

EXPLORING THE EXPERIENCES OF QUEER WOMEN OF COLOR IN SCIENCE,  
TECHNOLOGY, ENGINEERING, AND MATHEMATICS PROGRAMS: A NARRATIVE  
INQUIRY

A Thesis Presented to  
The Faculty of the School of Education  
California State University, Channel Islands

In (Partial) Fulfillment  
Of the Requirements for the Degree  
Master of Arts

By  
Yasmin Quigley  
November 2019

©2019

Yasmin Quigley

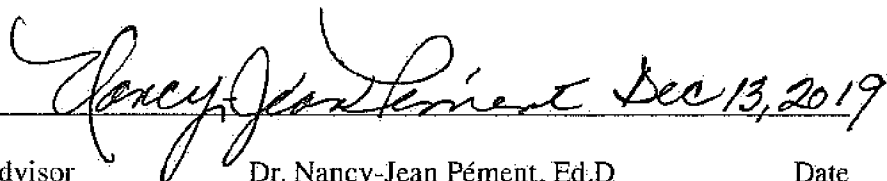
ALL RIGHTS RESERVED

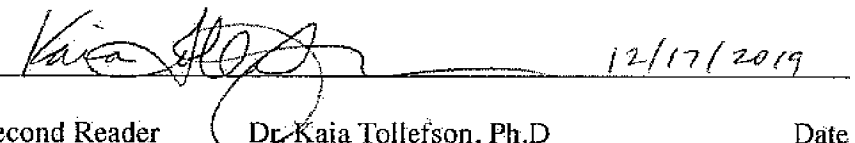
Student Name: Yasmin Quigley

Student ID: 002473719

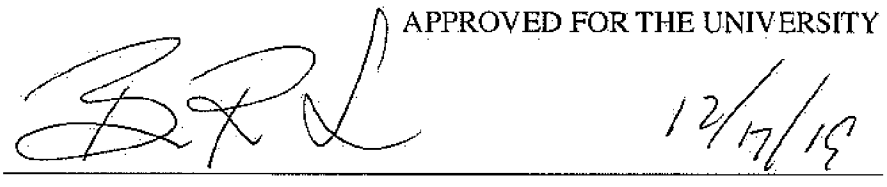
Thesis Title: Exploring the Experiences of Queer Women of Color in Science, Technology,  
Engineering, and Mathematics Programs: A Narrative Inquiry

APPROVED FOR THE SCHOOL OF EDUCATION

  
\_\_\_\_\_  
Advisor                      Dr. Nancy-Jean Pément, Ed.D                      Date

  
\_\_\_\_\_  
Second Reader                      Dr. Kaia Tollefson, Ph.D                      Date

APPROVED FOR THE UNIVERSITY

  
\_\_\_\_\_  
Dr. Brian R. Sevier, Ph.D                      Date

Dean, School of Education, CSUCI

## **Abstract**

Considerable global attention has been placed on science, technology, engineering, and mathematics (STEM) programs and professions crucial to solving global problems (Bianchini, 2013; Singer, 2011; Walker, 2015). Therefore, an increased importance has been placed on recruiting and retaining diverse students in STEM programs across higher education (Martinez, 2012; McGlynn, 2012; National Science Foundation, 2019; Racial and Ethnic Minority Students' Success, 2011). Although there have been slight shifts among women and underrepresented racial minority (URM) students enrolling in, and graduating from STEM programs (Holman, Stuart-Fox, & Hauser, 2018; Strayhorn, Harper, & Newman, 2010), increasing the representation of women, underrepresented racial minority (URM) students, and lesbian, gay, bisexual, transgender, and queer (LGBTQ+) students in STEM requires a nuanced understanding of these student populations and their intersecting identities (Byars-Winston, 2013; Linley et al., 2016). Specifically, this study aims to cultivate the current notions of underrepresented, minoritized and marginalized students in STEM and broaden the understanding of multiply marginalized students living intersectional lives while attending and graduating from their respective STEM programs. This study draws on the stories of five co-researchers who self-identify as queer women of color (QWOC) currently enrolled in a STEM program or recent graduates of a university-level STEM program. This qualitative study utilizes a narrative research design to explore the following research questions: 1) What are the experiences of QWOC in STEM programs? 2) How do QWOC explain their success in STEM programs? This master's thesis aims to advance our understanding of the experiences of QWOC in STEM.

## **Dedication**

To my love, my family, and my QTPOC peers—may we love ourselves despite what the world tells us.

## Acknowledgements

This master's thesis has been created by the varied and collective whole with which I am a part of intricately. The culmination of this research endeavor would not have been feasible without the support and encouragement of my loved ones. These acknowledgements are but a feeble attempt for me to humbly appreciate those involved in the vast contributions that assisted with this project.

To the five beautifully authentic co-researchers who volunteered their time and their stories. Thank you. You made this work possible and I am forever humbled and honored by the gift of your stories. I have been forever changed by each one of you. Thank you.

To the program faculty who encouraged my creativity and trying new ideas, thank you. Your belief in my ability and contributions to this program have forever changed me.

To my cohort, thank you for sharing and listening throughout our time together. Thank you for the thoughtful and engaging conversations. I am tremendously grateful for our time together.

To Nancy, thank you for being such an incredible advisor throughout this process. I did not deserve your patience and grace most days, but you supported me regardless. I would not have gotten to this point had it not been for our deep dialogue and critical conversations. I am forever indebted to you. When we first began our journey together, you gave me the gift of an incredibly ornate mirror to see myself more clearly in. And yet, as we wrap up this expedition together, I find myself leaving with an expansive and pristine window with which to reconsider the world through. I thank you for these gifts and the countless others you have given me over the past two years. Paulo Freire once said, "The educator has the duty of not being neutral."

Thank you for not being neutral. Thank you for fostering my exploration of the personal as political.

To my family, thank you for giving me the time and support I needed to get through this graduate program. I may never be able to make up for the missed birthdays and weekend adventures, but I promise to be more for you all as you have been for me. To my Granny, my Aunt, and my Mom, thank you for being incredible examples of strength and resilience. To Nicole and Michael, thank you for being the best siblings I could have ever asked for.

To my love, Lauren, thank you will simply not do. The time you have given me, this graduate program, and this master's thesis will never reflect the true acts of selflessness you have generously given these past two years. You fed and watered me, you watched me grow, and all you ever asked for was that I make myself proud. Thank you will never be enough and yet I will thank you for the rest of our lives. I love you.

## **List of Figures**

Figure 4.1. Co-Researcher Self-Identification .....	37
Figure 4.2. She Poem, We Poem, and He Poem .....	57
Figure 4.3. They Poem .....	58



## Table of Contents

Abstract.....	iv
Dedication.....	v
Acknowledgements.....	vi
List of Figures.....	viii
Table of Contents.....	ix
Chapter 1 (Introduction and Overview).....	1
Queer Women of Color in Science, Technology, Engineering, and Mathematics.....	3
Theoretical Framework.....	4
Statement of Purpose.....	6
Research Questions.....	6
Narrative Analysis and Poetic Transcription.....	7
Thesis Organization and Researcher’s Positionality.....	7
Chapter 2 (Literature Review).....	9
Science, Technology, Engineering, and Mathematics Programs: A Springboard for Innovation and Advancement.....	9
Under the Microscope: Science, Technology, Engineering, and Mathematics Ecology Revealed.....	11
Gender equity considerations: Women in science, technology, engineering, and mathematics.....	12
Racial and ethnic considerations: Women of color in science, technology, engineering, and mathematics.....	15

LGBTQ+ considerations: Queer women of color in science, technology, engineering, and mathematics.....	17
Theoretical Frameworks Considered .....	18
Critical engagement .....	19
Chapter 3 (Methodology).....	23
Methodological Approach: Narrative Analysis.....	23
Research Design: Theoretical Framework Integration .....	24
Data Collection and Procedures.....	25
Co-researchers.....	25
Recruitment and consent.....	26
Demographic questionnaire .....	28
Semi-structured interviews .....	28
Coding process.....	29
Confidentiality and pseudonyms.....	31
Trustworthiness .....	31
Crystallization.....	31
Member checking.....	32
Reflexive documentation .....	32
Thick description .....	32
Maximum variation.....	33
Role of the Researcher .....	33
Methodological Limitations.....	34
Conclusion .....	35

Chapter 4 (Findings) .....	36
Introducing the Co-Researchers and Truth Tellers .....	36
Emergent Themes .....	37
Representation, mentorship and belonging.....	38
Support through peers and student organizations. ....	40
Mental health, isolation, and imposter syndrome .....	43
Imposter syndrome.....	45
Persistence, resilience, and existence as resistance .....	47
Student success and meaning making.....	52
Conclusion .....	59
Chapter 5 (Discussion and Conclusions) .....	61
Under the Microscope: Intersectionality Discussed .....	62
Seeing yourself in the laboratory: Representation revisited .....	62
Musings of exclusion and othering.....	66
Recommendations and Future Considerations.....	69
Inclusivity and sensitivity trainings .....	70
Allocating necessary fiscal and human resources.....	74
Increasing diversity and representation .....	75
Limitations .....	76
Conclusion .....	77
References.....	81
Appendix A: Recruitment Email and Social Media Post.....	89
Appendix B: Recruitment Flyer.....	90

Appendix C: Research Informed Consent Form.....	91
Appendix D: Preliminary Demographic Questionnaire.....	93
Appendix E: Semi-Structured Interview Protocol for One-on-One Interviews.....	95
Appendix F: Role of the Researcher: Autoethnographic Vignettes .....	97
Appendix G: Role of the Researcher: Reflective Poem on my Educational Journey.....	105

## Chapter One

### Introduction and Overview

Considerable global attention has been placed on science, technology, engineering, and mathematics (STEM) programs and professions as crucial to solving global problems (Bianchini, 2013; National Science Foundation, 2019; Racial and Ethnic Minority Students' Success, 2011). Global areas of interest include increased technological advancements, renewable energy options, sustainable resource development and management, and the overarching consideration of climate change on future planning (National Science Foundation, 2019; Singer, 2011; Walker, 2015). While this list provides an overview of the varying roles that STEM programs and professions play in national and global advancement, it also reiterates the growing importance of increasing access and supporting matriculation through STEM programs across higher education. Currently, STEM programs continue to struggle with recruiting diverse students pursuing and obtaining postsecondary degrees (Bianchini, 2013; McGlynn, 2012; National Science Foundation, 2019; Singer, 2011).

Although there have been slight shifts among women enrolling in, and graduating from STEM programs, certain disciplines such as physics, chemistry, engineering, and computer science have seen virtually no increase and, in some cases, a decline in women's representation (Holman, Stuart-Fox, & Hauser, 2018; National Science Foundation, 2019; Strayhorn et al., 2010). Increasing the representation of women, underrepresented racial minority (URM) students, and lesbian, gay, bisexual, transgender, and queer (LGBTQ+) students in STEM requires a nuanced understanding of these student populations and their intersecting identities (Bianchini, 2013; Linley et al., 2016; McGlynn, 2012). Undergraduate research participation and faculty support have been instrumental when exploring opportunities to engage and support

LGBTQ+ students (Linley et al., 2016), women, and URM students (Strayhorn, Harper, & Newman, 2010) throughout their respective STEM programs. STEM pursuits across higher education have been noted as influential to both national and global planning and problem-solving (Martinez, 2012; Singer, 2011). However, institutions have continued to struggle to meet the variable and nuanced needs of marginalized and minoritized students in STEM programs (Byars-Winston, 2013).

In March 2019, the National Science Foundation (NSF) published a report on women, minorities, and persons with disabilities in science and engineering. This report summarizes recent national data that contextualizes the presence of women and people of color (POC) in STEM (National Science Foundation, 2019). When it came to degrees awarded, the NSF special report (2019) indicated that in 2016 women earned less than half of the degrees awarded in physical sciences. Underrepresented minority students received 22% of all science and engineering bachelor's degrees and 9% of all doctoral degrees in science and engineering. When looking at occupational data, the NSF report (2019) highlighted the following: (a) in 2017, more men were employed full time as scientists and engineers than women; and (b) of the scientists and engineers employed full time, about 70% are White. In 2017, women made less than men in each occupational group of full time employed scientists and engineers—the median annual salary for men was \$90,000 whereas the women's median annual salary was \$66,000. Similarly, salaries varied across racial and ethnic groups as well as across occupations—underrepresented minorities in science and engineering had an annual median salary of \$78,000, White individuals had median salary of \$90,000, and Asian identified individuals had the highest median salary of \$100,000. When it came to careers within science and engineering, women were less likely than men to work in STEM but were more likely than men to work in a STEM-related occupation,

including health occupations. Of those who received degrees in STEM, women (48%) were more likely than men (42%) to work outside of STEM occupations and 50% of underrepresented minorities went on to work outside of STEM occupations. The NSF special report (2019) further informs this research study with national data on the presence of women and people of color in STEM academic and occupational pursuits.

Given the aforementioned introductory research, this puts an onus on educational institutions and corporations to solve for an increase in diversity in STEM enrollment, subsequent graduation rates, and persistence to and within STEM careers. STEM programs are providing global and national solution-based innovations (Singer, 2011; Smith-Doerr, Alegria, & Sacco 2017; Walker, 2015) while being simultaneously translated into multiple forms of capital on an economic level (National Science Foundation, 2019). Similarly, the cultural capital that allows programs to further diversify enrollment and subsequent graduation, provides increased potential for community-based reinvestment via increasing diversity of women and underrepresented minorities in STEM. While enrollment and graduation are primary considerations from a postsecondary educational perspective, these are not the sole factors that lead to community and national STEM revitalization by mere matriculation of students in undergraduate programs. The pipeline extends throughout the path toward graduate programs and careers in STEM (Smith-Doerr et al., 2017). This reiterates the need to further explore and understand interest in STEM degrees and corresponding graduation rates throughout higher education.

### **Queer Women of Color in Science, Technology, Engineering, and Mathematics**

This project aims to explore the experiences of marginalized students in STEM. Specifically, this research project will inquire about the experiences of queer women of color

(QWOC) in STEM programs. There is a considerable lack of research on QWOC in STEM and much of this can be attributed to the lack of data in national studies for LGBTQ+ individuals (Naylor, 2018). Despite the research provided throughout years of data on women in STEM and underrepresented racial minorities or people of color (POC) in STEM, further research on the experiences of QWOC in STEM is necessary to better understand multiply marginalized student populations in STEM. Therefore, this research project aims to better understand the unique needs and experiences of QWOC in STEM programs. The goal of this study is to support critical reflection for STEM programs and institutions in an effort to advance equity, access, and support of QWOC throughout the process of applying, enrolling, and persisting throughout STEM programs. Given the increasing importance of global STEM engagement, issues of inequity in STEM become urgent priorities (Smith-Doerr et al., 2017).

### **Theoretical Framework**

In order to thoroughly and thoughtfully engage in the experiences of QWOC in STEM, I have chosen to anchor this study in critical theory and poststructuralism. Critical perspectives and poststructural paradigms acknowledge the presence of power differentials across marginalized populations and systemic oppression. More specifically, I focus this study's theoretical framework around two critical theories Critical Race Theory (CRT) and intersectionality. CRT acknowledges racism and focuses on the narratives of racially and ethnically diverse individuals or people of color (Delgado & Stefancic, 2001). Solórzano and Yosso (2002) argue that CRT assists in identifying and accounting for “the role of race and racism in education and works toward the elimination of racism as part of a larger goal of opposing or eliminating other forms of subordination based on gender, class, sexual orientation, language, and national origin” (p. 25). Through the lens of CRT, two additional theories used to



inform this research study are feminist critical theory (FemCrit) and critical theory drawn from queer theory (QueerCrit) (Abes, 2016). As noted above, intersectionality is used to inform this research study given the intricacies of the experiences of QWOC. The theory of intersectionality arose within legal discourse (Crenshaw, 1989, 1991) and was expanded upon through feminist scholarship to further describe and understand the experiences of women of color (WOC) in a patriarchal and racist society (Collins, 1986, 1990, 2000). Intersectionality and FemCrit support this research endeavor to better understand the experiences of WOC within systems of oppression. Queer theory further expands on the critical theory and leads into a poststructural lens whereby troubling the notion of heteronormativity and rigid gender portrayals identifying the fluid nature of both sexuality and gender identity (Sullivan, 2003).

Comprehensively, these theoretical notions provide the framework for this research study to explore the complex experiences of QWOC and their academic pursuits in STEM programs. These theoretical frameworks are also informed by Solórzano and Yosso's (2002) definition of critical race methodology (CRM):

A theoretically grounded approach to research that (a) foregrounds race and racism in all aspects of the research process. However, it also challenges the separate discourses on race, gender, and class by showing how these three elements intersect to affect the experiences of students of color; (b) challenges the traditional research paradigms, texts, and theories used to explain the experiences of students of color; (c) offers a liberatory or transformative solution to racial, gender, and class subordination; and (d) focuses on the racialized, gendered, and classed experiences of students of color. Furthermore, it views these experiences as sources of strength and (e) uses the interdisciplinary knowledge base

of ethnic studies, women's studies, sociology, history, humanities, and the law to better understand the experiences of students of color. (p.25)

This research study is supported and critiqued by the theoretical tools provided by CRT and CRM which honors the complex experiences of QWOC in STEM.

### **Statement of Purpose**

This qualitative study will explore the experiences of QWOC currently enrolled in and recently graduated from university STEM programs. A narrative research design has been utilized to engage and capture the storied lived experiences of the co-researchers (Boylorn, 2008), otherwise known as participants. The five co-researchers in this study showcase their personal and academic journeys as QWOC in STEM across the United States. The experiences shared in this study inform and broaden the current notions of underrepresented, minoritized and marginalized students in STEM. The goal of this study is to provide additional consideration to the experiences of QWOC in STEM programs for further review across institutions of higher education. Specifically, this study aims to cultivate and broaden the understanding of multiply marginalized students living intersectional lives while attending and graduating from their respective STEM programs. Institutional leaders must acknowledge the nuanced experiences of intersectional identity and the maintained homogeneity across STEM programs. In order to better understand the experiences of QWOC in STEM programs, we must center their truths and stories around the historical and political underpinnings of higher education and STEM programs alike.

**Research questions.** This qualitative study seeks to explore the following research questions: 1) What are the experiences of QWOC in STEM programs? 2) How do QWOC explain their success in STEM programs? To explore these questions, this study draws on the

stories of five QWOC that are currently enrolled in a STEM program or are recent graduates of a university-level STEM program.

**Narrative analysis and poetic transcription.** As the primary research question of this study focuses on experiential knowledge, narrative analysis was utilized to further explore the lived experiences of QWOC in STEM through co-participant engagement. Poetic transcription (Glesne, 1997) is used to explore and (re)tell the narratives of co-researchers (Richardson, 1994, 1997, 2018) provided by the five co-researchers in this study.

### **Thesis Organization and Researcher's Positionality**

This research project and master's thesis contains a total of five chapters where each takes on a specific focus. Chapter One introduces the research project and provides a brief overview of the purpose of this study. Chapter Two provides a review of the literature of marginalized populations in STEM, given the lack of research on the experiences of QWOC in STEM. Chapter Three specifies the methodological approaches taken to effectively address the research questions indicated above. Chapter Four introduces the co-researchers of this study, features their stories, and discusses the findings of these experiential data. Chapter Five revisits and expands upon the findings identified in Chapter Four while applying the critical and poststructural lens to the role identity plays in the experiences of the co-researchers. Similarly, Chapter Five addresses recommendations and feedback for faculty, staff and administrators of STEM programs and institutions of higher education at large.

This research project is a personal and political piece of work that deeply resonates with my own experience. While I did not aim to insert myself in this research study, this master's thesis was initiated by self-reflection of my own experience as a QWOC who completed her undergraduate coursework in a STEM program. Therefore, I acknowledge my positionality in

this research study. From the origin of the research topic and question, to the methodological approach, and theoretical application, these deliberations were thoughtfully reviewed and implemented to effectively begin this research endeavor. The greatest gift bestowed upon this master's thesis is the time and stories kindly provided by the five co-researchers in this study. My role was that of a vessel steeped in privilege with the opportunity to highlight their journeys and critically analyze the systems of oppression at play with these experiences in mind. My only request of the reader is that this journey is undertaken with the caveat that no one experience generalizes the whole. Each of the five stories should not to be considered an exhaustive part of a collective voice but rather their storytelling and counter-storytelling is reflective of the sinusoidal ebb and flow of their individual and collective beings. This is but a humble snapshot of their fluid realities deeply interwoven into the fabric of their existence provided in this master's thesis as seedlings in an orchard of fruitful propagation and meaning making.

## **Chapter Two**

### **Literature Review**

The literature discussed in Chapter Two highlights the importance of advancing equity and diversity in STEM programs and subsequently the STEM workforce. This chapter is centered around the marginalized student populations in STEM that this master's thesis builds upon when inquiring about the experiences of QWOC in STEM. The purpose of this chapter is to identify the literature focused on the minoritized student experience in STEM programs in higher education, to frame this research project within an increasing need for additional literature on intersectional identity in STEM, and to further establish the theoretical framework for my analysis. By minoritized student, I refer to marginalized student populations that are beyond the lived experience of White, cisgender, male identity including but not limited to race and ethnicity, gender and sexuality whereby this thesis focuses on QWOC. With this in mind, I will return to the research questions central to this master's thesis: 1) What are the experiences of QWOC in STEM programs? 2) How do QWOC explain their success in STEM programs?

As this research project moves forward, I would like to orient the reader to the three areas of literature provided within Chapter Two. First, I identify the importance of STEM as a national and global interest to contextualize the significance of diversifying STEM programs and occupations for minoritized persons in the United States. Second, I combine relevant literature of marginalized populations in STEM as it relates to my research questions and orientation around the experiences of QWOC in STEM. Third, I provide additional context to the theoretical framework discussed in Chapter One to round out the critical and poststructural lenses utilized to acknowledge the presence of power differentials across marginalized populations and disrupt systemic oppression.

## **Science, Technology, Engineering and Mathematics Programs: A Springboard for Innovation and Advancement**

As referenced briefly in Chapter One, STEM programs throughout higher education have been mentioned in various literature as instrumental in global and national planning (Bianchini, 2013; National Science Foundation, 2019; Racial and Ethnic Minority Students' Success, 2011). Specifically, institutions have begun fostering dialogue around sustainability and comprehensive STEM programming as a means of encouraging creative solutions to real world problems outside of the classroom (Bianchini, 2013; Rogers, Pfaff, Hamilton, & Erkan, 2015; Singer, 2011; Walker, 2015). Researchers have indicated that engaging learners and providing practical experiences have been important areas of focus through application-based curriculum and the nurturance of practical knowledge in the STEM workforce (Racial and Ethnic Minority Students' Success in STEM Education, 2011; Singer, 2011). While a shift in STEM program objectives has been discussed, the issue continues to revolve around increasing student enrollment and graduation in STEM (Doerschuk et al., 2016; Singer, 2011). Researchers have shown fewer women and underrepresented racial minorities (URM) pursue and graduate from STEM programs, reiterating the importance of continued research on representation in STEM (Bianchini, 2013; Byars-Winston, 2013; Doerschuk et al., 2016; Singer, 2011). Similarly, lesbian, gay, bisexual, transgender, and queer (LGBTQ+) students have been shown to struggle with identity and subsequent exclusion throughout their STEM pursuits (Hughes, 2017). The literature highlighted above simply scratches the surface on the importance of representation in the national and global advancement of STEM programs and occupations. Chang, Sharkness, Hurtado, and Newman (2014) further expand upon the significance of access and retention of diverse student populations in STEM programs while noting the most underrepresented student

populations in STEM happen to be the fastest growing groups in the general population. With this in mind, I will further examine literature on the experiences of minoritized student populations in STEM programs across higher education.

### **Under the Microscope: Science, Technology, Engineering and Mathematics Ecology Revealed**

While I did not come across any STEM-oriented research on QWOC, I sought to explore literature on broader identity groups. A vast majority of the literature was centered around the perspectives and experiences of women, separate from literature that specifically addresses sexual orientation or subsequent gender expression across the LGBTQ+ community. When discussing gender identity, gendered experiences must be acknowledged as societal implications and misogynist subjugation to internalized projections within and across group membership (Abes, 2016). Although this research project has been identified with CRT and intersectionality central to the theoretical framework for analysis, it should be reiterated to the reader that the literature in this section is singularly focused on specific identity groups within STEM.

Chapter Two was not created to discount the intersectionality of a QWOC student experience but to further advance the importance an intersectional experience through the simultaneity of oppression (Holvino, 2010). Holvino (2010) gives context to the multiplicity of meaning making and experiencing the world through intersecting experiences to be all identities and none within the same lived experience. It is my hope this literature can set the stage from which to consider the nuance and the margins of the experiences of queer women of color in STEM despite a lack of research yet undertaken. With this in mind, this section begins by exploring the largest source of literature on women in STEM, then reviews research on women

of color in STEM alongside a larger consideration of underrepresented minority students in STEM, and finally, the experiences of LGBTQ+ students in STEM.

**Gender equity considerations: Women in Science, Technology, Engineering and Mathematics.** In 2011, an issue brief in the Economics and Statistics Administration was presented by the Office of the Chief Economist indicating women were sorely underrepresented in STEM jobs and STEM undergraduate degrees (Beede et al., 2011). While this report used publicly available data from 2009, it highlighted the fact that women hold a disproportional amount of undergraduate STEM degrees when compared to men. While men occupied 52 percent of the entire workforce with women occupying 48 percent, women were found to represent 24 percent of STEM occupations compared to 76 percent of men in STEM occupations. Of the women who received undergraduate STEM degrees, only 23 percent of women held occupations in STEM. Comparatively, 40 percent of men with undergraduate STEM degrees held occupations in STEM (Beede et al., 2011). An updated issue brief in the Economics and Statistics Administration was published in 2017 by Ryan Noonan. While this report used data from 2015 (Noonan, 2017), it aligned data comparisons to the previous report (Beede et al., 2011) noting little to no overall change in the last five to six years. Numbers remained relatively the same where 23 percent of women with STEM degrees held STEM occupations compared to men at 39 percent. In both reports, women with STEM degrees worked primarily in the physical and life sciences fields (Beede et al., 2011; Noonan, 2017). Of the most recent report, Noonan noted 59 percent of women worked in the physical and life sciences fields. Noonan (2017) indicates:

The relatively few women who receive STEM degrees are concentrated in the physical and life sciences, while men with STEM degrees are concentrated in engineering.



Perhaps reflecting this difference in concentration, women who receive STEM degrees are less likely than their male counterparts to work in STEM jobs, instead opting for more careers in the healthcare and education sectors. For those women who do work in STEM, we find a somewhat smaller gender earnings gap than for the overall labor force. (p. 11)

Both issue briefs offered this information for consideration of policymakers and educators alike. Noonan (2017) spoke to the importance of STEM equity by noting, “STEM jobs are crucial to the competitiveness, innovation, and flexibility of the modern economy” (p. 11). As Beede and colleagues (2011) formalized the significance of these data through their assertions that these findings “provide definitive evidence of a need to encourage and support women in STEM with a goal of gender parity” (p. 8). The implications of these data remained in the financial access for women in STEM, particularly when engineering and technological careers have been least accessible by women (Beede et al., 2011; Holman et al., 2018; Noonan, 2017; Strayhorn, Harper, & Newman, 2010).

Similarly, as noted by the issue briefs presented above, STEM has seen an increase of women in areas of medicine and biology (Holman, Stuart-Fox, & Hauser, 2018; Malcom & Malcom-Piqueux, 2013; Singer, 2011)—an optimistic portrayal of gender equity when compared to the predominance of men throughout the fairly homogenous STEM fields. Although there have been slight shifts of women enrolling in and graduating from STEM programs, certain disciplines such as physics, chemistry, engineering, and computer science have seen virtually no increase and, in some cases, a decline in the representation of women (Holman et al., 2018; Strayhorn, Harper, & Newman, 2010). Interestingly, young girls who have experienced STEM exposure throughout early education developed a higher interest and subsequent achievement in STEM (Wai, Lubinski, Benbow, & Steiger, 2010). Early educational experiences and

considerations in STEM become central to advancing and engaging women alongside racial and ethnic minorities. In an effort to further explore the experiences of young girls and STEM engagement, it remains essential to explore any and all society-driven context of group membership and identity-based opportunity (Tan, Calabrese Barton, Kang, & O'Neill, 2013). Tan, Calabrese Barton, Kang, and O'Neill (2013) have brought to light the nuanced consideration of young girls' experiences given their own portrayals of identity-based interests and career considerations based on ethnographic and interview data.

Similarly, a recent study by Todd (2015) explored the notion of identity-related inquiry and STEM interest with young girls and their subsequent attendance in a science camp for girls. In this mixed methods study, Todd (2015) found young girls' interest in science varies as their gendered identity development solidifies. Gendered notions of science engagement arose during observations and interviews of the respective young girls attending science camp. While themes of varying science interest were explored through self-efficacy and identity membership, the findings showed a continued and solidified interest for young girls with continuing exposure to science (Todd, 2015). Along these considerations, gender was further explored in an ethnographic study by Carlone, Johnson, and Scott (2015). This study explored the experiences of fourth, fifth, and sixth grade girls' gender performance and interests in science. Carlone et al. (2015) noted the importance of framing a researcher's understanding of social structures when considering gender experiences within and outside of the classroom. Interestingly, gendered performances in this study impacted whether a young girl continued to explore or expand upon their interest in science. The notion that science may compromise a young girl's gendered image of being feminine or 'girly' led young girls to have less interest throughout early years based on the prominent portrayal and subsequent expectation of heteronormative behaviors (Carlone et al.,

2015; Todd, 2015). Carlone and colleagues (2015) observed that young girls had a declining interest in science when gender norms became a social priority. The exploration of the two, being a young girl and becoming interested in STEM was not identified in this study. These studies have identified the importance of STEM engagement and exploration of young girls' interest in STEM to promote diversity and inclusion STEM pursuits. When examining the relative absence of women in STEM, the considerations of young girls at an earlier junction other than undergraduate or graduate pursuits gave context to the complex notion of gender identity and subsequent interest in STEM (Carlone et al., 2015; Todd, 2015).

If gendered inhibitions dissuaded or excluded young girls from fostering an interest in STEM, it became reasonable to identify a gendered pipeline restricting and sidelining women in their pursuits of STEM programs in higher education. Another study highlights the importance of women feeling a sense of belonging across STEM programs and professions (Moss-Racusin, Sanzari, & Robasco, 2018). Similarly, researchers asserted that despite gender parity in a STEM discipline, if gender bias remains present, women have experienced less sense of belonging which may cause a loss of interest or self-selection out of the program or profession (McGlynn, 2012; Moss-Racusin et al., 2018). The significance of these findings has shed light on the considerable efforts educators and policymakers must undertake to truly look at a gendered pipeline in STEM. Next, I will explore STEM engagement of women of color alongside broader considerations of underrepresented racial minority (URM) students pursuing STEM degrees.

**Racial and ethnic considerations: Women of color in science, technology, engineering and mathematics.** When exploring the STEM pursuits of women of color alongside underrepresented racial minority (URM) students, I should note my use of the term women of color is an intersectional linguistic reference to expand upon the identity of women

who are also URM students. Bianchini (2013) and McGlynn (2012) have asserted increasing representation of URM students in STEM lies with a nuanced understanding of the experiences of these student populations and their intersecting identities. Undergraduate research opportunities, academic readiness programs, and financial support have become a few areas noted for further consideration to increase graduation rates of women and URM students in STEM (Bianchini, 2013; Martinez, 2012; McGlynn, 2012; Strayhorn et al., 2010). Similarly, research has indicated the necessity of institutional and systemic acknowledgment of inequity on a national level to better understand the needs of women of color and URM students in STEM programs (Byars-Winston, 2013; Malone & Barabino, 2009). Women of color and other URM students have faced persistent and variable challenges throughout pursuits in STEM programs most of which fall back to perceptions of social fitness, or social acceptance, as defined by Dika and D'Amico (2016). The notion of social fitness was presented largely through systemic perpetuations of discriminatory thoughts around performance of URM students (Dika & D'Amico, 2016) in predominantly White and male programs. The heteronormative, White, cisgender male experience has been seemingly synonymous with STEM culture.

When considering the presence of URM student populations within STEM, the literature focuses on faculty and peer engagement. Specifically, research opportunities have been identified as avenues for academic support and increased persistence rates of URM students (Hurtado, Newman, Tran, & Chang, 2010; Malone & Barabino, 2009). Too often URM students may feel isolated when they are the only ones in a lecture hall, small discussion course, or in a laboratory. Malone and Barabino (2009) discussed the impact of loneliness and its effect both in the classroom and in the laboratory. Alongside noting the importance identity may have on educational pursuits, laboratory-centered experiences in these exclusive spaces became worthy

of note (Hurtado et al., 2010; Malone & Barabino, 2009). Engaging with faculty remained an important consideration for retention and graduation of women of color and URM students in STEM (Hurtado et al., 2010; Hurtado et al., 2011; Johnson, 2007; Russell & Atwater, 2005). An increase in research and faculty engagement with URM have played significant roles in promoting URM student success (Hurtado et al., 2010; Hurtado et al., 2011; Johnson, 2007; Malone & Barabino, 2009).

Similarly, Strayhorn, Harper, and Newman (2010) indicated that undergraduate research participation was an important factor in the persistence and retention of women of color and URM students throughout their respective STEM programs. A higher level of engagement in undergraduate research led to an increased likelihood of pursuing an advanced degree in STEM (Singer, 2011; Strayhorn et al., 2010). Additional methods to increase persistence and retention rates for women of color and URM students in STEM programs included institutional policy review, action planning, and faculty and staff professional development to better close equity gaps and increase bias literacy (Aikenhead, 2010; Carnes et al., 2012; Malcom-Piqueux & Bensimon, 2017). Similar to a microsphere worthy of research and consideration in a larger ecosystem, mechanisms to retain women of color and URM students in STEM programs have been encouraged for actionable deliberation (Aikenhead, 2010; Carlone & Johnson, 2007). When exploring ways to further diversify STEM programs, supportive avenues toward retention alongside considerations around attrition of women of color should be at the top of the list. Next, I will explore STEM engagement of queer women of color alongside broader considerations of lesbian, gay, bisexual, transgender, and queer (LGBTQ+) students pursuing STEM degrees.

**LGBTQ+ considerations: Queer women of color in science, technology, engineering, and mathematics.** During my review of literature with respect to queer women of color,

research was seemingly nonexistent. It seems that the scope of such a nuanced intersection of identity with respect to STEM has remained largely unexplored. Much of what I was able to find focused around gay men in STEM and entirely focused on White, cisgender, gay men. Interestingly, Hughes (2017) researched gay engineering students whereby all participants remained salient in their gender identities and committed to the duality of a predominantly masculine gendered experience. Unfortunately, Hughes' (2017) study also noted these men were not out as gay to anyone in their program, much less their respective faculty members or advisors. Linley et al. (2016) noted the importance faculty members can play when supporting LGBTQ+ students in STEM programs. However, this focus, again, only included gay men in the study. Similarly, Waldrop (2014) called scientists to out themselves as LGBTQ+ members in the scientific community to better support current and prospective scientists. While this call to action was ripe for consideration and positive in its intent, it served to further illuminate the relative invisibility of QWOC in STEM programs.

In this final review of research when considering QWOC in STEM programs, a lack of findings solidified the importance of exploring said postsecondary experiences. Institutions must reflect upon their respective STEM programs to gauge equity, access, and support of QWOC throughout the process of applying, enrolling, and persisting in STEM programs. Given the increasing importance of global STEM engagement, issues of inequity in STEM become urgent priorities. Next, I will speak to the theoretical frameworks I consider when troubling the notion of STEM's hegemonic perpetuation of White, cisgender, maleness through the significant lack of representation and presence of QWOC.

### **Theoretical Frameworks Considered**

**Critical engagement.** As highlighted in Chapter One, this study's theoretical framework is primarily anchored in two critical theories: Critical Race Theory (CRT) (Delgado & Stefancic, 2001; Solórzano & Yosso, 2002) and intersectionality (Collins, 1986, 1990, 2000; Crenshaw, 1989, 1991). In order to comprehensively dissect narrative inquiry, I must first locate the inquiry within larger social and political frameworks. The importance of this philosophical exercise rests in the deconstruction of systems of oppression. Powerful forms of oppression, such as racism and White supremacy, have been mobilized to keep those in power at the pinnacle of dominant hegemonic discourse (Delgado & Stefancic, 2001; Solórzano & Yosso, 2002). When considering a comprehensive view of these ideological power structures, one cannot overlook their role in maintaining the status quo. As a means of analyzing dominant discourse, critical race theory (CRT) has been used to explore, expand upon, and challenge oppressive structures and discussion (Delgado & Stefancic, 2001; Solórzano & Yosso, 2002; Yosso, 2005). Ideological representations of dominance through racism, misogyny, the vilification of the poor, heteronormativity, and so forth have supported the well-oiled machinery of hegemony (Abes, 2016; Delgado & Stefancic, 2001; Lather, 1992; Solórzano & Yosso, 2002).

By removing the deficiency-based portrayal of minoritized and marginalized communities commonly adopted in dominant discourse, learning becomes centered around the multifaceted truths and experiences of marginalized individuals. This realization becomes a call to action capturing the untold and, often silenced, stories of the oppressed. Solórzano and Yosso (2002) discussed the idea of counter-storytelling as a means of countering the deficit-based model currently perpetuated in academia and amongst social scientists. Counter-storytelling “critically illuminates concepts, ideas, and experiences” (Solórzano & Yosso, 2002, p. 36), all while incorporating elements of CRT. Solórzano and Yosso (2002) assert:

We believe counter-stories serve at least four functions as follows: (a) They can build community among those at the margins of society by putting a human and familiar face to educational theory and practice, (b) they can challenge the perceived wisdom of those at society's center by providing a context to understand and transform established belief systems, (c) they can open new windows into the reality of those at the margins of society by showing possibilities beyond the ones they live and demonstrating that they are not alone in their position, and (d) they can teach others that by combining elements from both the story and the current reality, one can construct another world that is richer than either the story or the reality alone. (p. 36)

Specifically, Solórzano and Yosso (2002) identified this form of critical race methodology as an imperative framework to consider when engaging in educational research. Yosso (2005) reiterated the importance of critical race theory (CRT) in education and expanded upon this to include intersectional and multilayered portrayals of CRT through the incorporation of multiple racial and gender identities. While these initially included theories such as AsianCrit, FemCrit, LatCrit, TribalCrit, and WhiteCrit (Yosso, 2005), critical race theorists have gone on to theorize notions of multiculturalism and multiraciality in MultiCrit and, more recently, the experiences of those who identify as queer in QueerCrit (Abes, 2016). As highlighted in Chapter One, queer theory further expands on critical theory and leads into a poststructural lens whereby troubling the notion of heteronormativity and rigid gender portrayals identifying the fluid nature of both sexuality and gender identity (Sullivan, 2003).

Promoting a story of access and privilege across the masses dismisses the burdensome experiences of those that bear the weight of oppression in societal webs of misrepresentation and cultural erasure. This acknowledgement, therefore, steers our ship toward clearer seas by



honoring the multifaceted and varying experiences across communities as the final destination. A voyage weathering the stormy seas of ideological singularities while navigating the dynamics of systemic oppression. By setting sail on a critical journey of discovery, a researcher's privilege can denounce the hegemonic displays often feasting off the encumbered backs of the respective oppressed individuals and communities. Freire (2001) noted the importance critical theory plays when educators consider their praxis with traditionally marginalized learners in mind. In his book, *Pedagogy of Freedom: Ethics, Democracy, and Civic Courage*, Freire (2001) asserts:

One of the basic questions that we need to look at is how to convert merely rebellious attitudes into revolutionary ones in the process of the radical transformation of society. Merely rebellious attitudes or actions are insufficient, though they are an indispensable response to legitimate anger. It is necessary to go beyond rebellious attitudes to a more radically critical and revolutionary position, which is in fact a position not simply of denouncing injustice but of announcing a new utopia. Transformation of the world implies a dialectic between the two actions: denouncing the process of dehumanization and announcing the dream of a new society. (p. 74)

Freire emphasized this as an imperative consideration for educators when critically engaging with learners in any setting.

Freire's words serve as an important reminder when navigating the changing tides of a social and political existence. When reviewing CRT and counter-storytelling, engaging a narrative inquiry method seems a considerable opportunity to shed light on the stories untold, erased, or modified to maintain dominant hegemonic discourse (Abes, 2016; Delgado & Stefancic, 2001; Lather, 1992; Solórzano & Yosso, 2002). The burden is then placed on the shoulders of the knowledge seeker, or researcher, to dutifully address the injustice and mistrusts

consumed by way of the system's nutritional supply of monopolized storytelling and meaning-making. A common theme of the literature lies with the recommendations for STEM educators, administrators, and policymakers is that of diversifying the students entering STEM programs, understanding the needs of marginalized student populations to ensure success on each of their journeys throughout STEM pipelines (Aikenhead, 2010; Johnson, 2007; Russell & Atwater, 2005). Success in STEM programs and across higher education should not be dependent on maneuverability of student experiences with respect to White, masculine values focused on the replication of the hegemonic structures in place (Aikenhead, 2010; Carlone & Johnson 2007; Russell & Atwater, 2005). With this in mind, Chapter Three discusses the methodological approaches undertaken in this master's thesis in order to dutifully and thoughtfully honor the shared experiences of the five co-researchers in this study.

## **Chapter Three**

### **Methodology**

Chapter Two reviewed literature on marginalized experiences in STEM, contextualizing a need to explore the experiences of QWOC in STEM and providing further context to the theoretical frameworks anchored in this research project. When considering the lack of research on QWOC experiences in STEM, the need to focus on qualitative methodological considerations became apparent. Chapter Three comprehensively considers the methodological strategies employed to best consider the experiences of QWOC in STEM programs. This chapter addresses the methodological approach, details the research design, considers trustworthiness from a narrative perspective, and identifies the role of the researcher.

#### **Methodological Approach: Narrative Analysis**

Due to the lack of current research around the experiences of QWOC in STEM programs overall, I chose to refine my methodological considerations through qualitative research designs. When considering thrice-marginalized perspectives, it was important to consider a research design that would thoroughly capture the detailed nuances of the experiences of my co-researchers. With this in mind, I employed a narrative research design to best answer my research questions: 1) What are the experiences of QWOC in STEM programs? 2) How do QWOC explain their success in STEM programs?

Given the primary research question of this study focuses on experiential knowledge, undertaking a narrative inquiry seemed a clear pathway forward. Clandinin and Connelly (2000) detailed narrative inquiry as a research design to explore lived experiences alongside the (re)telling of these stories through co-participant engagement. Merriam and Tisdell (2016) reiterated narrative inquiry as the, “oldest and most natural form of sense making” (p. 33). The

stories and lived experiences told become the data further explored and analyzed through narrative inquiry (Clandinin & Connelly, 2000; Merriam & Tisdell, 2016). As noted above, the lack of research available around the experiences of QWOC in STEM programs led me to further support the narrative research design to advance this experiential inquiry. Exposure through engagement in further understanding diverse experiences in STEM have been the focus of this study. Narrative inquiry has been used to honor those willing to shed light on the relatively unknown experiences of QWOC. As the few illuminate their experiences, the call to expand upon this research to further explore and trouble the STEM spaces QWOC occupy may be instrumental in reconsidering the changes necessary across disciplines in education and workplace ventures. Narrative inquiry has offered an opportunity for co-participants to be heard and seen through an individualized perspective via each person's nuanced lived experience and the ownership one has over their narrative (Chase, 2018). As Merriam and Tisdell (2016) have stated, "the power of narrative is not so much that it is about life but that it interacts in life" (p. 34).

### **Research Design: Theoretical Framework Integration**

Chapter Two outlined Critical Race Theory (CRT) as the main theoretical framework employed for this analysis (Delgado & Stefancic, 2001; Solórzano & Yosso, 2002), along with two derivatives of CRT, FemCrit and QueerCrit. These critical and post-structural theoretical frameworks are employed in an effort to broaden the scope of CRT as well as the notion of intersectionality (Collins, 1986, 1990, 2000; Crenshaw, 1989, 1991). Since QWOC embody and occupy several intersecting identities at once, and since there is no one encapsulating theoretical framework from which to consider such unique experiences (Holvino, 2010). Therefore, the conceptual notions stemming from these perspectives seem essential to this research study. These

theoretical considerations set out a conceptual foundation allowing for honest dialogue between the co-researcher and the researcher as co-creators of this research. Furthermore, critical and post-structural frameworks focus on the phenomenological consideration of what it is like to be a QWOC in STEM through intersectionality. Utilization of these frameworks can increase an understanding of multiply marginalized perspectives in environments historically embedded in racism, sexism, and homophobia—such as higher education and STEM (Abes, 2016).

### **Data Collection and Procedures**

**Co-researchers.** This study did not take place at a particular site but rather recruited co-researchers from a variety of institutions. In an effort to further honor the storied lived experiences of QWOC in STEM and the co-constructed nature of this study, participants will be referred to as co-researchers throughout. Participants as co-researchers acknowledges their involvement in the research process and the expertise that one has of their own experience (Boylorn, 2008). In utilizing this vocabulary, the concept “co-researchers” addresses their collaborative role in making research while giving voice to their experiences and relaying further authority over their own story.

This study included five co-researchers who self-identified as women of color belonging to the LGBTQ+ community and who were current undergraduate or graduate students in a STEM program or recent graduates (within the last two years) of an undergraduate or graduate STEM program. Two individuals were current undergraduates while three were current or recent graduates of graduate programs. Co-researchers spanned a variety of public and private institutions across the United States. Four individuals attended public state institutions—three in the southwest and one in the south-central region of the U.S. Two of the four public institutions are currently listed as Hispanic Serving Institutions (HSI). Co-researchers had to be over the age

of 18 years in order to volunteer to participate in this study. Similarly, co-researchers had to be current or recent undergraduate or graduates of a STEM program. If recent graduates of an undergraduate or graduate program, the parameters of this study were expanded to having completed their programs within the last ten years.

**Recruitment and consent.** Purposeful snowball sampling (Plano Clark & Creswell, 2015) was utilized to recruit participation from co-researchers on a voluntary basis. Initial outreach occurred through informal communications with professional colleagues at various higher education institutions. Direct communication was made with administrators in STEM programs and LGBTQ+ resource centers at several campuses to assist with my efforts of purposeful snowball sampling for recruitment. In my outreach, I inquired about voluntary participation among individuals who self-identify as a QWOC currently obtaining, or recently completing a degree, in a STEM program. Additional outreach was undertaken across social media platforms specific to women in STEM, people of color in STEM and LGBTQ+ folks in STEM. This means of selection was employed to further address the intersectional considerations of this study.

Similarly, social media outreach was utilized as a consideration to the self-selective nature of said platforms to support and engage individuals across the LGBTQ+ community in a confidential manner. A copy of the recruitment email and social media outreach can be found in Appendix A. Alongside the outreach emails and social media posts, I attached a recruitment flyer for further dissemination. A copy of the recruitment flyer has been provided in Appendix B.

Throughout my outreach and recruitment, most higher education administrators echoed the need for this research and reiterated the difficulty in finding QWOC in STEM programs. Some proceeded to provide further support by noting student organizations with overlapping

populations for consideration. I subsequently communicated with a variety of student organizations including groups identified for women in STEM, racially or ethnically diverse student groups at large and some specifically with a STEM interest, and organizations for LGBTQ+ students in STEM. Despite these specific considerations in these three areas, recruitment of QWOC in STEM proved difficult. Notably, all five co-researchers could not identify other QWOC in STEM in their networks.

Throughout the recruitment phase of this project, I spoke of the difficulties in finding “unicorns like us.” In other words, recruitment proved a difficult task when considering three specific identity groups while also participating in STEM programs. Both faculty and administrators at several institutions of higher education expressed difficulty in supporting my recruitment noting they knew of potential participants who may represent one or two of the identity markers but never all three. Similarly, multiple faculty and administrators reiterated they may not have been privy to all aspects of people’s identity further confirming the difficult task at hand. The co-researchers echoed this difficulty and commented on passing privilege in the LGBTQ+ community. Passing privilege has been referred to as the notion that, unless someone outwardly shares their LGBTQ+ identity, it is difficult to know whether women of color in STEM may identify in the LGBTQ+ community if they passed for heterosexual or seemed feminine in their gender presentation. While internal and external identity consideration is further discussed in Chapter 5, it seemed important to reiterate here given the echoed sentiment expressed by the co-researchers themselves.

Once I confirmed interest in this research study, I asked each co-researcher to confirm their voluntary participation. The informed consent form can be found in Appendix C. It should be noted that all documents leading up to this point reiterated the voluntary nature of

involvement in this study. At any time, co-researchers were able to remove themselves from participating in full or in part from the study without negative implications or repercussions.

**Demographic questionnaire.** Once I made contact with co-researchers who met the parameters of this study, they were invited to voluntarily complete a demographic questionnaire. Co-researchers were given an electronic copy of demographic questionnaire via email. All were given the option of completing and returning the form in any way that suited their needs. The questionnaire was structured in a manner that offered folks to disclose their identities in an open-ended fashion. This allowed for self-identified responses specific to each individual around gender identity, racial and/or ethnic identity, and sexual orientation. Similarly, participants could complete the demographic questionnaire in whole or in part, or not at all. A copy of the demographic questionnaire has been included in Appendix D. Next, I scheduled semi-structured, one-on-one interviews with each co-researcher individually.

**Semi-structured interviews.** Once the co-researcher parameters were confirmed within the parameters of the study, I reached out via email to set a date and time for a one-on-one, semi-structured interview in a confidential and mutually-agreed upon setting. All interviews were scheduled via Zoom, an online meeting platform with closed meeting options. Interviews lasted between 45 minutes to an hour. The semi-structured interview protocol for one-on-one interviews can be found in Appendix E. Each interview was audio recorded and transcribed verbatim. A minimum of two audio recorders were used to capture data from both devices should one malfunction.

Before beginning the interview, I emphasized each co-researchers' right to take breaks before answering a question, to take breaks during the interview, to skip question(s) or to terminate their participation altogether at any time without repercussions. If, at any time,



emotional discomfort or distress arose from the questions asked, reminders of campus-specific support services such as counseling and psychological services, LGBTQ+ resource centers, women centers, cultural resource centers, and other services were reiterated for respective institutions or communities represented. Similarly, two 24-hour crisis hotlines were ready for reference in case of a need for additional support. These were the LGBT National Hotline (24/7): 1-888-843-4564 and the Trevor Lifeline (24/7): 1-866-488-7386.

**Coding process.** As noted above, each interview was audio recorded to assist with transcription. All five interviews were transcribed to review and code the data received. Given the ongoing consideration of intersectional and nuanced experiences of QWOC in STEM, it became of utmost importance to honor each co-researcher's language used, tone, and lived experience presented. I considered various coding strategies but settled on the Listening Guide Method (Gilligan, Spencer, Weinberg, & Bertsch, 2003) since it considered notions of identity especially among women within larger contexts. Gilligan et al. (2003) reiterated the importance of "following the lead of the person being interviewed" while also acknowledging the "ways in which a person's voice can be overridden by the researcher" (p. 157). The implementation of the Listening Guide methodological strategy seemed necessary to critically engage in the nuance of thrice marginalized identities as a QWOC in STEM while recognizing individuality in experience. This approach honored the lived experience of each individual co-researcher. Whether individual narratives were shared or contrasted from each other, the goal of this study is to acknowledge each person's experience as a means of further exploring the minoritized journey of QWOC in STEM. The goal of amplifying the voices of QWOC in STEM became a direct means of retelling a STEM experience that simply does not fit within the dominant culture of whiteness and heteronormative maleness.

I employed an adapted version of Gilligan's Listening Guide Method to code the interviews in this study. As noted above, this method encouraged a layered approach to gather detailed information in the varying points of information received. Each time I reviewed the data, I focused on certain aspects of the recordings and transcriptions. Gilligan et al. (2003) note each review as a "listening" with the Listening Guide Method focused on a minimum of three sequential listenings. I completed three listenings where the first consisted of listening for the plot. The first review of the data focuses the plot to orient the researcher in the life of the interviewee. In conducting this orientation, I highlighted main points of information that seemed significant to the interviewee due to word choice, tone, emotional response, and any other varying considerations worth noting. Second, I listened for first person voice to construct "I poems" for each individual co-researcher. Gilligan et al. (2003) note this listening as an opportunity to pick up on "distinctive cadences and rhythms" alongside hearing how a person speaks about themselves (p. 164). Lastly, I listened for contrapuntal voices to explore counterpoints within and across the narratives from each interview. In this final listen, Gilligan et al. (2003) suggest listening for contrapuntal voices offers a mechanism to "identify, specify, and sort out the different strands" in each individual interview (p. 165). This last listening became the most complex when considering the intersectional nature of a minimum of three identities for possible consideration as a QWOC in STEM.

I employed the Listening Guide Method to best support analysis of the research questions at large. Specifically, this coding strategy "offer(ed) a way of illuminating the complex and multilayered nature of the expression of human experience and the interplay between self and relationship" (p. 172). When utilizing this methodological strategy, Gilligan et al. (2003) reiterated the importance of documenting the listener's response after each listening. Thus, the

three listenings and my responses to each listening, were coding steps taken to inform thematic findings and further study considerations discussed in the upcoming chapters.

**Confidentiality and pseudonyms.** All interviews were conducted in a quiet and private location that was both comfortable for the individual and assured confidentiality. Pseudonyms were utilized to ensure confidentiality and anonymity of all co-researchers in this study. Co-researchers were offered the opportunity to select their own pseudonym. If co-researchers did not choose a pseudonym, I made every effort to choose pseudonyms representative of racial, cultural, or ethnic identity markers where possible without compromising anonymity. Any additional identifiable information, including the institution name, program name, institution location, or any other identifiers were removed from all data collected and transcribed, and from the master's thesis itself.

### **Trustworthiness**

In a qualitative research design, trustworthiness was established through the following criteria: credibility, dependability, transferability, and confirmability (Lincoln & Guba, 1985). To further ensure this study's overarching goals, I utilized the following five strategies: crystallization, member checking, reflexive documentation, thick description, and maximum variation. These strategies have been discussed below.

**Crystallization.** As indicated by Richardson and St. Pierre (2005), triangulation should be reconsidered in light of what they call crystallization. While triangulation may be seen as somewhat fixed and concrete in its goal toward validity, crystallization offered multiple considerations of information as imperative to comprehensive meaning making with qualitative research (Merriam & Tisdell, 2016).

**Member checking.** To best support internal validity, or credibility, I strove to maintain contact with co-researchers through member checking. Member checking, also known as respondent validation, was used to solicit feedback and clarification from co-researchers as a means of gaining clarity for analysis for any given researcher. In this case, I engaged in these techniques within the semi-structured one on one interviews through the use of clarifying questions and paraphrasing. When paraphrasing, co-researchers were given the opportunity to retell, confirm, and reiterate main points or sentiments for consideration in the specificity of their respective experiences. This has been a paramount tool in qualitative research

**Reflexive documentation.** I used reflexive documentation, as a means of speaking to reliability or dependability in this study. Throughout this study, I maintained a journal to capture changing demographic considerations and research details to audit my research endeavor. This was supportive in documenting the fluid changes throughout this research study. Similarly, I recorded voice memos after every interview with a co-researcher to give reflect on the conversation. These voice memos allowed me to bolster and reconsider my reflections during the coding process alongside my written listening response log noted above as referred to by Gilligan et al. (2003). Lastly, I addressed my own role in this research study in the later portion of this chapter.

**Thick description.** I utilized thick description as a means to further explore the experiences researched in this study. With trustworthiness in mind (Merriam & Tisdell, 2016), I relied upon thick description to detail the lived experiences of the QWOC who spoke with me. The detailed language and rich quotations as expressed by my co-researchers highlight and explore both their individual experiences and their shared knowledge (Geertz, 1973). Stories and narratives gifted by co-researchers are the focus of my analysis in Chapter Four.

**Maximum variation.** While noting the difficulty in identifying such a nuanced population of co-researchers, maximum variation became another strategy for enhancing transferability. Respondents in this study varied across institutions, STEM programs, and intersectional identities. While all co-researchers identified as QWOC currently in a STEM program or recently graduated from a STEM program, demographically each co-researcher is uniquely different. Maximum variation was employed to further document diversity and identify common patterns across diverse experiences (Merriam & Tisdell, 2016).

### **Role of the Researcher**

It was imperative to note my own presence in the research study from a methodological utilization to the meaning making relayed in Chapters Four and Five. While I do not remove myself from the research, I aim to give context to my role alongside my own identity. This research was born from the personal and advanced by the acknowledgement of my presence in this study while naming it most directly and humbly. As a means of further problematizing the STEM framework and research environment, omniscience has not been the goal of this research but, instead, to shed light on the lived individual experiences (Richardson, 1997).

This study has been deeply personal. I am a QWOC who completed her undergraduate studies in STEM within the last ten years. Thus, from the creation to completion of this study, I have actively engaged in CRT and intersectional theoretical contexts to inform my findings and analysis of data received. My involvement has been that of a vessel seeking safe passage between worlds to expand knowledge and experience uncharted territories. Sherry (2018) reminded me that I am an insider researcher as well as an outsider researcher. I am someone who may have been seen in the study but remains outside the scope of the experiences at large. I have acted as a conduit to place light on the unseen or untold stories in STEM while referencing my

own location with added consideration. In an effort to explore my role as a researcher in this study, I have utilized a few creative analytic practices to further expand upon my personal positioning. I have provided a series autoethnographic vignettes (Creswell, 2012; Humphreys, 2005; Neyman, 2011) and reflections to portray my undergraduate experiences as a QWOC in STEM. These autoethnographic vignettes can be found in Appendix F. Similarly, a reflective poem regarding my educational journey as a learner and educator has been included in Appendix G.

I remain committed to honoring the co-researchers in the truest manner possible. I am not my co-researchers just as they are not me. Each one of the co-researchers in this study is a mighty vessel sailing across society's seas as the water ebbs and flows from mountaintops back to the ocean in a fluid portrayal of the natural world. We are co-researchers together.

### **Methodological Limitations**

During recruitment of this study, I initially began my outreach regionally focused. This quickly became a shortcoming that led me to consider recruitment outside of a geographically constrained area of the West Coast. Similarly, I began this study with constrained STEM parameters where I only sought to recruit current undergraduate students or folks that had recently graduated over the last two years. The specificity of regional and student enrollment coupled with the already nuanced intersectional identity of QWOC in STEM proved impossible to recruit during initial recruitment efforts. It took expanding these parameters considerably to find willing co-researchers interested in sharing their experiences. I knew the specificity of identities considered in this research study, QWOC in STEM, may have created a smaller co-researcher pool when recruiting but I did not anticipate the other parameter consideration noted above to be significant factors for reconsideration. Given all but two co-researchers came from

different institutions and regions, I was unable to look at specific details around any one or two specific institutions. Lastly, it is important to note the comprehensive limitations referenced in Chapter Five as a thorough considerations when considering this research study.

## **Conclusion**

Throughout this chapter I have focused on articulating the reasoning for each methodological strategy employed in this research study. I have given context to my methodological strategies and provided justifications central to my primary and secondary research questions. I addressed issues of trustworthiness in this chapter in an effort to better understand and consider the various mechanisms I utilized to support the authenticity of the data and findings in this study. Finally, I located myself as an insider and outsider researcher in this project by recognizing my shared identities and differences to the co-researchers in this study. In Chapter Four, I offer the reader an opportunity to journey down a path of personal and political consideration through an intersectional lens of experiential knowledge via the lived, storied experiences of each respective co-researcher.

## **Chapter Four**

### **Findings**

Thus far, I have indicated the reason for conducting this research study is to explore the experiences of QWOC in STEM programs throughout varied institutions of higher education in the United States. Chapter Two provided a review of the literature on diversity throughout STEM programs and its respective workforce to provide context and support in exploring intersectional experiences in STEM beyond a homogeneously White and male perspective. Chapter Three demonstrated the methodological strategies employed to best answer my research questions: 1) What are the experiences of QWOC in STEM programs? 2) How do QWOC explain their success in STEM programs? The transition into Chapter Four aims to identify the findings that emerged in response to the two research questions above.

This chapter includes an introduction to the co-researchers in this study as well as a review of some emergent themes gifted by the co-researchers' experiences and highlighted in this study. It is imperative to reiterate the significance of CRT (Delgado & Stefancic, 2001; Solórzano & Yosso, 2002) and intersectionality (Collins, 1986, 1990, 2000; Crenshaw, 1989, 1991) as frameworks for reference throughout this research study. Abes (2016) further describes intersectionality as a framework that, “challenges educators to see how students live multifaceted lives and encounter oppression—or enjoy privilege—in different aspects of their lives” (p. 61). This research paper humbly strives to act as a conduit between the voices of the co-researchers to the reader.

#### **Introducing the Co-Researchers and Truth Tellers**

Five co-researchers participated in this study. All of them were over the age of 18 and ranged from currently enrolled in undergraduate programs to having graduated from their



respective undergraduate or graduate STEM programs within the last 10 years. All co-researchers identified as part of the LGBTQ+ community; three identified as lesbians and two identified as queer. Similarly, all co-researchers identified as people of color, or belonging to a racial or ethnic minority group. Four co-researchers identified as women and one identified as a gender-queer.

The co-researchers are introduced in Figure 4.1 with their respective pseudonyms.

Figure 4.1

*Co-Researcher Self-Identification*

Hailey identifies as an Indian queer, lesbian woman pursuing her doctorate in biomathematics.
Patricia identifies as a Chinese American lesbian woman pursuing her undergraduate degree in biochemistry.
Angelina identifies as a Mexican queer woman pursuing her undergraduate degree in the health sciences.
Marlene identifies as a Mexican American lesbian woman who completed a graduate degree in wildlife ecology.
Kate identifies as a queer Asian Pacific Islander genderqueer individual who completed a graduate degree in applied physics.

Given the nature of intersectionality discussed at the beginning of this chapter, a narrative introduction seemed an authentic means to introduce the co-researchers in this study. The descriptions in Figure 4.1 utilize language each individual co-researcher used to describe themselves in the open-ended demographic questionnaire and their respective interviews. In doing this, I aim to authentically and comprehensively honor the individuals sharing their lived experiences and telling their truths in this narrative research study.

**Emergent Themes**

As described in Chapter Three, I used systematic coding process to identify four themes present throughout the layered narratives of each co-researcher. The themes include: 1)

representation, mentorship and belonging; 2) mental health, isolation, and imposter syndrome; 3) persistence, resilience, and existence as resistance; and 4) student success and meaning making. The remainder of Chapter Four seeks to expand upon these themes through the lived, storied narratives of the co-researchers in this study.

**Representation, mentorship and belonging.** A consistent theme throughout each co-researcher's narrative about their experiences in STEM was the broader topic of representation and subsequent connection to mentorship, belongingness within respective STEM programs and eventual portrayals of confidence and self-efficacy. Co-researchers noted mentorship from high school teachers to teaching assistants in undergraduate programs and faculty members or advisors in undergraduate or graduate STEM programs they attended. When discussing their respective journeys in STEM education, co-researchers often noted the significance of someone investing time in their STEM pursuits as a means of acknowledging their ability to continue and perform well in their program. A shared investment by others seemed to create a supportive environment for co-researchers to move forward within their respective degree pursuits. Hailey noted this with her high school biology teacher:

My biology teacher was like, 'Okay. So, basically the options for regular biology for 10th grade would be either chemistry or geology, if you're struggling in this class.' I remember being like, 'Oh no, she's going to put me in geology,' or whatever. And then when I went to her office for sign ups, she was like, 'I was actually considering putting you in chemistry honors.' I was really surprised . . . and then in 10th grade I started honors chemistry. I really wanted to show that I had deserved to be there. I worked really hard. I also had a female teacher for that class. I was really inspired by her and I just fell in love with chemistry.

Hailey indicated this show of faith in her capacity for science had an impact on her initial pursuits in chemistry, which was her major when she first entered her undergraduate program. Similarly, Patricia noted a teaching assistant got her to reconsider STEM after she had taken a year away from it during her undergraduate experiences noting, “I was very hesitant to go back into STEM but, thankfully, I got pushed into it a little bit by a TA.”

Kate noted the importance of support by an advisor that went beyond sharing identities as an immigrant, but also through the ongoing support provided throughout her undergraduate program in Physics. Kate shared:

When I was in undergrad[uate studies], my physics advisor was a Black man. He was from Nigeria and I really connected with him over any of the other professors because he was an immigrant POC [person of color]. I think it's important to be able to identify with your mentors. If you made it there [academia] and you're queer, you're a POC, it's important for you to be visible to all the younger people, trying to make their way.

Angelina explained feeling most supported and represented by female-identified faculty throughout her experience in her undergraduate pursuits. She noted it was not until her last semester that she felt supported by a male-identified professor. Angelina reiterated this notion through the following:

I feel like I've received more support from women faculty than male [faculty]. I've never received any male support until this semester . . . I think because . . . he's just a very fluid person and I picked up on that from the beginning of class. I always talk to him and I always talk to him about what I'm doing after this [undergraduate education]. He's a pretty cool professor and I've always been able to reach out to him for help because he's

such an open person. I feel like he just knows how to talk to us [students], and he doesn't put up a barrier. He's helped me apply for an internship after graduation.

Angelina identified the importance of support and mentorship beyond the classroom, indicating her recent professor's support has been the first she was able to note from a male-identified faculty member. All of the co-researchers in this study reiterated the importance of representation within their STEM programs. This became an important theme through connections of identity and the seemingly supportive environments constructed through displays and discussions of identity membership. In other words, STEM programs have been echoed as highly competitive environments that, at times, perpetuate intellectual elitism as a means of maintaining the status quo in education.

***Support through peers and student organizations.*** Through clarifying questions about representation and mentorship, I asked each co-researcher about their experiences when it came to feeling a sense of belonging in their STEM program. Each one of them noted a few ways in which they felt like they belonged in their program or at their institution. Similar to the mechanism of support through representation of shared identity or allyship, co-researchers noted their feeling of belongingness to faculty or advisor mentorship. However, most noted significant support through peers whether within their programs or in student organizations. Beyond faculty and administrator support, the role of peers and student organizations were main sources of support and increasing self-efficacy and subsequent retention in STEM programs.

Angelina noted finding support outside of STEM altogether in her institution's Educational Opportunity Program (EOP). She stated:

I also feel like I have support from EOP . . . We had a female counselor that I was able to talk to when I needed help. She suggested I reach out to professors if I ever need help and I slowly did.

Angelina's support via her EOP counselor encouraged the use of resources beyond the usual tutoring services. The encouragement to advocate for one's needs with faculty directly, was a difficult concept for Angelina as she notes the eventual recognition of this as an actionable point of outreach. Angelina identified this as a first-generation college student reconciliation to make requests of faculty based on her needs. While this did not always assist her in the ways she initially desired, she recognized the need to advocate on her own to continue in her respective STEM program throughout her undergraduate studies.

Hailey, Patricia, and Angelina became connected to varying student organizations, some connected to STEM and others not connected to STEM at all. Of these organizations two were LBGTQ+ organizations and one was specific to Latinx female-identified student leaders. Patricia indicated:

I guess a place where I actually felt most supported would probably be in the [student] organization because it's not only for queer or trans people of color or anything, but there is a lot of diversity. I feel like I can talk about any topic related to any identity and feel understood and that we can actually support one another. Finding those spaces is just so rare. When I'm in my classes, I never really feel like I can expect to be able to actually find a space to talk about these sorts of things in terms of personal identity as opposed to just the general identity that we all share as college students.

When asked if they felt like they belonged in their STEM programs, Patricia, Hailey and Angelina all noted they never truly feel like they belonged. Although they may have made

friends with their peers and, subsequently found some way to connect, in the programs themselves it was noted to be a much more difficult undertaking. The following was Hailey's response to the question of whether she felt like she belonged in her STEM program:

I would say, socially, not really . . . but then I think the more I focused, not on who I am as a person, but more on my work there are times when I love being here. Usually when I'm working on physics things. Today, for example, I was reading a bunch of papers for my research project and I was like, 'I love doing this.' But it's weird because I feel those moments of belonging most when there aren't many people around me.

Angelina discussed the support she had received in her STEM program noting connectedness to her STEM program in the last semester, as noted above, as noted above with one male professor in particular. Angelina reminisced:

I feel most represented by my current professor that I keep talking about, but he's male and White-passing . . . I'm sad that it's my last semester, and I've finally met this person. I met this other professor who seems super cool and who is super interested in her field, and it just had to be my last semester, and I'm just like, 'Why are you guys showing up at the last minute? Where were you guys?' Because if they were there during my earlier years, I probably would have received the support I needed during certain times and I would have probably received better feedback than I had in the past.

By contrast, Marlene relayed her feeling of belonging throughout her undergraduate and graduate STEM experiences, "Almost all of the faculty in my department were allies . . . A lot of professors were female, too." During this interview, Marlene began to reflect on her seamless experience in her STEM program noting. She stated:

I'm starting to think that wildlife ecology and wildlife biology has a lot of understanding and supportive people . . . [My STEM program] has always been diverse. If you worked hard, everybody was willing to help you and support you.

While this mention did not negate any future considerations or constructive feedback, it is important to acknowledge the positive experience Marlene had throughout her STEM programs. Marlene was a recipient of financial support through grants and other awards that paid for both her undergraduate and graduate programs. Marlene's experience is an important example of how representation and financial support improve student experience, particularly in STEM.

**Mental health, isolation, and imposter syndrome.** Another prominent theme relates to mental health and imposter syndrome. When I refer to mental health, this includes sentiments of isolation or loneliness in STEM or in higher education experiences overall. Hailey and Patricia recount their experiences with mental health during their educational pursuits. Hailey referred to her experience in her current graduate program noting she “struggled a bit with mental health the first quarter.” Patricia noted her experience with mental health during her undergraduate program “in my second year at [undergraduate institution] I got hospitalized for suicidal ideation . . . for so many reasons [and] not feeling like I really belonged where I was.” Patricia's experience delves into a significant moment for her where, during her hospitalization, she connected with peers who identified as queer and supported her in reconsidering medical school.

Other co-researchers noted their experiences with isolation, feeling a lack of belonging, and lack of support within their STEM programs. Angelina explained this in the following, “when I came to [undergraduate institution], I've never felt like I could completely be myself with everyone, I don't know, there's always a level of professionalism that kind of brings down the vibe coming from [institution]. I've never truly felt welcome.” Angelina identified feeling a

lack of belonging in her undergraduate institution above but also clarified this impact in her STEM pursuit by stating, “None of my close friends are in health science . . . I'm the only one out of my close group [of friends], so I've kind of felt alone, but I do have some friends in the health science program.” Angelina indicated an interesting point about her friend group and their lack of STEM involvement. While this statement was made by Angelina, this experience was echoed across all co-researchers indicating they did not have any other friends like them in STEM. Specifically, that they did not know any other QWOC in STEM like themselves. This shared experience across all co-researchers in this study solidifies the significance of isolation within their STEM experiences. Patricia reflected on her feelings of isolation in high school and the impact it had on her performance and wellbeing:

I had these very difficult experiences where I went from being the Valedictorian of my class, being the very top of my class, expected to do the best . . . to feeling so dysfunctional and not being able to achieve, generally feeling isolated. At that point, it felt like I couldn't access STEM anymore because of my mental health.

Angelina reflected on the difficulties she has faced connecting with professors in her STEM program and the connection around support through difficult times she has had during her undergraduate experiences. Angelina explained:

I feel like professors don't really, I don't know. In the STEM program, they're all about what they're teaching. Their humanity level feels low. They're just more direct . . . I've always felt like there's so much happening in the classroom setting and there's also so much happening in real life that I haven't been able to combine both of them, you know?



Angelina noted the difficulty in reconciling her needs and asking for support with her respective faculty. She went on to reiterate the significance of feeling unable to connect with faculty as an impact with her ability to seek out support in her STEM courses.

***Imposter syndrome.*** The co-researchers in this study went on to acknowledge imposter syndrome as a consideration that may impact their confidence or sense of belonging in their educational pursuits. Imposter syndrome, or imposter phenomenon, was initially developed by studying the experiences of high-achieving women in a variety of fields (Clance & Imes, 1978). Similarly, researchers explored these experiences of individuals unable to identify success as truly earned but rather due to external factors such as luck or good fortune (Langford & Clance, 1993). Langford and Clance (1993) go on to note the significance of imposter syndrome even further by referencing the worry or anxiety experienced due to the pressure to live up to the successful appearance taken on by those who may be considered imposters in their esteemed roles.

Patricia and Hailey directly reflected on their experiences of imposter syndrome as a consideration to their confidence or sense of belonging in their educational pursuits. Hailey described her experience with imposter syndrome in the following:

I always had this feeling like, you know, people talk about imposter syndrome and I always felt like, 'I don't belong.' Especially because I started off in regular biology [in high school] and my teacher was like, 'Oh you should take honors chemistry,' but I always felt like, I'm the only one who came from regular bio.

Hailey noted her inability to see herself as competent enough to go into honors chemistry in high school explaining that she started off her science experience in regular biology. While this notion of having been in a regular biology class perpetuates the sentiment of a lacking worthiness to

continue or expand in her respective STEM pursuits. The imposter phenomenon shows up in this reference even in the slightest of manners. Patricia expanded further by relaying her experience with imposter syndrome:

I feel like, given the sort of difficulties I had in high school, that I didn't have the same background in STEM that I could have. I had a really strong foundation up until my last two years where I was in a lot of AP [advanced placement] classes but I didn't absorb anything from them. I felt behind and I felt scared because there's a lot of imposter syndrome, imposter phenomenon, where I feel like I don't [belong]. I get very high grades, but I haven't had the time to absorb the material and there's so many knowledge gaps that I'm trying to overcome.

Here, Patricia defines the imposter phenomenon as her inability to feel like she has truly absorbed the STEM material she needs to continue in her area of study. The knowledge gap referenced by Patricia is another marker of imposter phenomenon at work given the context she provides about getting high grades. Despite high grades, she still questions her absorption of the material.

While Marlene did not specifically name the imposter syndrome in her interview, she noted a few considerations that may play into a similar framework enmeshed in her experiences. The following exchange reflects Marlene's process as it relates to her feeling a sense of belongingness in her STEM experiences, specifically her new place of employment:

Marlene: [I think] that a lot of these people know way more than I do, because they've been there for so many years. I think that will fade . . . Man, you've got me thinking all these big thoughts. I feel like this is where I want to be. But I guess, sometimes, I just feel like a lot of these people know more than I do, and I think that has to do with just self-

confidence sometimes. All these people [coworkers] know how to do these big, specific things and I'm very question-based to make sure I don't mess up. I don't know what that attributes to though, but that's always been how I act—not to make mistakes.

Yasmin: You mentioned not making mistakes. I wonder, has that ever come up in a way that feels like you need to overcompensate?

Marlene: Yeah. I think so, because I'll try to be overly nice and helpful. If somebody needs help, I will try to do something nice to make sure they [other coworkers] can respond like, "Oh, well, she can't be that bad, because she did this [supportive act]," if I make a mistake someday. Or, if I've already made a huge mistake, oh my gosh, I'll bring donuts tomorrow.

Marlene described her response to mistakes as a means of rectifying it but also to create an environment where mistakes are lessened so as not to contribute to a negative perception of her ability. This exchange adds to the consideration of imposter syndrome within the narratives of the co-researchers referenced above.

**Persistence, resilience, and existence as resistance.** Markers of persistence, resilience and base line existence as *resistance* became another theme throughout the co-researcher's narratives. Both Hailey and Patricia indicated taking a gap year during their undergraduate experiences as they reconsidered their pursuit within STEM. Hailey relayed, "I took a year off of school and I did art school . . . I was like, 'I don't know if this [STEM] is what I want to do.' I was really struggling a lot with that [decision] and finally I was like, 'I just need to get a degree'." Similarly, as stated earlier, Patricia noted a teaching assistant got her to reconsider STEM after she had taken a year away during her undergraduate experience. Patricia explained her experience coming back to STEM after her gap year:

Taking a gap year is a long and difficult story where STEM, [after] being so important to me, had become something that I had grown afraid of—[afraid] that I would fail. In particular, because of my identities and . . . generally feeling very ‘othered’ or a theme of ‘othered-ness.’ I was very hesitant to go back into STEM but, thankfully, I got pushed into it a little bit by a TA. I just bit the bullet and went back into it and it came back quickly. Not to say there weren’t any difficulties, there were many difficulties, but it was just healing to be back in it.

Kate mentioned a similar experience starting her undergraduate education with mathematics in mind she explained, “In the beginning, my love for STEM was in math. Math was my major when I started, and by the time I had ended my undergrad[uate degree] I decided to do physics, and minor in math.” When recounting her experience throughout her undergraduate education, Kate identified being discouraged from continuing in math by a former advisor. While Kate was working on independent study projects in lieu of the extensive prerequisites in the math major, she relayed her frustration with her male-identified advisor:

Actually, the reason I ended up having a minor in math is because of my senior year. I was super bored in my math major . . . which caused a fuss with some of the professors in the math department. During my senior year, my math advisor told me that I did not have the qualities to hold a bachelor's degree in math, without knowing me, without talking to any of my professors who would have told him, yes, I completed all of the 300 and 400 level courses when I was a freshman and sophomore. I didn't realize I had to prove myself to another man at that point. I had my physics thesis underway, so I didn't think it was necessary to pursue math. I could have graduated with a double major, but instead I

minored in math, just because I just didn't want to have to convince this guy the entire year that it was possible for me to write a thesis in math.

Kate's narrative highlighted her frustration when being told she was not capable of completing her undergraduate mathematics degree. Kate's mathematics advisor ignored her boredom which she acknowledged as an institutional dismissal of her experience in the program. This boredom was identified as a byproduct of the STEM high school she attended in the Philippines, which gave her experience in college level mathematics. Despite her frustration, Kate continued to pursue physics and chose to minor in mathematics. Kate noted this decision as one she regretted making despite the circumstances.

Angelina discussed her experience of asking faculty for support in her courses. She recounted the effort it took for her to initiate requesting more time to complete coursework and the subsequent lackluster response from faculty to genuinely engage in providing support and resources. Angelina explained:

Professors felt kind of discouraging because a lot of them wouldn't respond so positively [when being asked for coursework extensions]. They still wanted the work and they still had the same expectations as they would with other students. I never felt comfortable disclosing my [life story and identities] to them. I don't know if that would have influenced things or not, but I just don't feel comfortable saying it all. I don't know if they would have more sympathy if I did but it's not something I would want to disclose.

In the excerpt above, Angelina reflected on whether providing faculty with more information about the difficulties in life may have prompted a more supportive response while, at the same time, reiterating the importance of not relaying personal information to get assistance. Both Patricia and Angelina remark on the difficulty accessing resources plays in their own external

portrayal of sought-after support. They also shared the internal conflict they both have felt when accessing services or requesting support. Patricia spoke to this reality further, “When I needed more accommodations, I had to access my trauma to prove that I need help. I really wish there were more resources for queer people of color and queer people of color in STEM, in particular.” Patricia highlighted the weight of accessing trauma to validate her need for support services, accommodations, and other considerations. Similarly, Angelina reflected on her experiences whenever she asked a professor for support or an extension. Angelina explained:

I hesitate [to ask for support] because I want to make sure I know what I'm feeling at the moment. I want to make sure that I need [extra] time. I don't know. Maybe it's not enough taking care of myself. It feels stigmatizing to ask them for help or tell them something's going on in my life. I just don't want to justify my situation so much.

The experiences of four co-researchers above illustrate the persistence and resilience so fundamental to their respective STEM journeys. These examples are coupled with other reflections each co-researcher provided regarding the varying difficulties they faced in their STEM journeys and their continued commitment through peer support, mentorship by faculty and teaching assistants, and family support. While these aspects of support assisted with retention, these do not represent an exhaustive list but rather a highlight reel of the most salient experiences across co-researchers as mechanisms to fuel perseverance and resilience.

Existence as a form of resistance was relayed by a few co-researchers when discussing giving back to their peer communities to expand STEM interest across identities. The experiences shared vary from identity-based support to STEM specific mentorship as a means of nurturing diversity in STEM. Kate shared:

Figuring out my identity as a woman, as a queer person, and then coming to the US, thinking of myself as a person of color, those are things that I had to make sure weren't a disadvantage to continue my career in STEM. That's how I've navigated through [STEM]. Now I organize QAPI [queer Asian Pacific Islander] events. I collaborate with a lot of people in the community who are also in STEM . . . trying to make things better.

Kate noted that as an immigrant who came to the United States to go to college, she has remained in the country while maintaining employment in STEM. She relayed the importance of giving back to the community and connecting with others who may share similar identities. The notion of giving back goes beyond initial altruistic displays but deeply connects to supporting others who may be like ourselves to better ensure persistence and retention of diverse individuals in any given environment and particularly in STEM.

Marlene highlighted her commitment to try to support undergraduate students pursuing STEM majors by encouraging research opportunities and getting them connected to respective graduate students and faculty working on a similar area of interest. Marlene explained:

I tried to tell them [undergraduate students], here's this professor doing this research. If there's nobody there to tell them, 'You matter. You're the ones that are going to be these master's students someday.' You're just going to have big dropout rates for these kids and a big amount of people changing their degrees. [Institutions] don't care, they just care about the undergrad getting there and dropping tuition. It doesn't matter what they choose. But if somebody hadn't let me do it [research], I wouldn't be where I am and where so many others could be.

Marlene went on to note her support from faculty advisors and her institution overall but indicated the ability to help others was an important area for her when interfacing with young

people starting off their pursuits in STEM. These examples further the significance of giving back to others in STEM, as QWOC, regardless of shared identities this investment goes beyond the classroom. Assisting others navigating STEM programs can be considered an avenue for further support where some shortcomings that have been experienced have become the subconscious means of resistance and expansion of different student populations in STEM.

**Student success and meaning making.** During each of the five interviews, co-researchers were asked how they would define their success in their STEM program. Hailey defined her success by getting into the graduate program of her choice. She explained, “I guess getting into [graduate program] was a big [deal]. For the longest time I was like, I just want to get my [undergraduate] degree. I guess getting into grad[uate] school was really a huge thing for me.” When asked this question, Hailey remarked that she had never genuinely reflected on the significance of graduating from her undergraduate STEM program and getting accepted into her graduate program. She acknowledged her success in STEM education was worthy of identifying it as such, while noting she had not quite done that yet. Similarly, Angelina reflected on her upcoming graduation with her undergraduate STEM degree. Angelina explained, “My own personal success is making it and graduating. That's always been my goal and I can't believe it's finally happening because every semester I was like, ‘I'm just trying to pass,’ and now I am considering grad[uate] school.” Angelina’s reflection reiterates the shared sentiment of trying to get by throughout every semester echoed in Hailey’s narrative above.

While Kate has been working in the STEM field for the last ten years, she shared that she recently completed her master’s degree in applied physics. Kate shared her definition of success which focused mostly on workplace considerations:



Success, to me, means feeling good at the end of the day with what I am doing . . . Do I feel successful in my career in STEM? I would say yes, because I'm at the point right now where I'm able to influence other people's STEM careers and mentor them, train them, and teach them.

The narrative Kate provided is one that merges with the significance of giving back to community members and rectifying the STEM working environment in a positive way. Marlene provided us with another consideration of what success meant to her and she explained:

I make a timeline and a specific goal for myself and if I hit that, I did it. I succeeded – with my undergrad[uate degree], my master's [degree], and then, this job that I applied for a million times. I got it, cool, then I'll make another goal for myself.

Marlene's words further highlighted the perseverance she displayed with her current employment through her continuous efforts when applying for the position she eventually acquired. The definitions of personal success by co-researchers in this study further represents the variety of experience and outlook on their journeys in STEM.

A follow up question was presented to co-researchers inquiring into what they believed attributed to their success in STEM. Kate reflected on her successes in the workplace which focused on her willingness to take on new projects, no matter the weight. She explained:

To me, what's important is that I learn something new constantly. How I've gotten promoted so many times is that they know that I would always take on new projects or take on new things that nobody's tried before. That's basically propelled me to move further ahead in my career. I've never shied away from less technical-related things. For example, I attend engineering meetings where we discuss how to use a database to keep track of all of our projects and inventories. It has logistical things in it but it's what

engineers use to release new products. That was actually the reason why I was able to propel myself from being an engineer to being a manager—being interested in all these other things.

Kate reflected on what it meant to be interested in less technical details which led to multiple promotions. From being an engineer to becoming a manager it took a willingness to take on responsibilities outside of the work itself. This notion is not unique to minoritized persons in the workplace where working beyond the scope of one's employment has been a method of discovery beyond normative employee standards.

Marlene attributed her success in STEM to the support she received over the course of her undergraduate and graduate degrees. She explained:

Gosh, I'm sure if I didn't have the academic support, the support from my family and my girlfriend . . . that made it better than I think a lot of people could ever have it . . . I could focus on my studies because I had this support and I had the support financially. I had this undying support from every single angle to help me be successful.

Marlene clarified that throughout her time in STEM she did not focus on comparing her successes to others' to lessen any negative impact by doing so. She said, "I try not to compare timelines, because I think that's when you start thinking, 'I'm not successful'." This was another factor she attributed to her success in STEM.

When asked what she felt attributed to her success in undergraduate studies and STEM, Angelina responded:

First of all, family. We come from an immigrant household and we were low-income . . . Seeing my parents struggle [financially] . . . every time I look at them, I'm like, 'Wow, you really did all of this, and you're here, and you have a house, you have a backyard,

and you have a girl in college,' and they don't speak English all the way. I just think to myself, 'If they can do it, I can too.' For school, I feel like what's helped me the most has been financial assistance and the EOP program. That's been huge because they help us with finances, [academic] counseling, and priority registration. If I wouldn't have gotten the classes I needed [through EOP], I wouldn't be graduating right now. I don't know where I'd be . . . maybe I would have dropped out by now.

Angelina credited her family and the Educational Opportunity Program (EOP) that assisted in her success in STEM, highlighting the many ways they provided support. Interestingly, Angelina asserted that knowing her parents' immigrant story and financial difficulties allowed her to be less overwhelmed by any difficulties in her undergraduate STEM program. Angelina also spoke to the mechanisms of support that she received through EOP such as priority registration, academic advising, and financial support.

Hailey reflected on her success and attributed this to a shifting mental paradigm, from perfectionism to progress-driven. Hailey explained:

I think the main thing that got me through it was being [flexible]. There were a lot of times when it would've been easy to be like, 'This is not for me, it's causing me too much stress.' My mom would be like, 'Why do you have to be in a theoretical physics lab? There are so many other labs you could be in that would probably be easier and wouldn't cause you this much stress.' I just [began] focusing on progress like when I reading a published paper going into it like, 'I didn't understand this at all before and now I understand this [small detail],' little steps of progress . . . Knowing that there are going to be times when it's shitty and even if it's something that's right for you, you're never going to be happy all the time. I used to be a perfectionist, I had to be the star student otherwise

it wasn't worth it . . . Also, I like journaling; writing down things that I accomplish even if it's nothing [big] like, 'Oh my code didn't crash today.' Focusing on progress rather than perfection.

Hailey provided context to familial support with her mother's reference and reflective practices that gave her permission to learn through failure. Embracing failure as progress was an important reflection Hailey made—one that noted self-awareness and a strengths-based perspective. Hailey went on to further dispel the notion of focusing on negative aspects of one's circumstance when she reflected, "It's so easy to be like, 'These are all the things I don't know and these are all the things that didn't work'." Identifying success was an important reflexive exercise for all parties to engage in but particularly for those in the margins whom baseline narratives exclude. Owning success for those that may be socialized to divert the acknowledgement of one's strengths and owning personal achievement was an important moment in each co-researcher's narrative.

In an effort to further highlight the counter-stories told by the five co-researchers in this study I utilized variation of "I Poems" (Gilligan et al., 2003) as described in Chapter Three. Beyond "I Poems" I focused on she, he, we, (Pément, 2013) and they statements. Every line included in each poem was drawn directly from the interview transcripts. Figure 4.2 has been provided to give the reader another lens with which to listen to these counter-stories through a gendered (she and he poems) and collective (we poem) voice.

Figure 4.2

*She Poem, We Poem, and He Poem*

“She Poem,” by Angelina, Hailey, Kate, Marlene, Patricia	“We Poem,” by Angelina, Hailey, Kate, Marlene, Patricia	“He Poem,” by Angelina, Hailey, Kate, Marlene, Patricia
<p>She's always been very influential in my life            She's always pushed me            She wanted to be a doctor or a nurse            But she wasn't able to do that            She helped me            She and I got super close            She was the one that suggested I reach out to professors if I needed help            She's never been homophobic            She's always said, "You can do it"</p>	<p>We decided to get married to keep me safe            We would go to church a lot            Why are we listening to this Bible?            We came from an immigrant household and we were low-income            We have been broke</p>	<p>He just knows how to talk to us            He doesn't put up a barrier            He's helped me apply for an internship after graduation            He sent me a recommendation            He expresses himself as a human            He doesn't divide us            He talks to us as people            He looks white            He was very homophobic            He was my first gay friend</p>
<p>She was relatable            She was a huge reason I pursued STEM            She encouraged me            She benefited from having female mentors</p>	<p>We were friends . . . she was in my major.            We helped each other study.</p>	<p>He thought that I had a crush on him            He was rude</p>
<p>She was very supportive            She was like, "Okay, you're going there."</p>	<p>We are pushing innovation in photonics and neuroscience</p>	<p>He told me I did not have the qualities to hold a bachelor's degree in math            He was from Nigeria            He recognized what I needed            He was really, really helpful</p>
<p>She can't be that bad            She's gay            But she also has zero college debt            She has two degrees</p>	<p>We knew everything about each other . . . there was an undying amount of support for anything we were going through.            Because we were all going through the same thing . . . that's how close we were.</p>	<p>He doesn't accept bullshit            He gave me this opportunity            He knew that I was capable</p>
<p>She reads as queer            She just seems really relatable            She interacted with gender in such a different way            She wasn't a person of color            She encouraged me to look at graduate programs</p>	<p>To create spaces where we can talk about these things            We talked about gender            We related to each other . . . to being women in STEM</p>	<p>He's not a nice person            He said research wasn't for people like me            . . . a person with disabilities.</p>

Similarly, a “They Poem” has been provided in Figure 4.3 to contextualize the perceived *other* as counter narratives in this research study.

Figure 4.3

*They Poem*

“They Poem,” by Angelina, Hailey, Kate, Marlene, Patricia

They don't think we're taking our education seriously  
They weren't exposed to a lot of diversity  
They were saying homophobic stuff on the phone  
They don't understand  
They're only about what they're teaching  
They made us feel uncomfortable  
Maybe they just don't care  
They never truly understood what I went through to be where I  
am.

They pushed me to apply for colleges  
They've opened my eyes  
They've gone through so much  
They've always supported me in getting an education  
They don't speak English  
They have been my primary motivators

They present women in STEM as awkward  
They don't really provide role models  
They wouldn't let people into AP classes if they didn't think they  
would be successful in them  
But they were all men . . . maybe two women  
They all worked together  
They got through it

They really don't know what was going on  
They think twice about saying those things  
They think of students as just a number  
They know I would always take on new projects  
They knew I was having trouble

They knew I was queer  
They were completely fine with it  
They are moving in the right direction, but it's taken so long

They don't care  
They care about the tuition  
It's not about what they know, but who they know  
They were all Hispanic  
They want me to go back for a PhD  
They funded me  
They have faith in me  
They want to see me continue

They face additional difficulties not faced by other students.  
They may have a pride flag, but they haven't gone through an  
ally training.  
I just don't know whether they really understand  
If they understand, they'll be supportive

Figures 4.2 and 4.3 proved another layer to truly demonstrate an authentic (re)telling of the counter-narratives kindly offered by the co-researchers in this study.

## **Conclusion**

Chapter Four set out to introduce the five co-researchers who participated in this study: Hailey, Patricia, Angelina, Kate, and Marlene. By gathering, reflecting upon and sharing their words, I attempted to honor their experiences, nuance and all, as identified through each interview, every transcription, and the coding processes undertaken. The four themes discussed in this chapter are: representation, mentorship and belonging; mental health, isolation, and imposter syndrome; persistence, resilience, and existence as resistance; and student success and meaning making. While this chapter sought to expand upon these themes through the lived, storied narratives of the co-researchers in this study, it is not without the acknowledgement of differences and, at times, contradictions within each individual experience.

Secondary to giving voice to the emergent themes in this chapter, I set out to honor each co-researcher authentically and holistically in their own voice. This aim continued to use direct quotes from each interview acknowledging similarities but focusing on the individualized experiences of the co-researcher speaking. The goal of this narrative analysis was to maintain a humanistic portrayal of the findings in an effort to illustrate the complexity and poignancy of the co-researchers' lived experiences as QWOC in STEM. Data displayed in this study relied upon non-traditional methods of representation with the mission of maintaining the humanity and authenticity of the co-researchers' experiences.

Chapter Five embarks on a discussion of systemic and theoretical considerations noted in this chapter while expanding on the meaning and significance of the experiences reflected in this study. Before navigating to the next chapter, I must revisit the primary research question of this

study—what are the experiences of QWOC in STEM programs? It becomes increasingly noteworthy to reflect on the weight of such a question in a structure that privileges cisgender, White, heteronormative, masculine hegemonic displays in the United States and subsequently in STEM. The task for deconstruction is ripe for the picking given traditional perceptions of identity and the power struggle for representation, retention, and subsequent growth of minoritized persons in STEM.



## Chapter Five

### Discussion and Conclusions

Chapter Five takes on the goal of troubling the notion of homogenizing nuanced experiences while reiterating the importance of critically engaging with said experiences to better serve and support marginalized students pursuing STEM programs across institutions of higher education. When considering the importance of intersectional approaches to understand the varying experiences of QWOC and their journeys through STEM, it becomes imperative to first acknowledge no one journey can be recreated in another's regardless of shared identities. The experiences of multiply marginalized individuals require critical and poststructural frameworks to better understand the intersectional experiences of QWOC in a society that willfully oppresses these identities. Thus, the historical and political underpinnings of systemic oppression must be at the forefront of our journey when engaging with this information. The notions of power and privilege, and systemic forms of oppression must be identified to critically consider co-researcher experiences.

Chapters Two and Three explored CRT (Delgado & Stefancic, 2001; Solórzano & Yosso, 2002), FemCrit (Collins, 1986, 1990, 2000; Lather, 1992), QueerCrit (Abes, 2016; Sullivan, 2003) and intersectionality (Crenshaw, 1989, 1991) as the theoretical frameworks to best understand and contextualize the knowledge shared by QWOC. These critical and post-structural theoretical frameworks are utilized in an effort to critically engage with the experiences shared by the co-researchers in this study. It is important to acknowledge that QWOC embody and occupy several intersecting identities at once, reminding the reader to consider this reality alongside systems of oppression and the increasingly nuanced experiences to expand upon. There is no encapsulating theoretical framework that provides an algorithm to fully understand and

analyze the unique experiences of QWOC. However, critical and post-structural theories provide conceptual notions to understand the first few layers of experience. These theoretical considerations provide a foundation to engage the reader in the honest discourse between co-researchers and researcher as co-creators of this project. These frameworks focus on the phenomenological experiences of QWOC in STEM while acknowledging this research study's inability to broadly represent each individual's experience.

### **Under the Microscope: Intersectionality Discussed**

The goal of engaging theoretical frameworks and the co-researchers' experiential knowledge is to better understand the shared identities and common lived experiences among these individuals. I value this opportunity to honor the co-researchers and their respective experiences on what it has meant to be a QWOC in STEM. It remains an incredible honor to shed light and amplify these experiences and to recognize the importance to do right by those willing to share their stories. This gift comes with a responsibility to critically engage with the systems of domination when considering what it means to be a QWOC in the United States and what it means to be a QWOC in STEM, while recognizing that these environments are notoriously exclusionary through the perpetuation of racism, sexism, and homophobia as a means of othering members of minoritized populations. These frameworks and theoretical conceptualizations guide this discussion toward meaning making and reframing the institutional responsibilities of higher education and the broader STEM field with respect to systemic change.

**Seeing yourself in the laboratory: Representation revisited.** A survey of the literature confirmed a lack of representation women and women of color in STEM across racial or ethnic diversity and gender (Aikenhead, 2010; Carlone & Johnson, 2007; Carnes et al., 2012; Malcom-Piqueux & Bensimon, 2017; Singer, 2011; Strayhorn et al., 2010). Lesser known is the presence

of LGBTQ+ persons across STEM programs in higher education and in the STEM workforce (Hughes, 2017; Linley et al., 2016; Waldrop, 2014), a likely a byproduct of heteronormativity in tandem with exclusionary policies and practices (Abes, 2016; Naylor, 2018; Solórzano & Yosso, 2002). The co-researchers in this study asserted representation to be extremely important in their STEM programs. The co-researchers explained how important it was to see themselves represented amongst faculty and staff in STEM programs. Regardless of whether representation included only one aspect of their multiple identities, sharing an identity with faculty or staff members in STEM was resoundingly supportive for each co-researcher. For example, Kate found connection through the national origin of an advisor. Hailey, Patricia, and Marlene reiterated the significance of receiving support from other women-identified faculty members. Likewise, Kate, Angelina, and Marlene acknowledged the importance of racial and ethnic diversity as a means of feeling connected in STEM. These racial and ethnic identities were not necessarily shared but acknowledged in a homogenously White environment. Hailey, Angelina and Patricia recounted that finding other queer faculty members or graduate assistants that identified within the LGBTQ+ community felt supportive in their STEM pursuits. It is important to note this study is representative of all QWOC in STEM but, rather, a portrayal of the nuanced forms of connections intersectionality and across identities.

Marlene discussed the support she received throughout her undergraduate and graduate pursuits while reflecting on her connection through a STEM organization focused on serving Hispanic students. Marlene shared:

Now that I think about it, there was a lot of support. I came across a lot of little cliques of groups that were very similar to me . . . I remember somebody making a note of that, like, do you only bring in females that are Hispanic? You had to be Hispanic to qualify for this

[STEM organization], but the [faculty] in charge of all of it said, 'No. This is what's in science right now. This is who applied.' It's pretty cool to see this shift going on and I'm grateful that I'm in such a comfortable place where I can go and get my master's and not be afraid to [voice] my thoughts and ideas because I've never been really oppressed or [told] that I was different. It makes me thankful I have had a lot of support. I guess nobody had any issues with me being gay or even had really anything to say about it.

Marlene recognized her experience may have been different from others and indicated that when she did research with women in other STEM programs across the country they often shared that their experiences were much different from hers. She went on to explain, "The [women] that have issues [in their programs] have shared they want to quit sometimes and have said, 'I just don't think I can do it anymore.'" Marlene's experiences highlight the importance of providing academic, social and financial support through the allocation of resources and in partnering with the local, state and federal government to provide access to women and racial or ethnic minorities in STEM. This is an important reference on the institutional potential this portrayal of comprehensive support can provide for the future of STEM programs (Bianchini, 2013; National Science Foundation, 2019; Racial and Ethnic Minority Students' Success, 2011). As STEM programs and their respective institutions strive toward inclusivity, they have the potential to, not only, increase access for those historically denied access from academic and occupational spaces in STEM but increase subsequent rates of entry and engagement into STEM occupations (Singer, 2011; Smith-Doerr et al., 2017; Walker, 2015).

Alternatively, Patricia shared that she did not feel represented in her program and felt this impacted her future goals when it came to career choices and graduate school:

I feel least represented when I first enter an environment and I'm not really sure about the intentions of other people. When I think about going into research, I know research is just so predominated by older White men. I never really know if they'll ever understand [me] or even being to understand what I have experienced. I never know what I can share [about myself], if anything at all, or whether I should just keep quiet. I become afraid. I feel like I can't even say [that] out loud unless I'm with other queer people of color because I don't know how it will come off. . . . Part of why I'm struggling to decide [between research and the healthcare profession] is that I know ethnic diversity and women in academic research are just not really represented.

Patricia went on to discuss her experiences of gender representation in STEM and shared:

It's really terrifying not know[ing] if I can express myself fully and to express my difficulties or challenges with the people who are around me. Being a woman of color with disabilities—I think about [my identities] all the time. At best I felt connected when meeting a woman in STEM or having [women-identified] professors in STEM. They didn't even need to hold any other identities with me but just crossing that bridge with them and talking about that sort of [gendered] marginalization. I think the most support that I've gotten has been from other women in STEM, even knowing queer men in STEM is not anything near experiences that I've had.

The quote above highlights the weight of intersectional experiences. Patricia specifically noted feeling most supported by other women in STEM beyond peer support with other queer men in STEM. This experience is all too familiar for individuals struggling with marginalization rooted in multiple identities. The story shared above is also complicated by the sheer reality that STEM is highly saturated with men and the possibility that even queer men may perpetuate sexist

notions alongside gendered commentary. Hailey echoed the importance of connections with women-identified teachers and faculty in STEM. She shared, “that’s one of the things I’ve really looked up to with female teachers in STEM, I’ve always been like, ‘If they can do it, I can do it too.’” Hailey’s words restate the importance of what it means to have additional gender representation. What a powerful reminder to those who are only too eager to see themselves reflected in even the smallest of ways when normative society and its respective power structures weave a web of deceit so deep that one’s mere existence is a reminder they do not belong.

Although none of the co-researchers in this study indicated they came across another QWOC in STEM, this reality further reflects the isolation expressed by co-researchers that may come from an experience of never coming across someone like themselves. Even having the exact shared identities as a QWOC does not reflect the same experience navigating systems at large with respect to racism, sexism, heterosexism, classism, ableism, and other oppressive structures perpetuating the repetitive dance of power and privilege (Abes, 2016). This research study emphasizes the importance of representation and shared identity across faculty, staff and peer groups. The simple notion of connecting with or seeing oneself in STEM faculty (Bianchini, 2013; Byars-Winston, 2013; Linley et al., 2016) can create a foundation extending safe learning environments for our most marginalized students in a highly homogenous academic field and occupational industry.

**Musings of exclusion and othering.** At times, co-researchers shared their direct experiences with identity-based exclusion and othering. Hailey discussed not feeling respected by faculty by microaggressions she has faced over the years and shared the use of gendered terms of endearment that further lend themselves to creating an exclusionary workplace and academic environment. Hailey shared, “the hardest thing for me was interacting with faculty and

not feeling respected. [Older male] professors would regularly call me, 'Dear,' and I know they wouldn't say that to a guy. Those [seemingly] little things can add up over time."

Beyond microaggressions are the larger impacts and realities of systemic oppression as considered by historical, cultural, political, and legal manifestations of exclusionary policies. Angelina recounted her experience based on her immigration status and queer identity. Angelina shared:

I think my immigration [status] and my queer identity have been the most impactful for me. Immigration gives me anxiety because we don't know what's happening. I remember when Trump got elected, I got very emotional because my whole world felt like it was falling apart. I remember reaching out to professors and asking them for flexibility saying, 'This is really affecting me and I feel like I can't focus on my academics.' A [male professor] in one of my harder classes, emailed me and was like, 'Sorry, but no, you can't take any time off.' It felt kind of inhumane because I was like, 'You obviously aren't going through what I'm going through, so you don't know.'

Angelina's experience when asking STEM faculty for support seemed to disregard her experience as a human, as she indicates above. In a climate when undocumented individuals have often been dehumanized through historical injustices and politicized policy enforcement (Abes, 2016), Angelina's lack of academic support during the 2016 presidential election, a time of heightened political turmoil, suggests the need for compassionate and thoughtful faculty and institutional support.

Alternatively, Patricia spoke to her intersectional identity as a QWOC with disabilities and the difficulties she faced when authentically engaging with faculty and administrators.

Patricia indicated:

The way queer people interact with gender—it's just so fundamentally different from the heteronormative society that we are placed in and . . . being a person with disabilities and being a woman of color with disabilities. I always think about how I may be discriminated against and misunderstood.

Patricia indicated she often thought about her queer identity and being a woman of color with disabilities. What she shared above exemplifies her foundational concern about how she must navigate and endure oppressive systems that continue to create difficulty during her educational pursuits.

Similarly, Hailey identified her critique of gendered media portrayals of scientists in a popular television show, *Big Bang Theory*. Hailey shared:

I always saw scientists as represented as men in the media. One thing I thought about a lot is that in [the television show], *Big Bang Theory*, all the main scientists are male, and the female scientists are shown as unattractive and awkward. Penny is the only attractive woman and she is not even a scientist. They present women in STEM as these awkward, undesirable people. As a woman watching it, if I wasn't already in STEM, I wouldn't be like, 'Hey, I want to be like that person.'

Hailey reiterated the importance that media portrayals can have on individual and collective assumptions and generalizations of minoritized communities. Especially, when a show about scientists leaves most male identified characters bound to their intellectual identity whereas social constructions of femininity are utilized to further perpetuate the objectification of a female body without intellect initially involved in these judgements. The media remain another structural means of communicating and perpetuating stereotypes and subtle forms of marginalization through social commentary.



Patricia elaborated on her disheartenment due to exclusionary responses from queer men in STEM. Patricia relayed:

I was in a research internship with many queer men in STEM and, yet, I still felt like I couldn't relate to them very much. I had hoped for something from them, in terms of support, and I really didn't get anything. I actually got a lot of discouragement from all of them and that stuck with me. I think even just being a woman in STEM is fundamentally more relatable than queer men in STEM.

Here, Patricia noted feeling more supported by women in STEM when compared to her experiences with her queer counterparts who happened to be men—a reminder of the influence of patriarchal oppression. She touched upon the idea of internalized oppression within and across marginalized groups that perpetuate normative expectations of each other (Abes, 2016) as a means of accessing the limited resources of cultural and economic capital (Solórzano & Yosso, 2002; Yosso, 2005). Internalized oppression and horizontal hostility can make their way into any minoritized population and may even become heightened by an intersectional experience (Collins, 1986, 1990, 2000; Crenshaw, 1989, 1991). Horizontal hostility and internalized oppression are concepts of infighting and perpetuation of oppressive ideals and mechanisms to support the power structures maintained by the majority. These realities reflect the perfect outcome of a system that pits people against each other with common experiences of historical and political exclusion to maintain the order of power and privilege. This, especially, cannot be overlooked when critically engaging in the meaning making of this research.

### **Recommendations and Future Considerations**

The purpose of the discussion above was to further highlight the ways in which QWOC in STEM in this study perceived their identity with respect to their academic pursuits. The nature

of their identities within a structure that seems most reflective of the historical and political underpinnings of the American higher education system is a stark reminder of the continued work our institutions of higher learning must consider in the future. The co-researchers in this study are among the first QWOC in STEM to be represented in the literature. While studies exploring the experiences of QWOC exist, these remain limited within the scope of STEM education. To shed light on one of the first voices heard, as QWOC in STEM, I asked all five co-researchers about the feedback they would provide to their STEM program or institution, as well as inquire about the changes they might suggest with respect to their STEM experience. As such, the recommendations and feedback provided below are their active requests for consideration and implementation.

**Inclusivity and sensitivity trainings.** The first recommendation, and the most readily identified area of critical importance by every co-researcher involved, the university's provision of inclusivity and sensitivity trainings. Trainings should go beyond basic concepts relating to identity and should include a thorough curriculum addressing the most marginalized and historically oppressed student populations. While not an exhaustive list, these trainings should minimally be focused on racial and ethnic diversity, sexism and gender discrimination, LGBTQ+ identity and gender expansive topics, undocumented student needs and experiences, disability services and support for first-generation student, among others. This training would be offered by university's in an effort to support our most marginalized students. In addition, these trainings should include all faculty, staff, and administrators to best support the students with whom they will be interfacing and serving consistent with the varying missions of institutions. Lastly, these trainings should minimally consider partnerships between resource centers, faculty, and higher education administrators for large scale implementation. These trainings should not be limited to

faculty and staff but extended to higher education professionals in orientation programs and beyond.

The following testaments from the co-researchers reiterate the importance of inclusivity and sensitivity trainings. Hailey responded with the following for future considerations and feedback based on her experience in STEM:

I wish people would be more sensitive. Actually, a couple of days ago a professor made a comment, 'Oh if I didn't have to write grants and do these sensitivity trainings, I would spend time doing [actual research],' which was a microaggression to me. Those sensitivity trainings are there for a reason. That comment wouldn't have bothered me a couple of years ago but after realizing how much these things had an impact on my self-esteem or perception of myself in STEM, I feel like people could be more sensitive [altogether] and particularly when it comes to mental health. This pressure [for professors] to be like, 'You're not doing enough,' [creates an unhealthy] mentality. There were a lot of times when I struggled with mental health and it would've been nice to have someone tell me, 'Whatever you're doing is enough.'

Similar to Hailey's point above, Patricia asserted:

I think institutions could do so much more in terms of educating administrators and educators about [LGBTQ+ issues] like queer ally training. The queer ally training exists at [my institution] through the LGBT center but I don't know whether it's mandatory or even if it's actually being done. I don't have that knowledge. But from what I've seen, I wouldn't think so. I just feel like there's a lack of understanding and how in most of the syllabi I read for my professors, the LGBT center is listed [as a resource], but it never feels genuine.

Patricia expanded upon exclusionary policies at her institution with regard to transgender peers. Specifically, she reflects on the use of legal names on identification cards at her university and the fact that, for some, they are repetitively deadnamed by the institution's use of someone's given name instead of their chosen name. Patricia noted, "legal names are still written on IDs and class rosters. People's deadnames are used often and that, in itself, is really problematic." Patricia summarized the reason for these trainings by pointing out that policy needs to be revised for transgender and gender-expansive individuals. The policy of using legal names represents a larger structural inequity indicative of the lack of care and attention given to transgender and gender-expansive individuals through national policy. If institutions have the capability to be on the forefront of social and political ideas, trainings on inclusion and sensitivity will inspire thoughtful and creative solutions toward a more welcoming learning environment.

Similarly, Kate discussed the importance of faculty support throughout STEM pursuits as well as workplace diversity and inclusion trainings for further implementation. Kate asserted STEM administrators and faculty members should consider:

Paying more attention to the student and not thinking of them as a number. Making sure that whatever is [said by faculty or administrators] is not biased. It's really important. If students in STEM get discouraged [enough] times, they're less likely to proceed in those fields. I know some people will completely switch majors out of STEM because of the number of times they've been told by professors and classes that they're not fit for [STEM]. It's pretty unfortunate, you know?

Angelina also provided feedback about the need for faculty awareness of, and sensitivity to, student needs. She said:

I wish faculty would be more humane toward their students. They really don't know what's going on in their lives. Some [students] are a lot more privileged than others. There's always going to be at least one student who is in class, having the worst day of their lives . . . students who are just living, trying to make it through [life] and [professors] don't know that . . . and I wish they knew.

Angelina reiterated her frustration over a lack of care and concern by faculty in her experience.

Kate went on to discuss their experience in their graduate program and highlighted the importance of faculty sensitivity when supporting students through their education. Kate recounted:

I had a really good advisor during graduate school. I would hope that applied to every single other advisor that was available with all faculty, but I'm pretty sure that wasn't the case. It is important to make sure those kinds of resources [and support] are available to everyone, not just depending on which advisor you end up with. I was really lucky, but I knew some professors said problematic things during class and I'm pretty sure they wouldn't have been as supportive of me if they were my advisor.

Kate noted the positive impact their advisor had on their graduate experience by identifying, that others did not have the level of support Kate did. This acknowledgement is a stark reminder that one faculty member can have an instrumental impact on whether a student feels supported in the STEM program. Kate expanded on the notion of inclusivity and sensitivity training beyond the university setting and identified feedback for the workplace experience in STEM. Kate asserted:

I feel like the corporate world gets away with a lot of things. There are laws that say you can't discriminate but that doesn't really translate into how people act in a company and I think they need to hold a lot more people accountable for their actions. I shouldn't be the

one educating everyone on why queer words should not be used in a demeaning manner. It should be some part of a corporate program, where we teach people not to discriminate in the workplace. There are laws for companies to abide by and basic trainings that are provided, but those are just the bare minimum. Basic trainings don't even scratch the surface as to what [information] employees should really get, in order to have a good working environment.

Trainings around sensitivity, particularly for LGBTQ+ communities were reiterated by the co-researchers. Diversity and inclusions trainings may cover multiple topics for university faculty and administrators, alongside mandatory trainings in the workplace. However, training initiatives remain an area for continued growth and refinement across higher education, throughout employment training efforts, and within state and federal implementation.

**Allocating necessary fiscal and human resources.** The second recommendation would be to have institutions and corresponding STEM programs commit fiscal and human resources to training, financial support, creating and maintaining resource centers, and time devoted to supporting marginalized student populations. Co-researchers spoke to the lack of academic, social, financial, and emotional resources available to them and the difficulties they encountered in seeking resources when necessary. These resources also included support across campus entities and through individual relationships between students and faculty. Patricia spoke about her experiences navigating access to resources and the lack of understanding for mental health support:

I've needed to access a lot of academic resources of my own accord because of the struggles that I face. I receive accommodations as a person with disabilities but I don't think there's very good support for queer people of color here, whether they're in STEM

or not. So much of the support we end up getting is because we hear about it from other queer people of color, because mental health is such a pertinent issue for many queer people. I have helped other queer people by telling them how to navigate resources. Sometimes we're told that there are resources, but then we aren't told how to navigate them. Navigating [resources] is also an enormous challenge and even more difficult for queer women of color because of how exhausting it is to advocate [for yourself] when the person on the other end of these administrative roles really do not understand our experiences. When we have to access our trauma or access these issues just to prove that we need help or accommodations . . . it's awful. It's horrible.

Patricia highlights the bureaucratic nature of accessing resources within her university while also acknowledging peer support. Allocating financial resources and a physical space, such as a resource center to assist with identity-based inquiries and connection to campus and community services, are firsthand representations of the need to deconstruct a heteronormative system in higher education that historically refused to acknowledge LGBTQ+ needs.

**Increasing diversity and representation.** The third recommendation circles back to the first portion of this chapter's discussion with representation in mind. Increasing STEM diversity of faculty, staff, and administrators to further create a supportive environment for QWOC in STEM is paramount to creating a welcoming space even beyond strictly QWOC identities. Increasing representation in admissions and attendance of QWOC students in STEM programs is also a large part of this conversation. Retention and persistence of these students then becomes directly connected to the allocation of resources and accessibility of services geared to support racially or ethnically diverse students, women, and LGBTQ+ students in addition to the many others working on the margins of ability, socioeconomic status, and beyond.

## **Limitations**

Chapter Three identified the methodological limitations of this study, namely sample size, geographic constraints, and the obvious constraints relating to the numbers of QWOC in STEM based on varying identities and access to higher education and STEM programs (Linley et al., 2016; Waldrop, 2014). In Chapter Three, I found a considerable area for further discussion based on my own limitations through recruitment. While I understood the reality that there would likely be fewer QWOC in STEM and, possibly, fewer QWOC in STEM that may self-identify going into this study, it became increasingly difficult to pinpoint mechanisms for connection given the varying nature of where and how students connect to social and academic groups.

The simple fact that QWOC span varying racial and ethnic backgrounds is a crucial consideration. I had to account for the simultaneity and multiplicity of intersectional identity with sexual orientation, gender, and racial and ethnic backgrounds in mind. Considering gender identity and recruitment strategies, anyone who did not identify as a cisgender man may be involved in a multitude of organizations across campuses. The LGBTQ+ identity also became a simple reminder that group membership to affiliated organizations have their own limitations. Efforts to recruit within STEM-based student organizations or academic groups may not have yielded many interested QWOC given the nature of increased support through social engagement and peer connectedness (Beede et al., 2011; Holman et al., 2018; Noonan, 2017; Martinez, 2012; Strayhorn et al., 2010). The limitations around identifying potential co-researchers must also acknowledge that the nature of social engagement and support often goes beyond STEM-oriented communities. More specifically, mechanisms for support as a QWOC in STEM go far



beyond the academic extending into the social and political experiences through solidarity and allyship.

As a QWOC or QPOC, and consistent with the ongoing understanding of intersectional experiences, fostering support and connection will continue to go beyond the strictly academic programs of STEM fields. This notion is consistent with ingroup and outgroup mentalities within the systemic oppression perpetuated toward minoritized persons and communities at universities and throughout the United States. Therefore, the limitation of finding individuals that identify as a QWOC in STEM spans identity groups, and social, historical, and political dynamics.

It is important to note that this study does not include the voices of Black-identified or Native-identified individuals as well as mixed or multiracial individuals. Efforts must persist to seek perspectives and better understand the experiences of these communities highlighting the importance for gathering context from other minoritized perspectives and employing recruitment strategies to spread this study further. It should also be noted while this study did not have any individuals identifying as transgender, the broadening of this research study to include expansive gender identities from the early recruitment stage would further highlight the voices being missed in the homogenous representation of STEM programs and career opportunities.

## **Conclusion**

When taking on this research project, I must admit, I believed the presence of QWOC in STEM to be far more robust than the number of individuals who expressed interest in contributing to this study. Although it took time to find co-researchers who met the parameters of and who were willing to engage in this research journey, it has been my incredible honor to be given a glimpse into the lives of these incredible individuals. While staying true to the qualitative approach, I employed the narrative research design to best answer two main questions: 1) What

are the experiences of QWOC in STEM programs? 2) How do QWOC explain their success in STEM programs? Based on the literature review I conducted, these questions had not yet been asked of QWOC in STEM programs. This project has been a personal and political undertaking to begin the process of amplifying the voices of multiply marginalized individuals in STEM. Through the troubling of systemic oppression and praxis, where critical and post-structural theory collide, I have sought to offer the five co-researchers' counter-stories as well as my own experience in the margins.

The silencing of people of color, women, and LGBTQ+ individuals are highlighted by the co-researcher's reactions to this research project. They reiterated their excitement and interest in a research project exploring the experiences of QWOC in STEM. Angelina affirmed the significance of this research by saying, "I'm glad that you're doing something like this. When I saw your email, I was like, 'Oh, wow! This is super interesting and I'm surprised that someone's doing it.'" While Angelina noted her surprise about this research study, she acknowledged that her surprise stemmed from the lack of interest in understanding such an intersectional experience. Marlene echoed similar thanks and excitement about this research opportunity as she recounted:

I need to say, that it's awesome that you're doing this study. My mom called me earlier, and I told her, 'Mom, you'll never guess what. This person is doing a study on literally what I fit the demographic of.' She was stoked. I told her it was about women that are queer and [racially or ethnically diverse] and she was like, "Oh, that's perfect. That's literally you." So, thank you. It puts a voice out there.

I commend the co-researchers for their vulnerability and willingness to speak authentically their truths. Their stories are nothing shy of gifts to which I hold a responsibility to move forward for

further research and consideration. This research project would not exist without the co-researchers involved: Hailey, Patricia, Angelina, Marlene, and Kate. In honor of them, I must contextualize the conclusion of this master's thesis by quoting Elisa Abes:

Educators should be acutely aware of the personal toll that systems of oppression take on students as they are developing their sense of self and support students whose energies are going toward managing others' perceptions at the same time that are internally negotiating their sense of self. Educators should also value students as resisters rather than complicit in oppression, recognizing that students often resist through their everyday actions. (Abes, 2016, p. 106)

It can be exhausting when one's existence is questioned every step of the way. Yet, at the same time, it can be an extraordinary triumph to know one's presence and existence acts as the very force to dismantle systems of power and privilege. In closing, I asked the co-researchers in this study how they would describe their journey as a QWOC in STEM. I leave the reader here to consider some final thoughts from Kate, Hailey, Marlene and Angelina:

Kate: I've found it important to be open about my identity [early on] to make sure it doesn't affect my career at a later point. Once I've done that, I've been able to focus on my career in STEM without having to grapple with how my identity fits into it.

Hailey: You know how in finding Nemo, Dory says, "Just keep swimming,"? I would say this [describes my journey]. Just keep swimming.

Marlene: What am I doing here? How did this happen? Those two years [of graduate school] and my undergrad[uate program] were a lot of work. So much fun, don't get me wrong, but gosh, it was crazy . . . Throughout my whole journey there was that imposter syndrome: 'Why am I here? What am I doing? Why did I do this?'

Angelina: I always go back to this image—a moment at home with my mom. We were outside picking up trash and I was going to move this *bote de basura* (garbage can), a big trashcan that you take to the curb. I was trying to pick it up because it was filled with rocks and I couldn't [lift it]. My mom was like, 'Let me help you,' and I said, 'No, I can do it.' She asked me, 'Are you sure?' and I said, 'Yes.' I fell down when I tried to move it. I got back up and told my mom, 'I can do it,' and she let me. I feel like that's always been a moment for us—since then she's always told me, 'Mami, you can do it. You can do it, even if you fall.'

## References

- Abes, E. (2016). Critical perspectives on student development theory. *New directions for student services*; no. 154).
- Aikenhead, G. (2010). Academic Science, Cultural Intransigence, and Devious Educo-Politics. *Cultural Studies of Science Education*, 5(3), 613-619.
- Beede, D. N., Julian, T. A., Langdon, D., McKittrick, G., Khan, B., & Doms, M. E. (2011). Women in STEM: A gender gap to innovation. *Economics and Statistics Administration Issue Brief*, (04-11).
- Bianchini, J. (2013). Expanding underrepresented minority participation: America's science and technology talent at the crossroads. *Science Education*, 97(1), 163-166.
- Boylorn, R. (2008). Participants as co-researchers. In L. M. Given (Ed.), *The SAGE encyclopedia of qualitative research methods* (pp. 600-601). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412963909.n310
- Byars-Winston, A. (2013). Connecting the disconnects: Considerations for advancing racial/ethnic and gender diversity in STEM. *Career Planning and Adult Development Journal*, 29(2), 53-63.
- Carlone, H. B., & Johnson, A. (2007). Understanding the science experiences of successful women of color: Science identity as an analytic lens. *Journal of Research in Science Teaching*, 44, 1187-1218.
- Carlone, H. B., Johnson, A., & Scott, C. M. (2015). Agency amidst formidable structures: How girls perform gender in science class. *Journal of Research in Science Teaching*, 52(4), 474-488. doi: <http://dx.doi.org/summit.csuci.edu/10.1002/tea.21224>

- Carnes, M., Devine, P. G., Isaac, C., Manwell, L.B., Ford, C.E., Byars-Winston, A., Fine, E., & Sheridan, J. (2012). Promoting institutional change through bias literacy. *Journal of Diversity in Higher Education*, 5(2), 63-77.
- Chang, M., Sharkness, J., Hurtado, S., & Newman, C. (2014). What matters in college for retaining aspiring scientists and engineers from underrepresented racial groups. *Journal of Research in Science Teaching*, 51(5), 555-580.
- Clance, P., & Imes, S. (1978). The imposter phenomenon in high achieving women: Dynamics and therapeutic intervention. *Psychotherapy: Theory, Research & Practice*, 15(3), 241-247.
- Clandinin, D.J. & Connelly, F.M. (2000). Narrative inquiry: Experience and story in qualitative research. San Francisco, CA: Jossey-Bass.
- Collins, P. (1986). Learning from the Outsider Within: The Sociological Significance of Black Feminist Thought. *Social Problems*, 33(6), S14.
- Collins, P. H. (2000). *Black feminist thought : Knowledge, consciousness, and the politics of empowerment* (2nd ed., Rev. tenth anniversary ed.). New York: Routledge.
- Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory, and antiracist politics. *The University of Chicago Legal Forum*, 1, 139-167.
- Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, 43(6), 1241.
- Creswell, J. (2012). Qualitative inquiry and research design: Choosing among five approaches (3rd ed.). Thousand Oaks, CA: Sage.

- Delgado, R., & Stefancic, J. (2001). *Critical race theory : An introduction*. New York: New York University Press.
- Dika, S., & D'Amico, M. (2016). Early Experiences and Integration in the Persistence of First-Generation College Students in STEM and Non-STEM Majors. *Journal of Research in Science Teaching*, 53(3), 368.
- Doerschuk, P., Bahrim, C., Daniel, J., Kruger, J., Mann, J., & Martin, C. (2016). Closing the gaps and filling the STEM pipeline: A Multidisciplinary Approach. *Journal of Science Education and Technology*, 25(4), 682-695.
- Freire, P. (2001). *Pedagogy of freedom: Ethics, democracy, and civic courage*. Lanham: Rowman & Littlefield Publishers.
- Geertz, C. (1973). Thick description: Toward an interpretive theory of culture. In *The interpretation of culture: Selected essays* (pp. 3-33). New York: Basic Books.
- Gilligan, C., Spencer, R., Weinberg, K., & Bertsh, T. (2003). On the *Listening Guide*: A voice-centered relational model. In P. Camic, J. Rhodes, & L. Yardley (Eds.), *Qualitative research in psychology: Expanding perspectives in methodology and design* (pp. 157-172). Washington, DC: American Psychological Association.
- Glesne, C. (1997). That Rare Feeling: Re-presenting Research Through Poetic Transcription. *Qualitative Inquiry*, 3(2), 202-221.
- Holman, L., Stuart-Fox, D., & Hauser, C.E. (2018). The gender gap in science: How long until women are equally represented? *PLoS Biology*, 16(4).
- Holvino, E. (2010). Intersections: The Simultaneity of Race, Gender and Class in Organization Studies. *Gender, Work & Organization*, 17(3), 248-277.

- Hughes, B. E. (2017). "Managing by not managing": How gay engineering students manage sexual orientation identity. *Journal of College Student Development*, 58(3), 385-401. Retrieved from <http://summit.csuci.edu:2048/login?url=https://search-proquest-com.summit.csuci.edu/docview/1897788728?accountid=7284>
- Humphreys, M. (2005). Getting personal reflexivity and auto-ethnographic vignettes. *Qualitative Inquiry*, 11(6), 840-860.
- Hurtado, S., Newman, C., Tran, M., & Chang, M. (2010). Improving the Rate of Success for Underrepresented Racial Minorities in STEM Fields: Insights from a National Project. *New Directions for Institutional Research*, (148), 5.
- Hurtado, S., Eagan, M. K., Tran, M. C., Newman, C. B., Chang, M. J., & Velasco, P. (2011). "We do science here": Underrepresented students' interactions with faculty in different college contexts. *The Journal of Social Issues*, 67(3), 553.
- Johnson, A. C. (2007). Unintended consequences: How science professors discourage women of color. *Science Education*, 91, 805–821.
- Langford, J., & Clance, P. R. (1993). The imposter phenomenon: Recent research findings regarding dynamics, personality and family patterns and their implications for treatment. *Psychotherapy*, 30(3), 495-501.
- Lather, P. (1992). Critical frames in educational research: Feminist and post-structural perspectives. *Theory Into Practice*, 31(2), 87-99.
- Lincoln, Y. & Guba, E. (1985). *Naturalistic inquiry*. Beverly Hills, CA: SAGE Publications.
- Linley, J. L., Nguyen, D., Brazelton, G. B., Becker, B., Renn, K., & Woodford, M. (2016). Faculty as Sources of Support for LGBTQ College Students. *College Teaching*, 64(2), 55–63.



- Malcom, S.M., & Malcom-Piqueux, L. E. (2013). Critical mass revisited: Learning lessons from research on diversity in STEM fields. *Educational Researcher*, 42(3), 176-178.
- Malcom-Piqueux, L., & Bensimon, E. M. (2017). Taking equity-minded action to close equity gaps. *Peer Review*, 19(2), 5-8.
- Malone, K. R., & Barabino, G. (2009). Narrations of race in STEM research settings: Identity formation and its discontents. *Science Education*, 93(3), 485. Retrieved from <http://summit.csuci.edu:2048/login?url=https://search-proquest-com.summit.csuci.edu/docview/194906853?accountid=7284>
- Martinez, C. (2012). STEM, shoots, and leaves: Increasing access of underrepresented groups to high-quality, career-readying science, technology, engineering and mathematics education. *Harvard Journal of Hispanic Policy*, 25, 15-24.
- McGlynn, A. (2012). Minority student shortage in science and technology. The Hispanic Outlook in *Higher Education*, 22(14), 8-9.
- Merriam, S.B. & Tisdell, E.J. (2016). Qualitative research: A guide to design and implementation. (4<sup>th</sup> ed.). San Francisco, CA: Jossey-Bass.
- Moss-Racusin, C. A., Sanzari, C., & Rabasco, H. (2018). Gender bias produces gender gaps in STEM engagement. *Sex Roles*, 1-20.
- National Science Foundation. (2019). Women, Minorities, and Persons with Disabilities in Science and Engineering: 2019. *Special Report NSF 19-304*. Alexandria, VA.
- Naylor, L. (2018). Counting an Invisible Class of Citizens: The LGBT Population and the U.S. Census. *Public Integrity*, 1-19.

- Neyman, V. L. (2011). *Giving my heart a voice: Reflection on self and others through the looking glass of pedagogy: An autoethnography* (Doctoral dissertation). Retrieved from <https://digitalcommons.nl.edu/diss/46>
- Noonan, R. (2017). Women in STEM: 2017 Update. *Economics and Statistics Administration Issue Brief*, (06-17).
- Pément, N-J. (2013). 'This has been my life's work': *A qualitative study of the experiences of doctoral student mothers in higher education and their quest for social justice* (Doctoral Dissertation). Retrieved from ProQuest Dissertations and Theses database. (AAT 3599510).
- Plano Clark, V. L., & Creswell, J. W. (2015). *Understanding research: A consumer's guide*. (2<sup>nd</sup> ed.). Upper Saddle River, NJ: Pearson Education.
- Racial and ethnic minority students' success in STEM education (2011). *ASHE Higher Education Report*, 36(6), 1-25. Hoboken, NJ: Wiley and Sons
- Richardson, L. (1994). NINE POEMS: Marriage and the Family. *Journal of Contemporary Ethnography*, 23(1), 3-13.
- Richardson, L. (1997). Writing matters. In L. Richardson. *Fields of play: Constructing an academic life* (pp. 86-95). New Brunswick, N.J.: Rutgers University Press.
- Richardson, L., & St. Pierre, E. A. (2005). Writing: A Method of Inquiry. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (pp. 959-978). Thousand Oaks, CA, : Sage Publications Ltd.
- Richardson, L. (2018). So, Why Poetry? *Qualitative Inquiry*, 24(9), 661-663.

- Rogers, M., Pfaff, T., Hamilton, J., & Erkan, A. (2015). Using sustainability themes and multidisciplinary approaches to enhance STEM education. *International Journal of Sustainability in Higher Education*, 16(4), 523-536.
- Russell, M., & Atwater, M. (2005). Traveling the road to success: A discourse on persistence throughout the science pipeline with African American students at a predominantly white institution. *Journal of Research in Science Teaching*, 42(6), 691-715.
- Sherry, M. (2008). Insider/outsider status. In L. M. Given (Ed.), *The SAGE encyclopedia of qualitative research methods* (pp. 433-434). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412963909.n216
- Singer, S. R. (2011). STEM education: Time for integration. *Peer Review*, 13(3), 4-7.
- Smith-Doerr, L., Alegria, S. N., & Sacco, T. (2017). How Diversity Matters in the US Science and Engineering Workforce: A Critical Review Considering Integration in Teams, Fields, and Organizational Contexts. *Engaging Science, Technology, and Society*, 3, 139-153.
- Solórzano, D. G., & Yosso, T. J. (2002). Critical Race Methodology: Counter-Story Telling as an Analytical Framework for Education. *Qualitative Inquiry*, 8(1), 23-44.
- Strayhorn, T., Harper, S. R., & Newman, C. B. (2010). Undergraduate research participation and STEM graduate degree aspirations among students of color. *New Directions for Institutional Research*, 2010(148), 85-93.
- Sullivan, N. (2003). *A critical introduction to queer theory*. New York: New York University Press.
- Tan, E., Calabrese Barton, A., Kang, H., & O'Neill, T. (2013). Desiring a career in STEM-related fields: How middle school girls articulate and negotiate identities-in-practice in science. *Journal of Research in Science Teaching*, 50(10), 1143-1179.

- Todd, B. (2015). *Little scientists: Identity, self-efficacy, and attitude toward science in a girls' science camp* (Doctoral dissertation). Retrieved from ProQuest. (Order No. 10006333)
- Wai, J., Lubinski, D., Benbow, C. P., & Steiger, J. H. (2010). Accomplishment in science, technology, engineering, and mathematics (STEM) and its relation to STEM educational dose: A 25-year longitudinal study. *Journal of Educational Psychology, 102*(4), 860-871.
- Walker, M. (2015). Imagining STEM higher education futures: Advancing human well-being. *Higher Education, 70*(3), 417-425.
- Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education, 8*(1), 69-91.

## Appendix A

### Recruitment Email and Social Media Post

Hello,

My name is Yasmin Quigley and I am a graduate student in the Master's in Educational Leadership program at CSU Channel Islands (CSUCI). As a queer woman of color who received her undergraduate degree in a STEM program, I find it increasingly important to discuss the nuanced experiences of queer and/or trans women of color (QTWOC) in STEM undergraduate or graduate programs.

Not surprisingly, research on the experiences of QTWOC in STEM programs is limited. It is my hope that you might agree to meet with me to share your experiences and to tell your stories in an effort to give voice to QTWOC in STEM programs. Your voice is crucial to advance a greater understanding of the unique needs and interests of QTWOC in STEM programs. In addition, I anticipate that this project will inform programs and policies across institutions of higher education, as well as STEM programs, more specifically.

I would like to hear about your experiences if you:

- Are at least 18 years of age;
- Are currently enrolled in an undergraduate STEM program; OR are a graduate of a STEM program (undergraduate or graduate) within the last ten years;
- Identify as a queer woman of color:
  - Identify as a queer person or as belonging to the LGBTQ+ community;
  - Identify as a woman; AND/OR identify as woman-aligned, gender expansive, gender fluid, gender non-conforming, non-binary, transgender, etc.
  - Identify as a person of color or as belonging to a racially or ethnically minoritized or marginalized identity group.

For more information about this research study, please contact me at the email listed below. Thank you for your time.

Yasmin Quigley  
CSUCI Graduate Student, MA Candidate  
[Redacted email address]

## Appendix B

### Recruitment Flyer

# ARE YOU A QUEER WOMAN OF COLOR IN STEM?

If you identify as a queer woman of color (QWOC) in STEM, I would love to hear from you! The following research project is open to current students or recent graduates (within the last ten years) of an undergraduate and/or graduate program in STEM. If you are interested in participating in a research study exploring the experiences of QWOC in STEM, please contact:

Yasmin Quigley

CSUCI Graduate Student, MA Candidate

Redacted Email Address



**FOR MORE INFORMATION ABOUT THIS RESEARCH STUDY, PLEASE EMAIL  
ME DIRECTLY OR VISIT THE FOLLOWING LINK:**

Redacted Google Interest Form Link

Participation in this research study is voluntary and will consist of a confidential interview lasting no longer than one hour.

## Appendix C

### Research Informed Consent Form

Dear Participant,

You have been invited to take part in a research study, the purpose of which is to explore the experiences of queer women of color (QWOC) in science, technology, engineering, and mathematics (STEM) programs throughout institutions of higher education. This study will be conducted by a graduate student in Higher Education Leadership at CSU Channel Islands (CSUCI). Your participation is voluntary, and you may withdraw from the study at any time. Should you decide not to participate in this study, your decision(s) will not prejudice your current or future relationship with CSUCI, your respective institution(s) or your STEM program.

Data will be collected through the following means: 1) a voluntary demographic questionnaire and 2) a semi-structured, one-on-one interview that may last between 45 minutes and one hour. Pseudonyms will be used in reporting results to ensure your confidentiality. All data collected in this study will be stored in a secure and locked cabinet for 5 years consistent with federal regulations.

It is anticipated that participants will experience minimal risks from this study. However, different people react differently to stimuli, and it is possible that some may experience negative feelings or recall a difficult event during the interview. If this were to happen, you may take a break. If you do not wish to answer a question, you may decline to answer without any negative consequences. If you experience any discomfort, you can terminate the process at any time. Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to end involvement in this study. Furthermore, you may reach out to me or my thesis advisor, Dr. Nancy-Jean Pément, should you wish to discuss any issues that may arise from your participation in this research.

Also, please feel free to ask me or my thesis advisor any questions you may have about this study either beforehand, during or after the data collection process. My contact information and my advisor's contact information are provided below.

I will gladly share the findings of this study with you after the research is completed. Findings from this study may help students, faculty, and staff advance their understanding of the unique needs and interests of queer women of color (QWOC) in undergraduate STEM programs. Furthermore, findings from this study may be shared at conferences and/or submitted to an academic journal for wider dissemination and publication.

For questions or concerns regarding your rights as a subject, please feel free to contact the Institutional Review Board (IRB) at [redacted phone number] or via email at [redacted email address].

I have read the information provided above. I understand that by agreeing to be interviewed, I am agreeing to participate in this research study. I understand that I must be at least 18 years of age to participate in this study. I will be given a copy of this form to keep.

- By selecting this box, I agree for the interview to be audio recorded.
- By selecting this box, I do not agree for the interview to be audio recorded.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Contact details:

Yasmin Quigley  
CSUCI Graduate Student and Primary Investigator  
[Redacted phone number]  
[Redacted email address]

Dr. Nancy-Jean Pément, Thesis Advisor  
[Redacted email address]



## Appendix D

### Preliminary Demographic Questionnaire

Name: \_\_\_\_\_

Pronouns: \_\_\_\_\_

Are you 18 years or older?  
Yes / No

Do you identify as a queer person or identify within the LGBTQ+ community?  
Yes / No

If so, please indicate how you identify: \_\_\_\_\_

Do you identify as a woman AND/OR identify as woman-aligned, gender expansive, gender fluid, gender non-conforming, non-binary, transgender, etc.?  
Yes / No

If so, please indicate how you identify: \_\_\_\_\_

Do you identify as a person of color or identify as a racial/ethnic minority; minoritized person because of race or

ethnic identity? Yes /  
No

If so, please indicate how you identify: \_\_\_\_\_

Are you currently enrolled in a STEM program (undergraduate or graduate)? Yes /  
No

If yes, please list what STEM program/major and respective institution(s) (if interested):

\_\_\_\_\_

Are you a graduate of a STEM program (undergraduate or graduate) within the last ten years?  
Yes / No

If yes, please list what STEM program/major and respective institution(s) (if interested):

---

*To maintain confidentiality, a **pseudonym** will be utilized for this study. Would you like to choose a pseudonym?*

*Yes / No*

*If so, please indicate your chosen **pseudonym**:* \_\_\_\_\_

**PLEASE NOTE: If a pseudonym is not chosen, one will be assigned and utilized for confidentiality.**

## Appendix E

### Semi-Structured Interview Protocol for One-on-One Interviews

#### **Introduction:**

Thank you for taking time out of your day to meet with me and engage in this research opportunity. As we have discussed, the purpose of this project is to explore the experiences of queer women of color (QWOC) currently in (or recently out of) undergraduate science, technology, engineering, and mathematics (STEM) programs. As a queer woman of color (QWOC) who received her undergraduate degree in a STEM program, I find it increasingly important to continue to discuss the experiences of QWOC in undergraduate STEM programs. While research on the experiences of QWOC in undergraduate STEM programs is limited, it is my hope that these interviews will enhance an understanding of the experiences of QWOC in STEM.

Please note that your participation is voluntary and your confidentiality will be protected. You may skip a question, request a break, or leave the interview at any time. This interview will be audio recorded and I may take handwritten notes as we speak. Are you ready to begin?

#### **Warm Up Questions:**

- Tell me about yourself.
- Why did you choose to major in STEM (reference specific major if noted in demographic questionnaire)?

#### **Identity:**

Please tell me about your experience as a QWOC in STEM?

##### *Probing Questions:*

- What has your experience been as a queer (LGBTQ+) person in STEM?
- How has it been being a woman in STEM?
- What has it been like being a person of color in STEM?

#### **Sense of Belonging:**

Do you feel like you belong in your STEM program? Why or why not?

##### *Probing Questions:*

- What has contributed to your feelings of belonging in your respective STEM program?
- How have your identity groups shaped your experiences in STEM, if at all?
- Do you feel like staff or faculty represent your experiences in STEM?
- Do you feel connected through a social context with peers and other students in STEM? Have these been created outside of your STEM program? How have you established these connections?

#### **Academic Support:**

Have you felt supported, academically, by faculty or staff in your STEM program?

**Explaining Success:**

How would you define your success in your STEM program?

*Probing Questions:*

- What do you attribute to the successes you have had throughout your experiences in STEM?

**Future Considerations:**

If you could change one thing about your experience in STEM, what would it be and why?

*Probing Question:*

- If you could give feedback to your STEM faculty or staff, what would you say to them?

**Cool Down Question:**

Please share with me one sentence that describes your journey as a QWOC in STEM.

*Probing Questions:*

- If you could only provide one word to describe your college journey thus far, what would it be? Why did you choose this word?
- If you could describe your journey as a QWOC in STEM through a metaphor, or metaphoric reference, how would you describe it? NOTE: A metaphor is a word or phrase used to represent or symbolize something in an abstract or non-literal way.

## Appendix F

### Role of the Researcher: Autoethnographic Vignettes

#### A Reflection by a Queer Woman of Color in STEM: An Autoethnography

As has been imperative when understanding new experiences, I enlist narrative inquiry and storytelling as methodologies to recognize diverse experiences in higher education. The nuanced experiences of systemically oppressed individuals and non-traditional students provides a magnificent sea of uncharted discovery—the depths, of which, have remained unexplored due to a lack of access and willingness to uncover. Colleges and universities maintain new territories ripe with undiscussed idiosyncrasies and a myriad of paths less-travelled—increasing the need for creative mechanisms for exploration. This reflexive exercise was initiated by a desire to contemplate on the importance of self-reflection as a researcher. Therefore, I will engage in critical reflection of my undergraduate experience as a QWOC in a STEM program. The following question guided this process: What moments in my undergraduate experience were most impactful as a queer woman of color (QWOC) in a STEM program?

This reflexive and creative analytic practice was located in qualitative research whereby the exploration takes place through autoethnographic practices (Creswell, 2012). I embarked on this adventure employing autoethnographic vignettes to portray my undergraduate experience to create an innovative alternative to mapping experiential knowledge through this qualitative tool of methodological inquiry. Thus, it is with tremendous excitement that I explore my own undergraduate experiences as a QWOC in STEM through the budding creative analytic practice of autoethnographic vignettes.

### ***Vignette One: STEM Orientation: One in Four***

*I vividly remember my first week of college. It was chalk filled with orientation sessions, meetings, and opportunities to be social with strangers. I recall walking into a large lecture hall, one of the largest across campus, alongside a few hundred other students. We were attending the biology, chemistry, and physics orientation. This session included every newly admitted student interested in pursuing a major offered through the three departments listed above, which included upwards of fifteen major emphases. The Dean of the college congratulated us on being accepted to the university and in the sciences, no less. I remember thinking this orientation must be an important event because the Dean wore a well-tailored suit, a suit like I had never seen before. The fabric had a somewhat iridescence to it. This was a statement suit.*

*After the Dean's welcome, a panel of speakers discussed academic advising and general major inquiries. As the panel answered a variety of questions, I remember the excitement of discussing majors with my new friends from the same residence hall. We compared schedules and courses, already creating study groups. An electricity from our excitement and nervousness filled the air. Whenever I heard an advisor discuss my major, I had ears for no one else; however, once the topic of majors flittered to the next, I quickly resumed excitable conversation with my peers.*

*As the panel came to a close, the Dean of the college proceeded with closing remarks. I remember these remarks centered around hypervigilance to homework, studying, and exam preparation. He reminded us that, while it was an incredible achievement to make it to the university in these majors, the next big hurdle would center around how well we do and whether we could remain in these majors. The Dean thoughtfully provided us with statistics, I can only assume, to assist us with our motivation throughout the major. In a somber tone he said, "I must*

*admit, you all will have a long way to go. The sciences are not for the faint of heart or for those wavering in their major decision. Only one out of every four of you will graduate with a major in the sciences and less than half of you will make it beyond the first year of your pre-major requirements.” The Dean concluded our orientation with this somber consideration. A lecture hall once filled with the buzzing excitement of opportunity and a youthful zest, quickly turned to doubt and insecurity. I remember looking around the room and seeing primarily, White students. The few I spoke to were White women. I did not see many people of color at all much less women who looked like me. I went to my residence hall later that day thinking about all the ways I would prove the Dean of our college wrong. The first step would be extra study groups and countless evenings in the library. That would make this a smooth transition, I was certain of it.*

### **Reflection on Vignette One**

The vignette above highlights an experience representative of the ongoing selective pressure to codify the sciences as high achieving. By creating and perpetuating a competitive pipeline toward formal succession in STEM programs, the institution creates a space for self-selection to naturally occur. Those who felt they could not keep up, opted to change their majors—every quarter. This experience is an ongoing coming of age story for those wishing to pursue STEM programs and who, inevitably, opt out of this dream. Add noteworthy faculty and significant research in STEM and an even more refined machine is created to keep out those who are deemed less-worthy of a degree in a setting like this.

An experience of this nature speaks to the commodification of education and a degree at a research university. The inherent credentials one receives by matriculating out of any given STEM program are similar to those of a secret society. Only the individuals who know what had to be endured to graduate and move on, understand the significance of this experience. Throw in

an experience of marginalization of any kind and you exacerbate these already prominent factors. This speaks volumes to the level of support marginalized students in STEM may require in order to make it through any given program.

### ***Vignette Two: Whose Office Hours***

*Regardless of the class, office hours consistently felt like a forced expectation of faculty interaction. Whether it was due to social awkwardness or other considerations, I learned to heavily prepare for a brief five to ten-minute conversation. It was as if I prepared for an arduous battle scene each and every time I went to office hours. Begrudgingly, I would go into office hours if I needed clarity around STEM concepts or if I had an inquiry about an assignment. I assumed all office hours to be uncomfortable and slowly stopped going unless absolutely necessary. I relied on my Teaching Assistant (TA) in any given class to get questions answered. Doing this, at times, led me down an incorrect path of learning when the professor wanted knowledge reflected in a particular way for streamlined grading purposes. Streamlined grading.*

*My undergraduate experience in STEM was far removed from essay writing. Course exams were scantron heavy or based in a printed workbook. High stakes exams were a regular occurrence in my courses with one to two midterms and a final being the entirety of my grade. I never questioned my exams. I understood grades as final representations of my comprehension and ability. It was not until my fourth year that I truly understood what my peers were doing when they attended office hours. They were establishing relationships. They were negotiating grades on exams. My peers were asking questions that they could easily ask their TAs, but this would not have the effect of meeting with the professor in person. I did not realize this was how office hours were being used by many others, as an opportunity to network.*



*I may have projected my own feelings of awkwardness during office hours thus continuing my own sense of discomfort. However, these feelings were not that different than my feelings in lectures. Only slightly better was my comfortability with my TAs during a lab or section. I experienced feelings of the imposter syndrome throughout my undergraduate experience that were exacerbated in my STEM coursework. My faculty members were primarily White men and, sparingly, with White women. I never had a professor or TA that presented as a woman of color in any of my STEM courses.*

*The closest I got to people who looked like me happened to be during elective or general education coursework. My classes in the humanities and social sciences supported me but never truly balanced the scales of what I was feeling in my STEM courses. My STEM classes consisted of about 66 percent of my overall undergraduate coursework. The scales were always leaning toward feeling out of place as a woman, as a woman of color, and as a queer woman of color in STEM. One day, I had to swing by one of my chemistry professor's office hours to drop off a lab workbook for credit. This was a professor I had interacted with before, but never in a significantly supportive or positive way. He was curt and direct in his communication and would often wrap up answers to questions with, "is that it?" giving me the impression I was bothering him. This was not a new experience for me. This was consistent with my overall faculty engagement. The sense that they always had something better and more important to work on than answering my questions or having, even at the least, a human connection with me. I often chalked this up to awkward STEM social skills—a running joke with most of my peers. Folks in STEM, students and faculty alike, were not known to be the most socially engaging.*

*Thus, I walked to and from office hours with the idea that social interactions were not a strength nor to be expected. As I walked down the hallway to my chemistry professor's office. I*

*heard raucous laughter and discussion about life and supportive, albeit, almost mentor-driven conversation coming from my professor's office. I figured they must be discussing exciting theoretical concepts with their graduate students or even colleagues. What else could be so engaging when my experiences with this professor always seemed so forced? As I approached, I felt a looming clarity around my presence as a possible interruption. I wanted to take up the least amount of space that I could as I dropped off my lab workbook. I approached the doorway and realized, to my great surprise, it was not graduate students or colleagues that were in my professor's office but rather other students from my class. Four of my male classmates were in his office. I stood in the doorway trying my best to interrupt politely—I simply wanted to drop off my lab workbook. I was not addressed for what felt like a few minutes. It was not until the young men in my class gave me their attention as I stood in the doorway when my professor acknowledged me. He looked at me with a raised eyebrow and asked, "can I help you with anything? Are you trying to find someone?" He clearly did not realize I was in his class. Although, I had been to his office before and asked him a few questions throughout the quarter shortly after the lecture. This lack of acknowledgement immediately created a space of embarrassment in front of my peers. I was in a section and a lab with all of them. I quickly responded to his question, "No, I was actually just looking to turn in my lab workbook." At this point, he realized who I was and said, "of course, you can drop it off there, unless there is anything else?" I reiterated that this was all I needed and dropped off my workbook.*

*I was mortified and embarrassed of the interaction, while also justifying it due to my professor's large class sizes. I left this behind me, like I did most memories of this nature—I simply did not have space in my heart and mind to think about these ongoing experiences. I had to stay focused because it would remain that much more difficult for me to connect. It would*

*remain that much more difficult for me to be seen. It would remain that much more difficult for me to be valued.*

### **Reflection on Vignette Two**

As I look back at this experience, I reflect on the realization I had in this moment. The realization that I had been working harder and had significantly less support from the very faculty from whom I was trying to learn and grow. This instance was one of my greatest learning moments. What I thought to be a shared experience was solely mine. While other women, or people of color, or queer folks had similar experiences, mine felt all that much more complicated. I could never quite understand which of my many identities made me less approachable when compared to my male counterparts, but I knew it had something to do with my identity and this reality weighed on my heart. I went to office hours only when it was absolutely necessary. Office hours were never truly mine.

I was unable to see the impact office hours, lecture formats, TA-led sections, and time in the laboratory had on my overall experiences in STEM in the moment. The little ways that I continued to feel isolated felt like the air that I breathed. It simply was—uncomfortable, awkward, isolating, intimidating, overwhelming, stressful, disengaging, surface-level, and such. I hardly spoke in lectures and I rarely participated in sections. I usually maintained a quiet engagement during my labs and, every once in a while, I would connect with the few other women or people of color. There was a solidarity when I we connected in lab. No faculty around to remind us of the power dynamics at play. We could work and talk and share stories. We would create study groups and discuss the coursework. When the quarter was over, we would compare schedules to see if we were in the same classes and or labs next quarter. Inevitably our time would come to an end and we would go off to different courses or labs. In a blink of an eye, the

solidarity and comradery were erased; only to fall back onto our shoulders and be recreated again.

I should note, most connections I had in classes were with White women. They were the predominant group I could connect with throughout my STEM classes. People of color, much less women of color, were hardly seen in my STEM courses. We were spread out so far from one another that by the time we would find each other, we would be on to a new course series leaving the responsibility on us to rebuild and reconnect. Inevitably, someone would have to retake a class or would decide to leave their STEM program. The further along I went in my program the fewer of us there were and the more isolating the journey became. I began to work on most of my coursework alone after my first two years, after the bulk of my peers left STEM altogether.

### **Final Thoughts and Reflections**

This reflexive exercise gave me the opportunity to reflect on my experiences as a first-generation, queer woman of color in a homogenous undergraduate science program at a public, research university in Southern California. By using this qualitative creative analytic practice (CAP) as a method of inquiry, I have been able to reflect on pivotal moments during my time spent in my undergraduate STEM program. My experience did not carry with it an award or a grandiose honor. I was a first-generation, queer woman of color who persevered. Where is the glory in my graduation story? Despite oppressive structures that regularly filtered out students and deemed them unworthy, I persisted.

## Appendix G

### Role of the Researcher: Reflective Poem on my Educational Journey

#### Learning Is My Home

I have grown up on a stretch of land that I know and love. Its people are familiar. I know their stories and their smiles. Its crops have nourished my body and soul. I know what and where to grow. This is my home. My foundation here is strong—one of familiarity and comfort. I feel safe. I feel at ease.

And yet...

I feel an increasing distance from it. This home has become restrictive - my learning, limited. Until one day, I realize my home has a new path for discovery. A path I have never noticed before. Has it always been there? Or did I will it there? This path becomes a disquieting beacon of uncertainty. Where does it lead? I wonder... Does it lead to an environment where I can grow more, do more, be more? If I walk down this path, might I get lost? Or even worse, could I lose myself throughout this new journey? No, I mustn't. So, I remain. I remain fixedly in my home, with my people, doing what I have done for as long as I have known.

And yet...

I cannot let this thought go. I remain voraciously curious at the potential of where this path may lead. Could I find myself? Haven't I already found myself? No, I haven't quite yet found who I am looking for in myself. I feel steadily compelled to find a new me. A better version of me. Whereby, I will do and be more. I need to find others who are looking for more. I need to know the differences in experience that I have been shielded from these long years.

And so, I go...

I take the path I have yet to discover. Will I know where to go or how to return? It does not matter. I must keep moving. I have made it this far. What is one more step—one more mile? What is one more path—one more journey?

And so, I go...

I go so far beyond my home and the many paths that have led me away from it. I meet new people. I learn new habits, new thoughts. My mind ebbs and flows alongside a rolling coastal tide, the edges of its capacity for learning in this constant state of flux. I feel malleable in my learning and inflexible in my commitment to wisdom. I feel reinvigorated and exhausted. How did I not know what I now know?

And so, I go...

Back. I go back home. To see if I can...if I can find it. I bring back the knowledge I have learned and the meals I have consumed. I work in new ways and realize that I am an outsider in my own home. Why do I feel so strange being back? Why do I feel frustrated at things I overlooked before my journey? I have become someone else. Or have I? I feel changed and yet I also feel the same as before I left. Why am I being told who I have become does not belong? Do I belong? I know I do and yet I don't. I don't feel like I belong. Where do I belong?

And so, I go...

I take a new path I have yet to discover. I will know where to go and how to return. It all matters. I will keep moving. I have made it this far. I know I can go further. How far can I go? What is one more step - one more mile? What is one more path—one more journey?

And so, I go...

I feel fulfilled. I feel whole. My comfort has become discomfort. I revel in the fluidity of my new home.