it helped push away that imposter syndrome. I try to remind myself that the better we get, the higher we hold ourselves. When I first started, I could see how much I have grown and it is really satisfying, and it helps me to keep wanting to move forward.

Similarly, Sarah was dealing with low self-esteem and not feeling like she was enough in the STEAM program. Overcoming the imposter syndrome was real for her and she needed to overcome these feelings and push through:

I would tell my younger self to deal with low self-esteem. Imposter syndrome is always a thing, I always felt like I was not enough. So, I had to push myself to overcome it.

All of the participants expressed how they had to push through and persevere through these feelings of doubts when imposter syndrome struck them and made them believe they did not belong in the STEAM programs. The journey to a successful career in the STEAM field clearly displayed the participants' strength of character and their determination to attain their goals.

Persevering Against All Odds

The participants describe their continued efforts to work hard despite facing obstacles, never giving up on their goals, and remaining determined in the face of adversity. They faced challenges such as lack of access to resources, lack of role models, and cultural barriers. Despite all these obstacles, they persevered and achieved their goals. They traveled to the United States to enter STEAM programs from different countries.

The accomplishment of the participants' goals and pride in what they have achieved is often an example of perseverance. It demonstrates their determination to succeed and willingness to work hard to overcome any obstacles that stood in their way. They had a vision to achieve and commitment to make it happen. Failure was not an option for them, as they were determined to succeed no matter what. The participants faced challenges and obstacles along their journey, but they didn't let that stop them from achieving their goals. Their ability to stay on their journey,

even when there were obstacles, is the essence of perseverance. This is how Pamela described some of her college experiences.

I just refused to give up and refused to be that next statistic. Come hell or high water. It was super intimidating; I did not know what an engineer was, and I did not understand the status of being an engineer. I had this arrogance or courage, and I could not understand why I was not in the highest class, and I asked why.

Pamela and Abby had different experiences and the challenges in their respective fields of college classes and the art professions, but what was important for both of them was to persevere and solve problems. Abby stated:

It was difficult to (major in art) and it wasn't going to be easy. I wanted to push myself to see how far I can go with it. I tried to put every piece of artwork, every piece of myself into it.

By providing a platform for the participants to share their stories and experiences, universities and other educational institutions can better understand the needs of their students and take steps to create a more inclusive environment. This could lead to increased access to resources, more equitable treatment, and improved learning outcomes for all students. Sarah provided one of the examples of her perseverance:

I really enjoy biostatistics. I read; I need to learn more about it. I am a very persistent person. I asked my professor if there were any opportunities in biostatistics and I became part of her lab.

Being a persistent person in the field of science is creating an atmosphere among the student body that all women, especially Latina women can persevere in their professional fields. Having the ability to ask for opportunities from your professor will create a space for educational identity among Latina scientists. Additionally, making sure that women of all backgrounds are included in the scientific process will create an equal voice for Latina women. Abby shared her experiences with perseverance through the eyes of the women in her life:

All my aunts are teachers. My mom pursued a different type of career, but education was important to help the next generation. My mother and grandmother kept persevering and working towards going to school and it did not matter what other people told them about making it happen.

Showing that Latina women can succeed in science is a form of empowerment that will show that all voices matter in the scientific world. Finally, it is important to be a role model for all women, especially Latina women, to prove that success is possible. Being a leader and advocating for other Latina women to pursue a career in science will create a bridge of opportunity and will help to create a more diverse scientific field.

Invisibility: The Importance of Being Seen

Feeling invisible in a classroom or other academic setting was a common experience for the participants of this study. The participants reported feeling overlooked, not having their voices heard, or not having their contributions recognized. They also reported feeling disrespected, misunderstood, and excluded from conversations, activities, and opportunities. Some participants described feeling intimidated by their peers and professors or feeling like there was an unequal power dynamic at play. They all stated that this feeling of invisibility had a negative impact on their academic performance and overall confidence. Such experiences differ in terms of the scope, detail, or their explicit or implicit character.

Florence's mention of not having developed a plan to feel visible in the science conferences and societies of which she is a member, suggests that the lack of representation and mentorship can make it difficult for her to fully participate and succeed in these spaces. The lack of representation and mentorship can create a feeling of invisibility in science conferences and societies, as Florence described experiencing. This can be both discouraging and alienating, as it

can be hard to feel like a part of the community in the absence of someone who looks like you or shares your experiences. She stated:

I do not feel like I have that part figured out yet, I still feel invisible, and I can in many unusual places. In my professional society, I attend conferences and I never feel included, it is difficult to participate in things and it sucks.

The participants felt the need to feel included to be seen. At times, their confidence was shaken due to the experiences they received in their respective professions. However, their persistence to remain visible is a constant battle but it is a battle they have accepted to continue their successful journey. They expressed feelings of empowerment and pride in the knowledge that they have achieved despite the challenges they have faced. The participants also expressed the importance of having a supportive network to help them through the tough times. They discussed how having a positive outlook can help to keep them motivated and focused on their goals.

Cultural Traditions and Ancestral Latina Voices

The voices of the abuelas and madres of Latina students are a constant reminder to continue the traditions of these strong, cultural women in their lives, and to pass down these strong traditions to their children. The participants of this study come from strong cultural and familial traditions where the family cares for all the members of the family. For example, cooking with the family is an event where the abuelas (grandmothers) and madres (mothers) have an opportunity to have discussions with their daughters about the events in their lives. The importance of community and familial influences, such as those of bisabuelas (great-grandmothers), abuelas (grandmothers), and madres (mothers), can play a significant role in shaping the lives and experiences of individuals, particularly in regard to their educational and

career paths. Ancestral traditions and voices can also provide a sense of cultural identity and pride and can serve as a source of inspiration and guidance. Empowering and advocating for women in STEAM fields is also an important aspect in the lives of the participants in this study. It can help to increase representation and diversity in these fields, and to promote gender equality in the workplace. Ancestral traditions and voices can also provide guidance on how to be successful in these fields, by offering valuable advice and insight into how to navigate the complexities of the STEAM environment. Furthermore, connecting to ancestral voices can help to foster a sense of belonging and community, and can provide a source of strength and support in times of difficulty. Finally, ancestral traditions and voices can help to create a sense of pride and purpose, as they can provide an opportunity to honor the history of the participants' culture and to connect to a sense of their cultural identity and heritage.

Community: Creative and Supported Networks

La comunidad (the community) can be considered just the location for some cultures, however, for the Latina community, it is something different. The community is where the people of the neighborhood come together and help one another in support and love. Pamela described her community as, "I would just find a person that could help me and not leave any rock unturned." Finding the people, your people, that will provide support is what the participants were looking for. Sarah shared what community meant for her: "I had friends and people that would support me, when I wouldn't believe in myself, they would help me." For Sarah and Pamela, the community was the people that would provide a solid foundation of assistance to achieve their goals. Some of the participants defined community in a different way. For instance, Henrietta said:

I think community with the people that we are surrounded by, and share similarities and values are what I can identify with.

Henrietta believed that people that identified with her ideals were providing more support in her dreams and values. Having support from family, community, and other sources can make it easier for individuals to achieve their goals, as opposed to experiencing barriers. Support can provide encouragement, motivation, and sense of belonging. It can also help individuals to overcome these barriers and achieve their goals. Theresa said:

A community for me means to support. I had big dreams and to pursue my dreams my mom always supported me.

Theresa's community also included her mother and how she would support her within her community. Laura and Florence shared how community in the academic arena would work together, even if their backgrounds were different, they came together to achieve a common goal.

Laura described her view of community as:

People who are working together. Students from different backgrounds and that was like my first time, there are other people here and that was great to the experience. I mean I got to meet other people from different communities and different backgrounds.

Florence echoed her description of community as:

It's the people that are part of my life in many different ways that you know, it's the culture that I want to be a part of, and I want to improve. Then I know that they will also have my back.

The participants all shared how the community is an important component of the support in the goals and dreams of being in a higher education STEAM program. This type of care was important to achieve their goals, their inspiration to be a strong community member for future Latina STEAM members was shared and present during the interviews.

Familial Expectations: Beliefs, Values, and Alignment

The participants also revealed that they had to fight with low expectations from either their own families or society at large. Some participants claimed that their family members did not believe in their ability to accomplish the goal of becoming a scientist or be part of the STEAM field.

The expectations from family members towards the daughters and sisters were at times difficult for the participants. Henrietta shared how her past behavior of inconsistency caused her mother to doubt her abilities to be successful in her goals. She stated:

My history was that I would give up, my mom would tell me that I give up on everything, I didn't like that and persevered to not give up and succeed.

At times these expectations can be used as a motivational factor to be successful. Henrietta shared how the unbelief from her mother created an atmosphere that she needed to persevere and not give up. She not only exceeded her own expectations, but she also shared how her mother began to believe in Henrietta's abilities in her academic classes. Abby shared how she would need to give herself reminders to exceed the expectations that were placed upon her by family members. She stated:

The way that I would mold myself is by adapting. I am taking things in stride, and I constantly remind myself. I remind myself that it is going to be fine. Just keep moving forward. If you stop and you let everything get to you, it is okay to take a break here and there.

The participants' emphasis on the importance of taking a break to be mentally strong is a valuable insight. Familial expectation can often discourage taking time for oneself, which can lead to burnout and negatively impact one's mental and physical health. To combat this, it is important to set boundaries and communicate them to family members. It is also important to make self-care a priority and take time to do activities that are enjoyable and help to reduce

stress. It is also important to remember that taking care of oneself is not selfish, but rather a necessary part of maintaining a healthy lifestyle.

Sarah shared how her grandfather's influence on her journey was essential to be a STEAM scientist. Her grandfather stated, be a veterinarian and do something that you are passionate about and you will feel accomplished.

It is important for families and communities to recognize the importance of supporting the individuals and maintaining a healthy mental and physical state to be equipped to face the challenges ahead of them with their academic journey. First, it is important to provide a safe and supportive environment in the home and community. This should include open and honest communication, positive reinforcement, and providing resources and support when needed. Encouraging a healthy lifestyle, which includes proper nutrition and physical activity so the participants can build resilience and gain the confidence needed to face the challenges ahead of them. Second, it is important to recognize that everyone experiences stress and to provide emotional support. This includes being understanding and validating the participants' feelings, offering reassurance and encouragement, and providing resources to manage stress. Finally, by providing a safe and supportive environment, understanding and validating feelings, and recognizing the importance of mental health, families and communities can help individuals face the challenges ahead of them.

Societal Expectations: The Impact of the Cultural Norms

Societal expectations can be a significant source of challenge for individuals from marginalized communities, particularly when it comes to accessing opportunities and achieving success in their fields of study and employment. Societal expectations can create an environment

where members of marginalized communities are seen as lesser, or even invisible. This can manifest in the form of discriminatory hiring practices, lack of access to educational and career opportunities, and an overall lack of resources that are necessary for success. For examples, the participants have reported that they have faced assumptions that they are not capable of performing at the same level as other members in the STEAM fields, or that their unique cultural or personal qualities are not valued. To address the challenges posed by societal expectations, it is important to create an environment that is equitable, inclusive, and supportive of Latina scientists.

The participants also revealed that societal expectations were equally challenging in their places of employment. They shared how women in particular need to rise to the standard society has set before them, which can include facing high expectations related to test scores, being an immigrant, or having children. These societal expectations can create additional barriers for women and other underrepresented groups in their pursuit of education and career opportunities.

Pamela shared her journey of having a baby and being in a doctoral program, she stated:

I was pregnant. I thought to myself, I'm going to go back to school and finish these two classes (doctoral classes) and finish before I have this baby.

For Pamela, being a Latina Ph.D. student and a first-time mother can certainly present significant challenges, both academically and socially, which she overcame. It is commendable that Theresa, as an immigrant, has been able to overcome these barriers and work towards completing her college program.

All the participants had to overcome generational and societal expectations in order to achieve their goals in STEAM higher education programs. This type of bravery was present as they shared their testimonies about the journey. Their stories of perseverance are inspirational,

and I wonder how their families were able to embrace their desire to be in higher education as Latina women.

Bisabuelas, Abuelas, Madres, and Familial Influences

The influences of bisabuelas (great-grandmothers), abuelas (grandmothers), madres (mothers), and other family members were present when the participants shared their experiences about how family inspired their successful journey in the STEAM field. Henrietta shared the following about her grandparents' influences:

The voices of our family encouraged us, and my sister was a role model. My grandparents had an enormous influence because my parents were both unemployed and my grandparents were the ones that helped us financially. My mom made sure we were studying. My aunt (dad's sister) was a microbiologist, and she was intelligent. She is a phenomenally successful woman in my point of view.

This influence was an essential component to a successful journey due to the sacrifices of the women who paved the way for Henrietta. Pamela believed that the influences and work ethic of her grandmother and mother were the inspiration to believing that she could accomplish her goals, even through the most difficult portions of her educational journey:

Think it partly largely because growing up in a matriarch, my grandmother was there. My mom could not give us barely anything, barely food on the table but she never missed a day of work. My brother was a role model, not in education but he would always say figure it out, so it forced me to figure it out. My grandmother raised all of us. My mom and aunt had to work so my grandmother was there in our home.

The influence of a strong grandmother or abuela was not only present in the life of Pamela but present in the lives of Florence and Theresa. The motivation of witnessing the hard work of their elder is what inspired them to reach for the stars even when the odds to keep them on the earth was a challenge. Florence witnessed her grandmother's work ethic:

My grandma, she was a force of nature. She was a single mom, had five kids. They had a hard life, did not have a lot of money, and raised them beautifully. She was a teacher and I always admired that.

Theresa echoed her experiences of witnessing her grandmother's ethic:

My grandma always knew about the issues and everything that she did to my mom. I have that sort of wall. You know that I keep in between us because I know of everything she did.

The influences did not always consist of the matriarchal presence, but the involvement of extended family members. The need for family to share support and love was explained by Abby as follows:

I grew up in a single child household, but I was lucky to have a big family. I had a lot of cousins to spend time with. My grandmother is my role model because she left five kids back in Ecuador to come to a country to start a new life for them and did everything she could take night classes to learn English. My grandmother worked in a factory until she was able to get a job with the Board of Education.

To learn the stories of our ancestors and understand the cultural capital that was passed down through generations, participants needed to actively engage in learning and research. Reading, listening, and engaging in conversations with our elders and community members gave an inspirational perspective to the participants that Abby was sharing with her abuela. The participants were able to be open to their learning environment by incorporating the knowledge they gained into their own lives. This allowed the participants to honor the sacrifices of their ancestors and continue to pass down the cultural capital.

Abby explained how the extended family provided guidance on her educational journey and Sarah echoed the need for other members of her family to acknowledge her challenging journey. Sarah provided details of how her father would encourage and challenge her to excel by stating, my father was always pushing me to be my best and he was supportive by always telling

me he was proud of me. This acknowledgement for Sarah was a turning point in her educational career in the STEAM field.

The guidance of the family was essential to the participants. Several of the participants felt their family was their guiding light to success. Without the influences of the ancestral voices, their education was driven because of these sacrificial remembrances of their ancestors.

Henrietta described her relationship with her family and Latina identity as:

Being Latina and helping Latinas is important. Heritage is every day which would be our education.

Pamela's description of her family's influence and the voices of her ancestors guided her path to educational success as:

My sister was the only one in my family making comments in reference to me going to college and doing well in school. The influence of our indigenous roots plays your part, be an influence in being a happy and good person.

Theresa echoed the importance of family and their sacrifices to success as:

Being a Latina, my mom was inspiring. When I start thinking about every detail it makes sense and it makes me feel successful.

All the participants testified how the culture of family and community was inspirational to their STEAM journey and the importance of mentors in their lives. Laura shared the following about the culture of Latinas:

Being Latina, being unique. Not a lot of people look like you. Being Latina is being able to share your culture, being able to express yourself in a way to be family-oriented to be with family. I love being able to have this culture and be able to teach others about who I am and where I come from and where my family comes from.

The pride, love, and acceptance from family members is what inspires these participants to pursue the most challenging components of their educational journey. For these participants,

life without their family and community would be a difficult task to accomplish the dreams and goals they had set on their educational journey.

Ancestral Traditions and Voices

Día de los Muertos or Day of the Dead, is a traditional Mexican holiday celebrated on November 1st and 2nd. It is a celebration of life, death, and the afterlife, and is a time for families and communities to come together to honor and remember their loved ones who have passed away. The holiday is a unique blend of indigenous and Catholic beliefs. In fact, many Latin American countries celebrate some type of Day of the Dead traditions, although the traditions may vary from country to country. Regardless of the country of origin, the basic principles of the holiday remain the same. Celebrations usually involve honoring departed loved ones with offerings of food, drinks, and candles. It's a time to remember, to celebrate, and to appreciate our loved ones who have passed away. The participants shared how they all recognized their loved ones that have passed in some form of traditions from Day of the Dead. One of the most important aspects of the celebration is the ofrenda, which is an altar or offering table that is set up in honor of the deceased. The ofrenda typically includes items such as candles, flowers, food, and photographs of the deceased, as well as their favorite things. The items on the ofrenda are believed to provide comfort and guidance to the spirits of the ancestors.

For the participants in the study, the celebration of Los Dia de los Muertos (Day of the Dead), and the tradition of creating ofrendas may have provided a sense of connection to their cultural heritage and a way to keep their ancestors' memories alive. It may have also been an inspiration and a source of guidance in their lives, as the ancestors' voices were present and guiding them to greatness. Abby spoke eloquently about her cultural tradition:

Keeping cultural traditions with your family is listening to music, hearing the stories from my grandmother and grandfather. My great-grandmother passed away when I was young, but she loved animals and she always encouraged my interest in animals and horses. The influence of my grandmother is humbling. She surrounded herself with her children and grandchildren. She built an amazing life that was not easy. My role model was my grandmother, and I always received a lot of encouragement.

Remembering the ancestors and the sacrifices they made for our dreams and goals to come true is a voice that the participants continued to listen for guidance. The importance of being Latina and the influence of their culture continue to inspire the participants. Laura shared how the Latina voices led to the ability to achieve her educational goals and described the process as:

Being a Latina means being part of our beautiful culture, and I see how much I have in common with the Latinx people from all over Latin America. We are warm, we are accepting, and we have a beautiful culture, beautiful food, and music.

Laura had similar experiences with the importance of being Latina and described the voices that led to her success as:

The family was together but yes, it's voices. Voices that I hear are my mom, and my grandmother. She would always, always tell me, you are the one that's going to take your best, like *bastante familia elegante*.

Hearing the voices of ancestors, especially, the abuelas through songs strikes the heart cords and the memories that are present guide these participants to continue to strive for greatness. Sarah shared how this remembrance is important to her and it was not only her abuela but her abuelo (grandfather) that gave her support, she shared her experienced as:

Being Latina for me is remembering what I want to do for me and my family. Embrace your culture, and do not fear what people are going to think about you. Embrace all your languages. My grandpa was my supporter, he was a cardiologist and before my grandfather died, he told me to do what I found passionate. I had told him I wanted to be a veterinarian and he thought it was a promising idea.

The cultural capital and the voices of ancestors proved to be a powerful source of inspiration and guidance for the participants of this study. For the participants in this study, the cultural capital and the voices of ancestors were heard through various forms such as music, cooking and remembrance of their ancestors.

In addition, by remembering their ancestors, the participants were able to channel or focus their intentions to their cultural capital and the voices of the ancestors to overcome barriers they faced in the STEAM program.

Empowering and Advocating for Women in STEAM

The voices of the abuelas, or grandmothers, were important for the participants in this study, as they provided guidance, support, and inspiration. The abuelas served as mentors to the participants, imparting the importance of education and self-advocacy. They also provided advice on how to deal with gender-based discrimination. The abuelas encouraged the participants to pursue their dreams and be bold in their decision-making. They also emphasized the importance of solidarity and collective actions and how to use their voices to create lasting change. The empowerment provided by the abuelas was vital to the participants' success in their educational and career paths, as it helped them to overcome barriers and to achieve their goals. The abuelas, through their voices, their guidance, and their example, helped to instill a sense of self-confidence, self-worth, and self-esteem in the participants, which were a key to their successful journey in the STEAM program. Henrietta shared her experiences of how women helped her through this journey by stating:

I feel like women feel intimidated, but we should not feel that way because the most places where men are the majority, we show how we will make ourselves seen by speaking up. Feminism is women advocating for one another and giving

them a voice to accomplish things they thought they were not capable of because of their gender.

The participants' found inspiration from the voices of their abuelas and how they impacted them on their journey. Abby shared how women should treat each other on their journey to success and the influence of the abuela's matriarchal was important despite all the barriers in their way. Abby stated:

When I think of empowering women, I see someone that believes in treating women like people that are just kind, I think for the most part. I would say that I am a feminist probably because my family was matriarchal. There is a lot of strong women in my family, and I was raised by a lot of women. They were encouraging and it did not matter what the barriers might be, common or uncommon, gender issues would not hold me back from any challenges or pursuing happiness.

The voices of the abuelas were critical in the movement, as they were usually the driving force and provided a strong cultural foundation for the other participants. These abuelas were working class women who had a powerful presence in the fight for equality. Their stories and experiences inspired the participants to keep going and to fight for a better future. The presence of empowering women to have a strong focus on their rights, equality and justice. For the most part, the participants were raised by the women in their lives and this guidance gave assistance to a successful journey. Theresa shared how the empowerment from other women affected her journey by stating:

I feel warm in my heart because I feel like I want to just hug every woman and just help them and you know, be friendly and be supportive. I feel like just supporting every woman in the best way possible. I am a photographer and I like to use photography to share my story.

Laura and Florence shared how they wanted women to empower other women and to stop the view that "women are the weaker species." By empowering other women, the

possibilities of achieving more than could be imagined could be a reality. Laura felt empowering other women would be described as:

They are trying to have or want to empower women. I feel like there should be some sort of balance. How do we get them to be more inclusive? Feminism for me would be the empowerment of women, women for so long have been just put down and then seen as a weaker species and that is not true. But, anywhere in the world, there will be an unequal balance between a woman and males how there is no fairness where we are just. I just want it to be more equal. I think women should be able to empower more women and should not put one another down.

Florence felt the empowerment of women would allow her success to soar. She described this empowerment as:

To me, empowerment is believing that women have the same rights as everyone else and can do whatever they want to do. It is supporting their rights; it is about supporting women's causes. I support women's rights and I want to see women thrive. Feminism is good for everyone and not just for women, for a better society.

While feminism is not always viewed as a positive trait, the strength of women was present in the lives of Pamela and Sarah. Both women possessed a strong sense of self-determination and resilience, which are essential qualities of feminism. They viewed feminism as a divisive trait and while the strength of women provided guidance on their successful journey in the STEAM field, their identity was founded on their position within a challenging journey. Pamela's view of feminism was described as:

I have never considered myself a feminist because there is a lot of baggage with the word feminist. I do resist gender notions about what we are supposed to do and not do, but the word feminist is divisive, but we should challenge our roles.

Sarah similarly shared her view of feminism as:

It is hard, I am not a feminist. I agree with the fact that females need to have the same opportunity to be treated the same as men and we should fight for equal rights, but in Latin America, tribalism has a big effect. But being a feminist does not mean treating men to be brought low.

The participants' view of empowerment is that it is a process of self-discovery and realization of one's own potential. It is about believing in oneself and one's abilities, taking risks and pushing boundaries. It is also necessary to recognize the unique opportunities and challenges that come with being a woman in a male-dominated field. Role models provide a source of inspiration and motivation for these women to push themselves and strive for success. These role models are women who have achieved success in their respective fields and demonstrate that it is possible to reach one's goals despite the obstacles. Feminism is an important part of the discussion as it helps to frame the conversation on female empowerment. It is a movement that works to challenge gender roles and stereotypes and to promote gender equality. It is important to recognize the strength and resilience of women and to strive for a more inclusive and equitable world.

The narratives of the participants in this study shared their personal experiences and insights on their journey to become successful in higher education in the field of STEAM. They shared how their ancestors, through their voices, provided guidance and inspiration, and how their cultural capital and traditions were instrumental in helping them to overcome obstacles and achieve their goals.

The participants shared how the memories of their ancestors were kept alive through the tradition of Día De Los Muertos (Day of the Dead), where they set up ofrendas with their ancestors' favorite items, these ofrendas were not only a way to remember and honor their ancestors, but also a way to connect with them and to receive guidance from them. It is likely that the ancestors of the participants, looking from their ofrendas, would feel love and pride for their descendants. They would see how their sacrifices and struggles served as a foundation for their children and grandchildren to build upon, and how their cultural heritage and traditions

were passed on and continued to be honored in the present day. Through the narratives of the participants, it is clear that the ancestors' sacrifices were not in vain, but rather have been instrumental in providing guidance and inspiration for the participants to be successful on their journey in higher education in the field of STEAM.

“When life hands you a difficult situation
where you feel undervalued and disrespected,
be bold and brave enough to know your worth.” -
(Tabaka, 2016)

Summary of the Findings

Thematic analysis has revealed several themes that conveyed common experiences shared by the participants centered around the research questions about higher education, perseverance, overcoming barriers, invisibility, and depending on the cultural capital of their family, especially abuelas and madres (grandmothers and mothers). The themes that emerged from the data analysis helped to provide insights and answers to the questions being explored, by offering a more in-depth and nuanced understanding of the successful journey from the Latina Women. *The highlights of the findings from the participants of this study reveal the following:*

1. The participants of this study emphasized the impact of family influences on their success in the STEAM fields. They highlighted that while the journey of each participant was different, their outcomes were achieved through persistence and perseverance. Additionally, the participants shared that the key to success was having the right attitude and being willing to learn, as well as have a supportive network of friends, family, and mentors to help you along the way. Taking steps towards

achieving their goals, having patience, and staying focused were encouraged to be successful.

Another impactful influence was the need for mentors that looked like them or were Latina-influenced and would have been helpful to them to have a smoother transition on this higher education journey in STEAM fields. The participants needed courage and confidence, which are important qualities that are often needed to succeed in any field, including STEAM fields. The participants had to take risks and step out of their comfort zone to achieve their goals. STEAM fields can be particularly demanding, requiring individuals to be able to think critically and creatively, solve complex problems, and adapt to new technologies and techniques. It is also important to note that the path to success was unique for each participant and that everyone had their own set of obstacles to overcome. But all of them needed to persevere, adapt and learn from their failures to achieve their goals.

Despite these challenges, the Latina women did not feel hindered by the process, but rather they had to work harder to achieve their goals. The participants felt that they had to work extremely hard to overcome the barriers and be successful in their chosen STEAM career path. They also felt that it was important to stay positive and be resilient in the face of adversity. They saw their own success as an opportunity to inspire other Latinas in STEAM fields and demonstrate how they can also achieve their goals.

2. *Women often face invisibility and stereotypes* when overcoming barriers on the path to success. This can be displayed in a variety of ways, from being overlooked for STEAM opportunities to being judged about their abilities to complete the tasks required for their field. The results of this study highlight the challenges and barriers faced by Latina women in STEAM fields. It raises the question of what the future

holds for Latina scientists, and what policies would be necessary to create a more inclusive and successful space for them in the STEAM profession. A way to be seen may be considered exploring potential solutions such as increasing representation and visibility of Latina women in the field, providing more mentorship and support, and addressing systemic inequalities and biases within the industry. Additionally, Latina women could consider taking advantage of any available networking or outreach opportunity. This could include attending conferences, meetings, and other events in STEAM areas. Latina women could look for ways to increase their visibility by joining organizations that are specifically focused on supporting and promoting Latina women in the STEAM fields.

The participants in this STEAM career path faced barriers due to societal and gender inequalities, as women, particularly Latina women, were underrepresented in the field researching animals in the wild. The participants had to be resilient and persistent in order to overcome the obstacles in their way and reach their goals. They also needed to stay focused and motivated, as well as be willing to learn and adapt to succeed.

3. On their path to success, the participants benefited from a variety of *networks of support* that assisted them in their quest, which altogether can comprise of their *cultural capital*. For instance, the importance of family support was a significant factor for the participants in the STEAM fields. The role of the bisabuelas (great-grandmothers), abuelas (grandmothers), madres (mothers), and other family members played a significant role in the decision-making process for these Latina women. In the Latina culture, having family approval for one's career choice is important, but the passion for their choices was often met with disbelief due to societal norms. The

support from their family members helped these Latina women pursue their passion in science, technology, engineering, math, and art (STEAM). Their ancestors' sacrifices and struggles served as a reminder to them of what they were capable of and to keep pushing through the challenges they faced. Ultimately, their cultural capital and the voices of the ancestors were instrumental in helping the participants to be successful in their journey in the STEAM program.

The voices of their ancestors played a crucial role in guiding them on their journey, and while some of those voices may have been negative, they were used in a positive manner to overcome barriers. The ancestors provided a source of wisdom and experience to help guide the participants along their path. The ancestors provided advice on how to handle difficult situations and provided guidance in times of need. Additionally, the ancestors were a source of strength and encouragement, reminding the participants of their values and helping them to stay focused on their goals. Finally, the ancestors are a reminder of their culture and heritage, reminding them of the importance of family and community.

CHAPTER FIVE: DISCUSSION OF THE FINDINGS, CONCLUSIONS, AND REFLECTIONS

*Believing in yourself and
fighting for your dreams
is what enables you
to live each day
and face every obstacle. –
(Tabaka, 2016)*

Latina women paving the way to success in STEAM programs has been a difficult process for the participants. Their narratives demonstrate strength and growth with their inspiring walk to success. Latina women often face challenges due to societal and cultural barriers, and these barriers can be a result of cultural expectations. Anzaldua's (1990) concept of "mestiza" describes how Latina women may feel in-between or straddling two cultures, which can create challenges in pursuing higher education with STEAM programs. Despite these challenges, Latina women have been making progress in STEAM fields and have become role models for future generations.

The participants' narratives and success stories provide inspiration and motivation for other Latina women who may have experienced similar challenges while pursuing their goals. By sharing their experiences and overcoming barriers, these women are breaking down cultural and societal expectations and paving the way for future generations to be successful in higher education programs like STEAM. It is important to recognize the accomplishments of the participants in their respective STEAM fields and celebrate their journey to mentor the future Latina STEAM scientists of the future.

The goal of this study was to gain an understanding of how Latina women were able to pave their way to success in STEAM fields. What follows is the analysis of the findings based on the research questions. Regarding the first research questions:

How do Latina women narrate their stories of perseverance in gaining higher education in STEAM?

The participants' narratives represent the stories of success of seven Latina women pursuing education and professional careers in STEAM fields. Each of the participants' stories is documented in depth and detail in chapter four. While all the participants share several common experiences of perseverance, each of their stories tells a different tale about the path to success riddled with particular challenges and traits of character to overcome them.

The common experiences that the participants of this study shared demonstrate that they developed higher levels of self-efficacy, resilience, and resourcefulness as they navigated the challenges of their STEAM higher education path. Another significant finding regarding the participants' perseverance is a sense of belonging, support, and affirmation from their peers and mentors, which helped them to persist in the face of difficulty. Additionally, the study uncovered that the participants utilized a variety of strategies to successfully complete their STEAM degree, including setting achievable goals, seeking resources, seeking out mentors and used other forms of support. Finally, I found that the participants experienced increased confidence in their abilities to pursue STEAM-related careers and further their education to higher levels due to their perseverance. Challenges that the participants of this study faced in their pursuit of education and careers in these fields represent the experiences common to other Latina women (Quiquley & Herro, 2016). Such challenges include cultural and societal barriers, financial difficulties, lack

of support, and can present difficulties among Latina women, but the participants faced these challenges with rigor and perseverance.

Calzada et al. (2021) suggest that Latina women in STEAM programs face challenges related to academic confidence, particularly when it comes to obtaining funding and scholarships. Similarly, the participants of this study shared in their narratives of the challenges they experienced in the STEAM professions. According to Calzada et al. (2021), the inexperience of knowing how to navigate the financial aid process can be a significant obstacle for these students. Calzada et al. (2021) found that when Latina women were provided with information and support to navigate the financial aid process, it had a positive impact on their academic confidence. By understanding the steps involved in obtaining funding and scholarships, the participants felt more empowered and better equipped to pursue their academic goals in STEAM programs. The findings of this study underscore the importance of various systems of support for Latina women to succeed in STEAM, including the knowledge of navigating the institutional structures and services.

The participants relied a great deal on their familial support, particularly the support of their mothers and grandmothers, necessary to overcome barriers on their path to success. The participants also shared that the challenging and engaging classes increased their desire to succeed when faced with difficult content in their programs. This finding aligns with what Gonzalez (2015) refers to as the three main lessons for Latina women: (a) positive self-efficacy; (b) the need for expanded social, emotional, and cognitive capabilities, and (c) a healthier lived context for Latina children and their families. Further, the participants of this study, by virtue of what they have attained in their lives in terms of educational and professional accomplishments, have already proved what perseverance means for Latina women pursuing STEAM careers.

The narratives of perseverance and success in higher education by the participants of this study exemplify what Solórzano and Yosso (2002) claim as the need for Latina women to use their voice for educational advancement. This provided valuable insights into the factors that shaped the experiences of Latina women in these fields, including cultural values, family support, access to resources and opportunities, mentorship, and community. Furthermore, this study demonstrates how Latina women overcome the challenges that they face in their path to success and why it is so important to convey these stories to promote other Latina women, like them, to follow in their footsteps.

One of the findings of this study suggests that it is important to consider a multidisciplinary approach and the expertise of many disciplines in solving problems presented in a STEAM learning environment (Quiqley & Herro, 2016, p. 412). In particular, the participants of this study benefitted from what Herman et al. (2018) called a positive mindset from instructors, teachers, and professors. It is possible that the positive mindset from the teachers and professors in the lives of the participants was the result of increased confidence in navigating the educational process which led the participants to be more mindful of their social, emotional, and cognitive abilities and ultimately to success in their STEAM programs. The participants of this study felt more confident in their ability to pursue STEAM programs and were able to engage more fully in their classes. This increased engagement and motivation led to improved academic performance and great success in the career pursuits of the participants.

On the other hand, some experiences of the participants of this study attest to what Wetzl (2018) states as being “vulnerable” and “uncomfortable” when their instructors focused on their deficiencies instead of celebrating their accomplishments. The participants of this study also amplified the role of mentors, family values, and community networks that have been

instrumental on their path to success. By having more support systems for STEAM students like mentorship programs, tutoring services, and career guidance, it would provide direction for Latina women in STEAM programs. This would encourage educators to provide access to and become comfortable in a laboratory environment as a key component to promote success of Latina students in STEAM programs. In this regard, the findings of this study support what Mina-Osorio (2021) state, that mentors are a vital piece of success for Latina students and it is the “best approach and lean on this group to learn from their strengths” (p. 82). The participants of this study shared how relying on mentors for support and guidance along their journey was a source of strength and it was vital to have mentors as a powerful strategy for promoting success. It is important for educators, administrators, and professionals in the STEAM fields to actively seek out and support underrepresented students, particularly through mentorship. This can help to create a more inclusive and equitable environment for all students to succeed in their academic and professional pursuits.

To elaborate on what has sustained the participants of this study’s success, it is worthwhile to mention how supremely important the role of their familial connections have been on this educational path. The participants shared how they were the first in their family to gain a higher education degree and the challenges that accompany this feat of achieving not only a higher education but a job in the STEAM field. O’Shea (2016) notes that first-generation college students, including Latina women, face a number of challenges in completing their educational programs. These challenges include a lack of understanding the educational system, financial barriers, and social pressures. As a result, many first-generation students may not complete their education and leave higher education all together. It is inspiring to know that the participants in this study were able to overcome these challenges and achieve success in the STEAM field, and

is a testament to their perseverance, dedication, and talent. By being the first in their families to pursue higher education and gain employment in STEAM careers, they are not only breaking down barriers for themselves but also paving the way for future generations of Latina women to follow in their footsteps.

Regarding the second research questions: *How do these women experience “invisibility” and stereotypes, if at all, when overcoming barriers on the path to success?*

The findings of this study under-score the significance of the concept of invisibility in terms of its lived reality and volatility when it comes to the experiences of the participants. Whether explicit or not, all participants referred to feeling either “invisible” in the classroom setting or isolated in their professional worlds. The participants in this study likely experienced invisibility and stereotypes in various ways as they overcame barriers on the path to success in STEAM fields. Feeling “invisible” or stereotyped is directly related to the participants’ resilience in overcoming numerous challenges in their lives. One of the findings of this study concur with what Ramirez (2011) and Gonzalez (2019) refer to as the challenges that Latina women faced in the United States. As it has already been discussed earlier, such challenges include discrimination, limited access to education, and a lack of representation in the STEAM fields. Further, Gonzalez (2018) argue that Latina women are often “falling through the cracks” in terms of social and economic support systems. While the participants of this study have experienced many and similar challenging experiences, they have persevered regardless of the odds.

How did the participants of this study respond to the challenge of being “invisible”? The findings of this suggest that the participants’ experiences of being “invisible” or being stereotyped at various stages of their educational and professional pathways vary. Some

participants testified to more overt experiences than others. For instance, some of them did not feel included or valued while in the classroom setting or professional environments. The participants shared how it was a constant battle to ensure they were included at professional conferences, or their ideas would be valued at their places of employment. The participants may have also felt invisible in terms of representation, with a lack of Latina women as role models in their field. The findings from the study confirmed what Solóranzo and Yosso (2002) referenced their research, suggesting that Latina women are often challenged with educational success, and this can take a toll on their sense of self-worth and motivation to excel. They may also feel invisible among their peers, which can make it difficult for them to receive support and guidance from others.

Latina women faced many challenges in their pursuit of higher education and careers in STEAM fields, including negative perceptions of their own intelligence and confidence, invisibility among their peers, and barriers that prevent them from achieving their educational goals. However, it is important to note that educators can play a crucial role in meeting the needs of Latina students and supporting them in their pursuit of higher education and careers in STEAM fields. By recognizing and addressing the unique challenges that these participants felt as Latina women faced, educators can help to create a more inclusive and supportive environment that empowers these students to pursue their goals (Villenas, 2014, p. 217). All the participants shared how invisibility affected their path to success but due to their resilience and strength, they were able to overcome these feelings of inferiority to superiority.

For instance, this can include not being recognized for their achievements, not being included in important conversations and decision-making, or not being given equal opportunities for advancement. The participants of this study needed to be heard, seen, and to have the ability

to resist the feeling of being invisible to feeling powerful and valued. This is echoed in the study from Mena and Vaccaro (2017). The participants of this study faced some negative assumptions about their abilities, interests, or potential based on their race, gender, and ethnicity. These stereotypes can include the belief that the participants in this study are not as capable as their peers, not able to pursue careers in STEAM, or that they are not able to handle the demands of a career in a STEAM field. These experiences can have a significant impact on their academic and professional experiences and can make it difficult for them to succeed in these fields. This is echoed by what Achinstein (2015) quoted to the administrators in his study, that Latina women “are here, breaking stereotypes. The odds were against you, but you are showing that you can do it.” The participants’ shared the feeling that embracing your passion to have a successful journey was an important piece of advice. Mina-Osorio (2021) shared how successful Latina/o/x scientists and their advice was to “Nurture your passion,” a quote shared by Carpio from President Franklin Roosevelt, “A smooth sea never made a skilled sailor” (p. 35). I believe she is relating this quote to the experiences of the participants’ educational journey in the STEAM field from adversity to success. The quote from President Franklin Roosevelt also further reveals how the participants felt that “self-doubt and imposter syndrome” were true barriers that would need to be overcome to be successful in any science career (Mina-Osorio, 2021, p. 36). The importance of recognizing the impact of imposter syndrome or self-doubt could provide support for future Latina STEAM scientists in the future. Many of the participants revealed the struggles of overcoming imposter syndrome, feeling that they did not belong in the STEAM professional fields and having to remind themselves that they were smart enough to be part of this profession. Creating a culture of inclusivity and promoting diversity in STEAM fields can help to reduce imposter syndrome and self-doubt by providing a sense of belonging and demonstrating that

Latina women can succeed in the STEAM fields. Another Latina scientist and author, Martinez, who is a neuroscientist and artist shared how she was able to erase stereotypes by “never giving up regardless of the circumstances” (Mina-Osorio, 2021, p. 106).

Advocating for themselves was another component of what was necessary to ensure that their value was present in the science fields. The participants shared that the amount of persistence and perseverance that was required every day to accomplish their goals. They emphasized that it didn't matter the odds that were placed against them, they were going to overcome these barriers and be an example of what strong Latinas in the STEAM field should resemble. The idea of never giving up despite the circumstances is a theme from the participants to persevere through all the stereotypes, feelings of imposter syndrome, and knowing their path to success is the goal for their professional career.

Finally, the third research question intended to explore was the relevance of cultural capital to the participants' experiences: *What is the relevance, if any, of cultural capital to these women's success?*

As mentioned earlier, cultural capital refers to exploration of the participants' experiences as representatives of their native cultures infused with the wealth of traditions that provide sustenance to one's personal identity and at times, can present a challenge to one's professional identity. The participants shared how their abuelas and madres promoted their success through cultural capital. The difference between success and despair is dependent on the voices of our ancestors. This may imply that Latina women seek the wisdom and guidance from ancestors and how they play a critical role in shaping our outcomes and attitudes in life.

One of the main findings of this study, in relation to the conception of cultural capital, is that all participants of this study clearly identified their cultural “capital” as their cultural

heritage. Be it in connection to their familial ties, distinct cultures, religious beliefs, traditions, rituals, or the importance of their ancestry. The relevance of cultural capital to the success of the women in this study was explored. Harding et al. (2015) defines cultural capital as a set of “preferences and behaviors” and needed validation from the members of their society to uplift them during challenging times. The findings of the study indicate that cultural capital plays a significant role in the participants’ lives and contributes to their success. Cultural capital refers to the knowledge, skills, education, and social networks that individuals possess and can use to gain social and economic advantages. For the participants of this study, cultural capital was presented through the ancestral tradition sustained by the actions of their abuelas and madres. The cultural capital passed down to the participants from their abuelas included instilling a strong work ethic and respecting what an honest day’s work looks like, the unconditional love from their abuelas, and the idea of always having pride in your heritage. The traditions that have been passed down from their abuelas are valued such as how the family is the center of life in their community, finding joy in life, and living out your passion. The abuelas don’t speak often, but when they do speak, it has a profound effect on the participants. These lessons are examples of what cultural capital are to the participants and their journey to success in the STEAM fields.

Also, the participants of this study praised networks of support that extend their cultural heritage when it comes to their gaining success in education or professional careers. All in all, it is “cultural heritage” and networks that can be associated with the notion of “cultural capital” as the theoretical framework considered for this study. To be more precise, each participant of this study associated very clearly with the culture of her origin, which means that all participants of this study have a clear sense of their cultural identity. At the same time and as this study demonstrates, the participants came from various regions of Central America and Brazil

(Mexico, El Salvador, Ecuador, and Brazil). Even though they all identified themselves as Mexican, Latinas, and Brazilians; they also claimed several common aspects of Latina scientists in the STEAM professional fields.

It is worth noting that all the participants' experiences as representatives of their native cultures infused with the wealth of traditions that provide sustenance to one's personal identity and at times, can present a challenge to one's professional identity. The participants shared how their abuelas and madres promoted their success through cultural capital. The difference between success and despair is dependent on the voices of our ancestors. This may imply that Latina women seek the wisdom and guidance from ancestors and how they play a critical role in shaping our outcomes and attitudes in life. The study conducted by Saldaña (2021) reveals the importance of family support in the participants' decision to pursue a career in the STEAM fields. Munter-Orabona (1990) explained the importance of an abuela (grandmother) in a Latina woman's life and how this role, along with their madre (mother), is essential to their personal and educational growth. The impact of the bisabuelas (great-grandmothers), abuelas (grandmothers), madres (mothers), and other family members was significant for the participants, suggesting that the elderly women play an important role in guiding, protecting, and encouraging young Latinas to strive for success in their education and careers. This was evident in the description from the participants to have their abuelas and madres not only promote their journey through the educational process but to celebrate their successes when they completed their tasks.

The findings of this study confirm what Solórzano and Yosso's (20020) claim as support from ancestors, such as bisabuelas (great-grandmothers), abuelas (grandmothers), madres (mothers), and other family members, was essential to the success of the participants in their

quest for higher education and STEAM careers. The positive support provided by these family members was crucial in overcoming obstacles and helping the participants to achieve their goals. Although there were a few comments from the participants about negative support systems, the overall role of family support in their success was highlighted in this study. This highlights the importance of family support in the pursuit of higher education and careers in STEAM fields for women. The participants of this study shared the importance of abuelas and madres in their lives as they were attending college in the STEAM programs. The study from O'Connell et al. (2021) described the voices of abuelas and madres as relieving the levels of fear, failure, to the need of experiencing self-esteem and success, suggesting that the voices of the abuelas and madres can have a positive impact on the emotional well-being of the participants, their children, and future children. The importance of family revealed the need for support of their decisions to pursue science in the STEAM fields and embrace the passion they felt as a scientist, engineer, or artist. The impact of the bisabuelas (great-grandmothers), abuelas (grandmothers), Madres (mothers), and other family members were significant for the interview participants.

In the Latina culture, it is important to have the approval of family members for personal and career decisions, but the participants' passion for their choices was often met with disbelief due to societal norms. This highlights the importance of having support from family and loved ones in pursuing one's passion, particularly when it goes against societal norms. The study also highlights the significance of the role of the bisabuelas (great-grandmothers), abuelas (grandmothers), madres (mothers), and other family members in the Latina culture. Their support and guidance play a crucial role in the participants' journey to become successful in their chosen field. This reflects the importance of the role of family in the Latina culture, where the support

and guidance can make a significant impact in the lives of the individuals, especially in their professional lives.

This study also reveals that the participants had to work hard to convince their family of their passion and their decisions to pursue a career in the STEAM field. This highlights the societal norms that exist and the challenges that underrepresented groups, such as Latina women, face in pursuing their passion in the STEAM fields, and how they must work hard to overcome these barriers. The participants in this STEAM career path faced barriers due to societal and gender inequalities, as women, particularly Latina women, were underrepresented in the field of researching animals in the wild. Despite these challenges, the participants did not feel hindered by the process, but rather they had to work harder to achieve their goals. The voices of their ancestors, for example, bisabuelas (great-grandmothers), abuelas (grandmothers), and madres (mothers) were important because they knew that they would be proud of their efforts, and it was the driving force to succeed. Providing a voice and representation for underrepresented groups in higher education is a valuable and important goal. By sharing their experiences and struggles, the participants can raise awareness and create a sense of community for others who may be facing similar challenges. The participants' efforts can also inspire other girls to pursue their education and careers, despite any obstacles they may face.

Some of the participants identified with the concept of the feminist culture based on their passions to be in STEAM programs. The matriarch values that were passed down from their abuelas gave direction to a successful path. However, some of the participants did not want to identify with the idea that they were feminist despite their success in the STEAM fields. Kayumova et al. (2015) defined the feminist culture studies as the “ways of knowing” through the mother/daughter interactions regarding the culture process to empower one another. This

would suggest that identifying and understanding the cultural capital can have a positive impact to the participants' academic and personal pursuits. The diverse perspective and experiences of the participants can provide strategies and approaches that are better suited to their strengths and needs.

Recommendations for Educational Professionals and Policy Makers

The findings of this study can serve as a blueprint for educational professionals and policymakers in terms of providing more opportunities for Latina students in the STEAM fields through offering more incentives and programs conducive to increasing the presence of Latina students in STEAM and other fields as well as expanding spaces for inclusive and equitable educational and professional settings.

For example, one such program, CLAVE (in Spanish, Colaborando con las comunidades Latinx para avanzar en educación; or in English, Collaborating with Latinx communities to Advance Communities) opened an opportunity for me and other graduate students to benefit from mentors and resources to complete my doctoral studies.

I would like to propose that teacher education programs preparing future teachers of STEAM develop more effective curriculum in terms of linguistic and immigrant diversity to attract more students of Latina and other ethnic backgrounds. The findings of this study suggest that Latina students need particular assistance from mentors and other representatives from various networks that would encourage them to pursue education and future careers in STEAM. The participants of this study highlighted the importance of mentorships and internship opportunities in their path to success. They shared that having a mentor earlier in their educational journey would have been helpful in navigating the challenges and barriers they faced

in the STEAM fields. They emphasized the importance of having a mentor, asking questions, and not being embarrassed to seek help. The participants suggested that young Latina students should seek out a supportive group and to have mentors to provide guidance and affirmation on their journey toward success.

School administrators should provide more professional development opportunities for teachers in terms of better understanding different racial and ethnic backgrounds of their students to develop more culturally relevant teaching and learning practices. Higher education institutions should develop more effective enrollment strategies to attract potential students from Latino and other ethnic and racial groups. University faculty and staff should engage in on-going cultural sensitivity training to develop and sustain successful practices from which all students can benefit, and particularly those students who might feel “invisible” in the culturally mainstream environments.

Finally, the implication of this study sends an important message to policy makers who could initiate more programs assisting Latino and other ethnic communities to pursue higher education and professional careers in STEAM and other fields.

Recommendations for Future Research

This study can be developed in several ways. First, it can be expanded in terms of geographical location to include participants from different regions in the U.S. or other countries to conduct a comparative study. This would provide a more diverse perspective on the experiences of Latina Women in the STEAM fields.

Furthermore, this study can be developed as mixed methods research integrating both quantitative and qualitative data, which could ensure a much larger sample and could make a

more comprehensive case for Latina women in the STEAM fields. Finally, this study could focus on teacher education programs preparing future teachers of STEAM by analyzing the curricular development, design, practicum experiences, and outcomes, particularly for Latina candidates.

Final Reflections

Learning about the journey of these talented and gifted women allowed me to gain insight and appreciation for their experiences, struggles, and the barriers they faced. It also allowed me to understand the importance of the role of family, culture, and mentors in their journey towards success. It also helped me to understand the importance of embracing their histories and celebrate their futures as Latina scientists through their individual victories and accomplishments in the STEAM field. The participants stories made me reflect on how important it is to support and encourage more Latina women to pursue their passion in the field of science, technology, engineering, art and mathematics.

As I was considering how I could be an advocate for future Latina STEAM students, Malcolm, my grandson was born in September 2021. This ignited a desire to make a difference, not only in the lives of future Latinas but for the young people like my grandson Malcolm. I would ask myself, how do I influence the lives of young people who want to be in the STEAM field? It is my goal to ensure that young kids like Malcolm have people in their lives that will lift their dreams and goals to be the stars that they can be. Malcolm brought purpose to my life, and it is amazing that this little baby boy made me a Nini (his abuela). Now I am the person that my Mena, my abuela, was in my life. The memories of my abuela, Mena, has encouraged me to be the best Nini (abuela) that I can be with Malcolm. For Christmas, Malcolm received about fifteen books about the STEAM field, and the first 100 words in science (zoo animals, biology,

physics), technology, engineering, arts, and math. When I read these books to Malcolm, I wonder to myself, are other Latina toddlers being read to about STEAM children books? As I stated before Malcolm brought purpose to my life and to my study about Latina women in the STEAM field, he would look at me with these eyes of wonder and I knew that it would be my job to be one of the many positive people in his life. As I finish the study, it is a great responsibility to encourage our young kids to have the positive mindset to achieve their goals and it all begins when they are babies. Malcolm is the joy to my life since the birth of my own daughters. I hope that Malcolm would be proud of his abuela, like I am proud of my abuela, Mena. That is the goal in my life.

When I began this journey for this dissertation study, I was remembering how my abuela, Mena, was a significant role model in my life to achieve as much as I could in the areas where I was passionate. My mother, Irma, was also a significant key member of my success in the science world. As the dissertation process continued, my mother passed away and lost her battle with Alzheimer's Disease and Breast Cancer in March 2022. This was a significant loss in our family because we lost our matriarch, our role model, and our cheerleader to live our lives authentically and with joy and passion. My mother influenced my walk as a mother to my daughters, Ofelia and Carolina. The love she shared with my daughters was similar to looking at the most beautiful sunset. She was their abuela, she loved her grandchildren, and they loved her with an everlasting love. When she passed away, both of my daughters talked about her and went to therapy to discuss the grief they were feeling about losing their abuela. As their mother, it is hard to see how the loss of their abuela effected their lives and now that I am an abuela to Malcolm, I can understand. Ofelia and Carolina have made their abuela very proud with the lives they are living and have continued to live the life that my mother wanted for them. She would

always say to Ofelia and Carolina, my dream is to make sure that you are happy with your life, work with passion in your job, but most importantly, love your family with all of your heart. When I walk across the stage to receive my doctoral degree, it will be the first time in my life that my mother will not be in the audience. It will be the first time that I will be unable to see the pride in her face as I accomplished another goal. This was the story that I wanted to tell about my mother, mi madre, and my best friend. She was the one that was always by my side and encouraged me to live my life with passion and joy. So now, as I walk across the stage, I will look up and see her in heaven and tell her that I told her story, Mena's story, and the stories of the participants about how to be successful in the STEAM field and how to mentor our future.

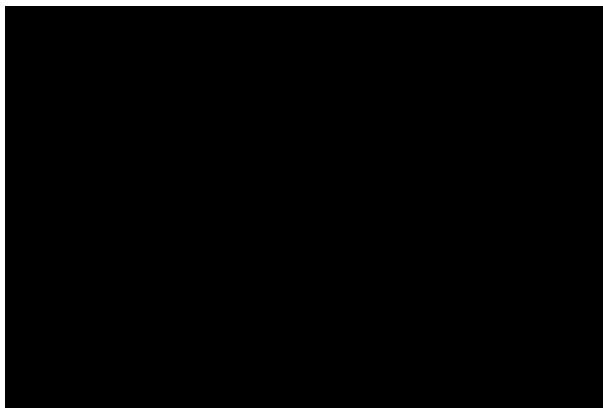


Figure 9

*Photograph of Carolina, Malcolm and Ofelia
from Brynn VB Photograph*

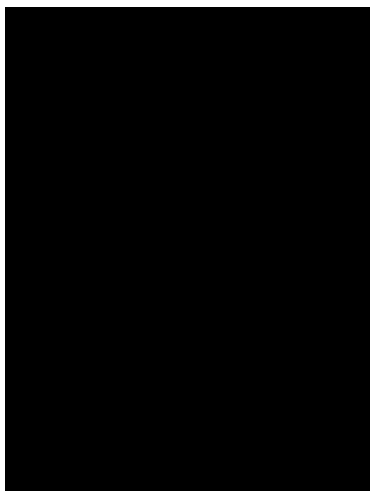


Figure 10

Toni and Malcolm

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Appendix A: Invitation to Participate

Invitation to Participate

Dear xxxxx,

I am a doctoral student at National Louis University located in Wheeling, Illinois. I am pursuing a Doctorate of Education in Curriculum, Advocacy, and Policy. In order to complete the requirements for this degree, I am conducting a research study titled, “Narratives of Perseverance by Latina Women Paving Their Way to Success in Science, Technology, Engineering, Art, and Math (STEAM) Higher Education”. The purpose of this study is to explore the narratives of Latina students in the Science, Technology, Engineering, Arts, and Mathematics (STEAM) educational programs who encounter struggles on their journey to successful careers. Some examples of the area where Latina students struggle are experiencing invisibility and stereotypes in the science fields. However, there are successful Latinas that have persevered to achieve their goal in the STEAM fields. The aim of this study is to collect their stories through a narrative study to discuss the personal, maternal, and grand-maternal experiences of overcoming barriers and how they dealt with the effects of invisibility within the education environments over generations. Using the narrative inquiry study as a method in order to reveal the life lessons and document their journey by telling their stories of their lived experiences to successful careers in the STEAM fields.

Participants selected to participate in the study will have the opportunity to engage in a 90-120-minute zoom (online) interview, participants will receive a consent form and discuss the prospects of their voluntary participation in the study. As part of the zoom (online) interview, participants will be asked a series of questions pertaining to their lived experiences and journeys to higher education in STEAM education, perceptions of maternal and grand-maternal leadership, and obstacles they may face as Latina women in STEAM. Your participation in this study will be kept confidential and is completely voluntary, as will be noted in a required signed consent form.

Lastly, due to the lack of Latina female scientists in the STEAM fields, your assistance with finding additional participants would be extremely helpful. If possible, could you please provide the email addresses and/or other contact information of any Latina scientists in the STEAM field who meet the criteria of this study? Any interested candidate can also choose to contact me directly with the information provided below.

Thank you for your consideration. Your contributions to this study will be valuable and greatly appreciated. If you are interested in participating in this study, please reply via email to [REDACTED]. Shortly after, you will receive an official informed consent form prior to participation in this study. If you have any questions, I can be reached at [REDACTED]. I look forward to hearing from you soon.

In appreciation,

Toni Lynn Carmichael
Curriculum, Advocacy, and Policy Doctoral Candidate
National Louis University, Wheeling, Illinois
IRB: ER01112

Appendix B: Informed Consent Form

Consent Form

Dear prospective participant:

My name is Toni Carmichael and I am a doctoral student at National Louis University. I am conducting the study, “Narratives of Perseverance by Latina Women Paving Their Way to Success in Science, Technology, Engineering, Art, and Mathematics (STEAM) Higher Education.”

The purpose of this study is to understand the lived experiences of Latinas in the fields of Science, Technology, Engineering, Arts, and Mathematics (STEAM).

The following research questions guide this study:

1. How do Latina women narrate their stories of perseverance in gaining higher education in STEAM?
2. How do these women experience “invisibility” and stereotypes, if at all, when overcoming barriers on the path to success?
3. What is the relevance, if any, of cultural capital to these women’s success?

You are being invited to participate in a qualitative interview that may last approximately 90-120 minutes. The interview will be audio- and video-recorded, pending your consent. The interview transcript will be sent to you for verification of accuracy. A follow-up interview may be requested depending on the research needs and purposes. During the interview, we will be discussing your path to higher education and the STEAM profession and other related questions.

Your participation in this study is strictly voluntary and you can withdraw from it at any time with no consequences to you. To ensure full confidentiality, the interview transcripts will be stored in a computer protected external drive that cannot be access from my laptop without physically connecting the device. The drive will be stored following the completion of my research, stored for 8-10 years, and then destroyed. All written research for the study will be kept on a protected server. For further protection, you will be assigned a pseudonym to keep your name and personal information fully confidential.

There are no anticipated risks or benefits, no greater than that encountered in daily life. Further, the information gained from this study could be useful to the National Louis University and other schools and school districts looking to initiate or refine culturally relevant practices related to STEAM educational fields.

If you have any questions regarding this study, please feel free to contact me at [REDACTED]. You can also contact my dissertation chair Dr. Antonina Lukenchuk at Antonina.lukenchuk@nl.edu or at 630-874-4636.

This study is being conducted in part to fulfill my doctoral requirements for the CAP EdD program at National Louis University. It is approved by the NLU IRB. Please contact NLU IRB Chair, Shaunti Knauth, shaunti.knauth@nl.edu; or at (312) 261-3526, if you have any questions.

You will be tendered a copy of your signed consent form. Please acknowledge with your signatures below your consent to participant in this study.
Thank you,

Toni Carmichael

I consent to participate in this study.

(Signature) (Date)

I give my permission to videotape this interview.

(Signature) (Date)

IRB: ER01112

Appendix C: Interview Guide – Semi-Structured

- What was it like to grow up in your family?
- Was education encouraged when you were growing up? If so, then how?
- Did you receive support from your family to pursue education?
- Did you have role models when growing up? If so, then what were they?
- Did you keep cultural traditions in your family, if so, then what were they? How important are they to you?
- Have you been influenced by the voices of your female ancestors?
- What does community mean to you?
- How early did you develop interest in STEAM?
- What or who influenced your interest in STEAM?
- Did you have any barriers when pursuing your career in STEAM? If so, what were they?
- Please tell me about your specific field with regard to STEAM. Why interest in this specific field?
- What is the motivational force behind your accomplishments and aspirations?
 - What would you tell your younger self about your goals and aspirations?
- Do you think gender plays a role in choosing STEAM professions?
- Do you consider yourself a successful professional? Please explain.
- Have you ever felt “invisible” in the pursuit of your education and professional career?
- Do you experience any barriers in your current position?
- Did you have any doubts about choosing this profession?
- When you hear the word “feminist,” what comes to mind first? How would you define it?
- Do you consider yourself a feminist? Explain why you think you are.

- What does it mean to you to be a Latina?
- What role, if any, does your ancestral heritage play in your life?
- Is there anything I didn't ask but you would like to share with me?