A Qualitative Narrative Inquiry Study Investigating the Life Experiences of Identified Females in Their Efforts to Participate in Technology Careers when America Needs More Technology Workers and Technology Leaders

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ABSTRACT

The experiences of identified females in their efforts to participate in technology careers as workers and leaders was examined in this study. Studies indicated America did not have enough skilled talent to fill technology jobs and there were disproportionately low numbers of female workers and female leaders who participated in technology careers (Ashcraft, McLain, & Eger, 2016; Zweben & Bizot, 2016). Statistics revealed women represented 57% of the labor force, but only 20% in the technology industry (Cyberstates 2017, 2017; United States Labor Department Bureau of Labor Statistics, 2015). I utilized narrative inquiry research design with feminism and gender role incongruity theories as theoretical frameworks. I interviewed five female technology leaders in their natural setting using Seidman's (2013) three step interview process to understand their experiences becoming and serving as technology leaders. Data analysis using memos, categorizing, document analysis, and constant comparative methods revealed four major themes: climb your ladder, know your worth, discover your career, and nurture your vision. Participants revealed discriminatory exclusions and bias against female specific issues like pregnancy and work and life demands as the primary barriers for entering and staying in the technology field. Barriers were mitigated by their intrinsic motivation augmented by encouraging role models, personal persistence, interpersonal skills, and risk aversion. Study participants exhibited an innate ability to nurture team members and organization goals using soft skills to ameliorate the rigid and fast-paced technology industry. They favored a balance that incorporated aspects of both genders to develop individuals and the organization which may encourage a diverse talent pool of American men and women who will be highly competitive in the growing field of technology.

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As I worked towards achieving my highest level of education, my personal relationship with God the Father grew and developed. He has ordered my steps and covered me with His love. He has given me everything, including a wonderful support system of family and friends. Thank you, God, for my best friend and husband; my handsome, smart, and strong sons; and my friends, who have been there for me through it all.

Chapter I

INTRODUCTION

Overview

In the late-20th century, American employment opportunities shifted from industrial to information computing (Tripathy, 2017). According to Beckhusen (2016), there were 450,000 employees in American information technology jobs in 1970. In the "Cyberstates 2017" (2017) report released by CompTIA, the United States technology industry increased by 3% in 2016, bringing the total number of workers to seven million.

Initial job growth was impacted by the introduction of affordable home and work computers in the 1960s and 1970s, but the employment opportunities increased tenfold between 1970 and 2014 as businesses harnessed the benefits of increased productivity (Beckhusen, 2016). According to Rodriguez (2017), many current technology industry employees are immigrants because the United States does not have enough natural born citizens to fill the positions. U.S. Department of Labor (2015) projections indicated American universities will only produce enough graduates to fill 29% of technology specialists' jobs.

Statement of the Problem

America does not have enough skilled talent to fill the jobs made available in the growing field of technology and there are disproportionately low numbers of female technology workers and female technology leaders participating in technology careers

(Ashcraft, McLain, & Eger, 2016; Moye, 2017; United States Labor Department, 2015; Zweben & Bizot, 2016). Statistics reported by The United States Department of Labor Bureau of Statistics revealed women currently represent 57% of the workforce. However, women face a significant gender gap as evidenced by a current 25% participation rate in the field of technology and 6% participation as technology leaders (Ashcraft, McLain, & Eger, 2016; Harvey Nash CIO Survey, 2015; United States Labor Department, 2015). Trends in the last twenty years indicate a steady decline in the percentage of females in technology (Ashcraft, McLain, & Eger, 2016).

Purpose

The purpose of this study was to reveal the experiences of identified females in their efforts to participate in technology careers as workers and become technology leaders. According to Powell, Dainty and Bagihole (2012), the perceptions of females who currently hold technology positions should be considered to reveal common barriers associated with choosing and staying in a technology career.

Research Questions

Using existing literature and my experiential knowledge, the following questions were generated to address the main inquiry for this study:

RQ1: What are the life experiences of identified female leaders prior to participating in technology careers as workers and leaders?

RQ2: What barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders?

RQ3: What strategies did identified female technology leaders use in their efforts to participate in technology careers as workers and leaders?

Study Significance

America does not have enough skilled talent to fill technology jobs and there are disproportionately low numbers of female workers and female leaders participating in technology careers (Ashcraft, McLain, & Eger, 2016; United States Labor Department, 2015; Zweben & Bizot, 2016). This study identified the barriers and the strategies used by females in their efforts to become technology workers and technology leaders. Findings from the study may help the United States Department of Education, state educational agencies, university systems, school districts, and counselors at all levels to promote female participation in technology. The study may also provide knowledge that may assist American technology industries in their efforts to recruit, train, and promote more females in technology positions, resulting in opening the talent base for skilled American technologists. In addition, this study may benefit workplace culture by revealing practices technology organizations can employ to remove barriers for females so they can consider technology as a viable and rewarding career.

Conceptual Framework

My Experiential Knowledge

My interest in this research topic was inspired by my experiences as a female technology leader in South Georgia. For twelve years, I have been the Technology Director for a rural, mid-sized public K-12 school district. At regional and state meetings, I am often the only female in the room. Education technology meetings and conferences are heavily male populated with long lines for the men's room and none for the ladies' room. Although that is a welcome change, it is occasionally more difficult to

be taken seriously, as the men would be assumed to be the ones in charge. I always feel pressure to perform at my maximum at all times being a woman.

Through the years, I am convinced that being a woman in a male-dominated field can be an advantage. I do not consider underrepresentation in the tech field as a disadvantage; I use it as a competitive differentiator. I am constantly searching for a unique selling point in my profession. I have had my fair share of professional challenges over my 12-year career, but I keep going by celebrating the highs and powering through the lows. As a district technology director, my job is to help improve teaching and learning and genuinely improve children's lives-something that has driven me throughout my career. At regional and state technology director meetings, I am one of very few females; therefore, there seems to be major gender gaps in my technical field which could be attributed to personal or professional choice. Informal discussions with women in other technical fields reveal underrepresentation of females. My reasons for conducting this study centered around two main issues: understanding the barriers for females choosing and staying in the technology field and to inform industries and institutions about the issues surrounding females in technology.

The first female and former United States Secretary of State, Madeleine Albright, once said, "There is a special place in hell for women who don't help other women" (Miller, 2016, p. 1). Women do not reach the top without help and support from others. Every successful leader has benefited from guidance, advice, or mentorship throughout their career that helped solve introspective questions, overcome career challenges, and propel them forward toward their ultimate potential. In this study, I hoped to share five female technology executives' experiences to give women a voice to reveal the common

barriers associated with choosing and staying in a technology career. The inclusion of my personal and professional experience was an important component of this study and was a part of the design (Clandinin, 2007; Maxwell, 2013; Patton, 2002).

Prior Literature

Current literature on women in the technology industry, informed the conceptual themes for this study. Feminist theory and the gender role incongruity theory undergird the theoretical framework and ultimately provided a lens for data analysis (Daiute, 2014; Denzin & Lincoln, 2005).

Feminist theory is the philosophical discourse which aims to understand the nature of gender inequality. This theory is based on three basic principles: first, the relationship between men and women has almost always been unequal and oppressive; second, all known societies have been patriarchal; and third, all major social institutions have been characterized by male dominance (economy, political systems, family and religion). Feminist theory explores both inequality in gender relations and the constitution of gender was used to explain women's underrepresentation in technology leadership positions (Carlson & Ray, 2011).

Gender incongruity theory was used to explain the disapproval encountered by women who occupy positions of leadership. This theory is based on the premise that individuals develop descriptive and prescriptive gender role expectations of others' behavior based on an evolutionary sex-based division of labor (Eagly, 1987; Wood & Eagly, 2012). This division of labor has traditionally associated men with breadwinner positions and women with homemaker positions (Wood & Eagly, 2012). Based on these

social roles, women are typically described and expected to be more communal, relations-oriented, and nurturing than men, whereas men are believed and expected to be more assertive and independent than women (Cejka & Eagly, 1999; Eagly & Carli, 2007; Eagly & Karau, 2002; Layne, Vostral, & Boyer, 2010; Paustian-Underdahl, Walker, & Woehr, 2014).

The researcher examined feminism theories and gender roles separately and synonymously as field experts suggest they are one and the same (Eagly & Karau, 2002; Henning & Weidner, 2008; Saucerman & Vasquez, 2014; Suter & Toller, 2006). Gross (2003) defined feminism as the pursuit of breaking free from gender roles. Feminism theories and gender role incongruity intersect in their focus on the female experience and were used to help understand alternate ways that female technology leaders may perceive their experiences (Eagly & Karau, 2002; Gray et al., 2015).

A common thread in feminism theory exists in the view that the law lacks equal attention to women relative to men (Armani, 2013). The researcher examined gender equity policies and laws to determine the extent to which political legislation and government support have impacted gender specific issues (Fifty Years after the Equal Pay Act, National Equal Pay Task Force, 2013). The goal was to include information to explore the history and current condition of the female experience and to determine the extent to which the law supports or opposes females with specific emphasis on workplace legislation.

According to Bloom (1996), qualitative researchers use their experience and subjectivities as necessary components of the inquiry and design process. The conceptual framework for this study included experiential knowledge, relevant studies and

experiences of other female technology leaders, and theoretical frameworks including feminism, gender incongruity, and gender equity policies.

Summary of Methodology

The research questions connect with a qualitative dynamic narrative inquiry study. According to Ary et al. (2014), narrative inquiry allows the researcher to examine the participants' past with the present in order to gain understanding of the essential experience. Using purposive sampling, five current female technology leaders in a southeastern United States metropolitan city participated in interviews following Seidman's (2013) three step interview process to collect rich, meaningful data in their natural setting. Daiute's (2014) dynamic narrative inquiry diversity principle along with significance analysis guided the data collection and analysis process. Data was analyzed through the lens of a feminism interpretive framework. Study credibility and dependability were reinforced with rich data, triangulation, and member checking, while bias and assumptions were monitored through self-memos. Clandinin (2007) indicated qualitative methods allow the researcher and participants to discover new understandings.

Limitations

This study has internal validity limitations because it focuses on the experiences of women who agreed to participate in the study which may not be generalizable to other female technology leaders or representative of all female technology leaders. Using a small sample is necessary to achieve comprehensive emphasis on each of the cases; however, transferring findings may be hindered due to the small sample. As such, transferability to groups not represented in the study is a limitation. Study results do not

transfer to other cultures and countries since the primary focus was female technology leaders in a southeastern United States metropolitan city.

The most prevalent limitation is the bias of the researcher who is female and currently works as an administrator in technology. Biased influence on the interpretation of data may impact the overall analysis.

Chapter Summary

This study addresses the problem that America does not have enough skilled talent to fill the jobs made available in the growing technology field and there are disproportionately low numbers of female workers and female leaders participating in technology careers. The purpose was to reveal the experiences of identified females in their efforts to participate in technology careers as workers and become leaders. Feminist theory, gender role incongruity and equity policies undergird the theoretical framework and ultimately provided a lens for data analysis. Female technology leaders' experiences were collected and analyzed using qualitative dynamic narrative inquiry method. Findings from the study may help the United States Department of Education, state educational agencies, university systems, school districts, and counselors at all levels to promote female participation in technology. The study may also provide knowledge that may assist American technology industries in their efforts to recruit, train, and promote more females in technology positions resulting in opening the talent base for skilled American technologists and impacting workplace culture by revealing practices technology organizations can employ to remove barriers for females.

Definition of Terms

The following term definitions provide clarification for concepts in this study which may have multiple meanings. The definitions here indicate term usage in this study.

Barriers. A term used to describe hindrances to women's participation in technology which may include educational, societal, and institutional bias (Ashcraft, McLain, & Eger, 2016).

Feminism. A theory which evolved from political, cultural, and economic movements to raise the awareness and recognition of women's rights and seeks to protect women against exclusionary practices (Stephens, Jacobson, & King, 2010).

Gender Equity Policies. Federal laws regarding women's workplace rights in the United States as noted in legislation like the Equal Pay Act 1963 which legislated against workplace discrimination (Fifty Years after the Equal Pay Act, National Equal Pay Task Force, 2013).

Gender Role Incongruity. The inability to meet the obligations, personal skills, morality or expectations set by society for a gender specific role (Brumels & Beach, 2008). It is an evaluation based on typical social roles made by peers and an influential factor in how females viewed their capabilities (Brumels & Beach, 2008).

Leaders. In this study, the term leader is used to encompass females who are in decision making positions with supervisory responsibility within an organization (Berkery, Tiernan & Morley, 2013).

Strategies. A method or plan used by a female technology worker or leader to achieve job acquisition, retention, or promotion in the technology industry.

Technology Career. Used to describe employment in Computer and Information Technology for a period of time. For this study, participants must have worked in technology for a minimum of ten consecutive years.

Technology Industry. Used to describe occupations related to Computer and Information Technology as defined in the United States Department of Labor-Bureau of Labor Statistics (2015) and include Computer and Information Research Scientists, Computer Network Architects, Computer Programmers, Computer Support Specialists, Computer Systems Analysts, Database Administrators, Information Security Analysis, Network and Computer Systems Administrators, Software Developers, and Web Developers.

Technology Leadership. A term used to include positions such as: Chief Information Officer (CIO), Chief Technology Officer (CTO), and Chief Information Security Officer (CISO).

Technology Worker. Used to describe any position earning full time employment in the technology industry.

Search terms used in electronic databases included: women, females, gender role, leadership, women in technology, and women in technology leadership. Multiple databases, including ProQuest, EBSCOhost, Google Scholar and ERIC, were used to retrieve articles, dissertations, and books related to women in technology leadership. Though historical data provided background, primary sources were authored within the last ten years.

Chapter II

LITERATURE REVIEW

Description of the Problem

The subsequent literature review includes scholarly discourse pertaining to the ever-expanding technology sector in America with specific emphasis on female technology workers and technology leaders in the United States. The problem explored in this study is that America does not have enough skilled talent to fill the jobs made available in the growing field of technology and there are disproportionately low numbers of female technology workers and female technology leaders participating in technology careers (Ashcraft, McLain, & Eger, 2016; Moye, 2017; United States Labor Department, 2015; Zweben & Bizot, 2016).

The following review includes information which supports the study problem and purpose. The first part of the literature review describes the historical perspective of the problem. The second part includes information regarding the female experience with emphasis on barriers encountered and strategies used while entering and staying in the technology industry. The third part includes feminist theory, gender role incongruity, and gender equity policies which will support the conceptual framework for the study. Search queries on these topics through ProQuest, EBSCOhost, Google Scholar and ERIC identified articles for the review.

American Technology Industry

This study examined the technology industry which is comprised of occupations related to Computer and Information Technology as defined in the United States Department of Labor-Bureau of Labor Statistics (2015) and include Computer and Information Research Scientists, Computer Network Architects, Computer Programmers, Computer Support Specialists, Computer Systems Analysts, Database Administrators, Information Security Analysis, Network and Computer Systems Administrators, Software Developers, and Web Developers.

American employment opportunities prior to 1970 were dominated by agricultural and industrial sectors (Tripathy, 2017). According to Beckhusen (2016), the United States Census Bureau began identifying Information Technology occupations in 1970. Information Technology employment opportunities increased tenfold between 1970 and 2014 (Beckhusen, 2016). During this time, large and expensive mainframe computers were replaced by small, affordable personal computers which spiked sales in home and business purchasing and consequently increased the demand for more Information Technology workers (Beckhusen, 2016).

In 2017, the United States leads the world in the number of top technology companies in revenue earnings and innovation (Griffith, 2015). According to Stoller (2017), American based corporations leading the list include Apple, Microsoft, and Facebook. These technology giants employ a large portion of the seven million technology workers as reported by "Cyberstates 2017" (2017). According to Beckhusen (2016), 24% of technology industry workers were foreign born. U.S. Department of Labor Department (2015) projections indicated American universities would only

produce enough graduates to fill 29% of the computer specialists' jobs. Rodriguez (2017) stated there are about 250,000 computer science jobs available at all times in the United States.

The Computing Research Association's Taulbee Survey reported 21,880 Bachelor degrees were awarded in computer related majors in May 2016, which would fill approximately 4.5% of the technology jobs that will be available (Zweben & Bizot, 2016). Post-secondary institutions responded to industry needs by increasing the numbers of computer majors (Zweben & Bizot, 2016). United States public schools attempted to increase student achievement in science and math by ramping up Science, Technology, Mathemathics and Engineering (STEM) programs in response to industry needs (Roehrig, Tamara, Hui Hui, & Mi Sun, 2012). Despite education reform efforts which emphasized the importance of technological skills, 45% of United States employers reported difficulty filling technology related jobs due lack of talent or specific skills, also referred to as the "skills gap" (Bessen, 2014; Talent Shortage Survey, 2016).

According to Hickey (2013), United States technology industry interest groups pushed policy makers to allow increased work visas to enable them to hire skilled talent outside of the United States. According to Rodriguez (2017), more Americans could fill the skills gap, but the industry overlooks talented women, African Americans and Hispanics. Ashcraft et al. (2016) reported the need for American education institutions and employers to employ specific strategies to harvest female talent in technology and narrow the skills gap in the United States. Statistics indicated 15.7% of computing related Bachelor degrees were awarded to females (Zweben & Bizot, 2016) and 25% of computing occupations belonged to women (Ashcraft, McLain, & Eger, 2016). *The New*

York Times, as reported by Miller (2013), observed the doors to the expanding technology field "remain virtually closed to women" (p. 1). Moreover, women are absent from technical managerial positions. Gettings, Johnson, Brunner, and Frantz (2007) noted equal representation in technical leadership would take over 40 years at the current pace. The Harvey Nash CIO Survey (2015) reported the percentage of female Chief Information or Technology Officers in the United States as 6%. Huge technology corporations like Google reported, "17% of their technical staff was represented by females" even though "women constitute half of the United States working force" (Whitney & Ames, 2014, p. 28). Despite federal grants for gender representation in non-traditional employment, women lacked equal workplace representation in technical fields (Kuruvilla, 2014).

Pujol and Montenegro (2015) stated the absence of female technologists lends to the new "digital divide" which encourages the current patriarchal structure of the technical industry (p. 1). Technology companies that included equitable female technologists and gender diverse employment strategies reported financial gains as compared to similar companies without female technologists (Adams & Funk, 2012). A nation's economic survival and growth relies on the talent base which includes the "quantity, quality, and utilization of human resources in science and technology" and must have representation from both men and women (Chou, Yen, & Sun, 2012, p. 158). In their study, Chou et al. (2012) reported countries like Korea ranked at the top for females in technology who are responsible for high tech exports, written scientific articles, or been leaders in high tech corporations. The United States was not one of the countries in their study because the number of females in technology is disproportionate

and difficult to show statistical significance (Chou et al., 2012). According to Cozzens (2008), the United States must increase efforts to include women at all levels because ignoring their place would be inherently unfair, a waste of human potential, and a threat to goals of science excellence. Feminists and other organizational leaders continue to promote political legislation and other government funded programs that improve gender equity. According to Morelli (2015), the Obama administration took "action to tackle social and economic advancement for women" (p. 1). This action was taken on behalf of women who represent 57% of the labor force according to the United States Labor Department Bureau of Labor Statistics (2015). Statistics also revealed 40% of working women had college degrees and accounted for more than half of the positions in the financial, education and health care industry, but had comparatively low participation of 20% in the technology industry (Cyberstates 2017, 2017; United States Labor Department, 2015). Deliberate design and development approaches purposefully inclusive of the female perspective and thought processes provided a broader spectrum of diversity, and explored topics and products which benefited the entire community (Henry, 2015; Saucerman & Vasquez, 2014). However, American technology industry recruitment and employment has targeted mostly males which has resulted in a disproportionately low number of female technologists (Ashcraft, McLain, & Eger, 2016; Dermody, 2012; United States Labor Department, 2015; Whitney & Ames, 2014). The purpose of this study is to reveal the experiences of identified females in their efforts to participate in technology careers as workers and become technology leaders. The purpose of this literature review is to provide knowledge on topics in the following questions.

RQ1: What are the life experiences of identified female leaders prior to participating in technology careers as workers and leaders?

RQ2: What barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders?

RQ3: What strategies did identified female technology leaders use in their efforts to participate in technology careers as workers and leaders?

The literature review will provide information regarding the barriers associated with females choosing and staying in a technology career and strategies used in their efforts to participate in technology careers. Findings from the study may help the United States Department of Education, state educational agencies, university systems, school districts, and counselors at all levels to promote female participation in technology. The study may also provide knowledge that may assist American technology industries in their efforts to recruit, train, and promote more females in technology positions, resulting in opening the talent base for skilled American technologists. In addition, this study may benefit workplace culture by revealing practices technology organizations can employ to remove barriers for females so they can consider technology as a viable and rewarding career.

Common Barriers in Choosing Technology Field

According to a study conducted by Schmidt (2012), a girl may hear she can be anything, but the curriculum she reads does not "acknowledge the multiple ways that womanhood might be constructed" (p. 712). De Welde, Laursen, and Thiry (2007) noted unavailability of role models leave girls with no picture of how career demands can be conquered by females. A case study conducted by Autio (2013) revealed divisions in

educational settings eventually lead to a traditional selection of textile programs of study for girls and technical programs for boys. In his study, individual theme interviews were conducted with three women who were selected based on technology skills assessment scores acquired when the women were still students. As top scorers, they intended to establish technology as a college major and seek a career in technology. Despite earning college degrees in the technology field, each of them chose a path other than technology. Autio reported subject feedback using the "Expectancy Value Model of Motivated Behavioral Choice" (2013, p. 19). This flow chart model allowed the results to be graphically demonstrated to show choosing technology as a career was a complicated process for females and very difficult to predict (Autio, 2013). As Saucerman and Vasquez's (2014) research illustrated, disconnect exists in young females' experiences and their ability to view technology as a viable and rewarding field of study.

Cheryan, Plaut, Handron and Hudson (2013) conducted research which revealed technology field stereotypes as barriers for female inclusion in the career. After an extensive study of participant perceptions and media representations, researchers concluded study participants' perceptions and popular culture created a stereotyped image of computing professionals that was "highly intelligent, singularly obsessed with computers, and socially unskilled" (Cheryan et al., 2013, p. 67). They further noted females did not identify with these traits and favored people oriented professions that allowed them to help others as opposed to a lonely, isolated computer profession (Cheryan et al., 2013, p. 67). In another study, stereotypical physical images of computer professionals who are unattractive, thin, and glasses wearing, discouraged women more than men because an attractive physical appearance was noted as an important component

for females (Cejka & Eagly, 1999). Popular culture and broadcast media continued to perpetuate stereotypical images in movies and television like *The Big Bang Theory* (Prady, Collier, Belyeu, Cohen, Goetsch, & Molaro, 2008) which as noted by Cheryan et al. (2013), portrays scientists as unattractive, but highly intelligent men and the primary female as attractive, but not connected to a scientific role. Cheryan et al.'s (2013) research concluded alternate media images showing diversity in the profession could remove barriers for females entering the technology field.

Women who ignored stereotypes and enrolled in highly technical classes, often reported feeling uncomfortable in male dominated courses (DuBow, Farmer, Wu, & Fredrickson, 2015). College women reported feeling a lack of encouragement from their instructors which ultimately led to interest loss or achievement decline (De Welde et al., 2007). Continuing a path not followed by many other women appears risky so young women opt for careers that seem safer and attainable (Cozzens, 2008). The sociologist perspective holds that women act according to some type of self-fulfilling prophesy, adhering to society's predetermination of gender roles and as a result choose which job may or may not be appropriate (Armani, 2013). Armani (2013) noted society wanted women viewed as incompetent and nice rather than competent and cold.

Common Barriers in the Workplace

If a female pushed through educational obstacles and entered the workplace, they often found barriers therein. According to Powell and Sang (2015), women who worked in male dominated fields like technology and engineering reported a number of common issues. Exclusion from events, projects, or training opportunities limited the scope of experience and contributed to consequent promotion by-pass. This particular issue is the

most difficult to overcome. Other barriers include prohibitive advancement and unequal pay (De Welde et al., 2007). Ultimately, Cukier (2009) blamed a deficit in support systems for women who desire a balance of work and family life for the absence of women in the challenging, time-consuming technology sector.

A qualitative study conducted by Orser, Riding, and Stanley (2012) echoed these reports. In their study, an online survey sent to 195 women yielded 115 completed forms. Responses were analyzed through sentence and subject coding to identify themes and concepts. Using NVivo software, interpretive analysis revealed findings related to personal barriers, workplace barriers, and response strategies. The most prevalent challenge revolved around personal barriers, but all findings were presented in a descriptive table. Validity and reliability were addressed in the admission of a narrow scope of participants, but the results showed individual perceptions regarding the difficulty in acquiring technology credentials as the principle barrier for women choosing technology as a career. Workplace barriers like exclusion from events, projects, or training opportunities also limited the scope of experience and contributed to consequent promotion by-pass. A specific participant in the study cited a male manager who denied professional learning to women because he felt they were more likely to use sick leave. In some cases, women perpetually passed over for opportunity simply left and sought other employment (Orser et al., 2012). The "leaky pipeline," noted by Chou et al. (2012) was used to describe the exodus of females from science and technology fields in different stages of their career and in which personal barriers prompted resignation from the career (p. 159). According to Orser et al. (2012), very little research has been conducted to specifically document the perceptions of

women in the advanced technology sector and they recommended future studies in this area (Orser et al., 2012).

Women who persevered through the aforementioned barriers noted male humor as a way to socially exclude women in male dominated technology positions (Watts, 2007). However, the women in this study did not voice concern with inappropriate humor in an effort to fit in with male colleagues, which ultimately leads to perpetuation of homosociality, a term used to define male dominance (Powell & Sang, 2015). The women who laugh with the men become "complicit in the social construction of identities that ultimately marginalize them" (Powell & Sang, 2015, p. 928).

While external factors seemed to take precedence regarding workplace barriers, researchers in one study found female engineers keeping other females out of the field as unconscious gatekeepers of the profession (Powell, Dainty, & Bagilhole, 2012). The unfortunate underlying assumption was gender bias had been eliminated simply because a successful female had broken down the walls and learned to like and to adapt to a male dominated field (Powell, et al., 2012). In this mixed methods research study, quantitative survey data was collected and reported descriptively regarding the influential factors in career decisions with specific comparisons by gender and discipline. The qualitative interviews focused on how and why career choices are made. Findings indicated of the 3,206 undergraduate engineering students emailed, 656 responded and completed the Likert scale survey. Using a multivariate regression, survey results were compiled and analyzed with specific emphasis on how the candidates decided to study engineering. Researchers cited possible validity and reliability concerns in the control factors that could have confused results like the specific engineering discipline, ethnicity or other

demographic nuance. Reported results indicated career decisions centered on influential people, social and financial rewards, and enjoyment—all of which were heavily impacted by social stereotypes and attitudes. This study was conducted in 2011 in the United Kingdom, a country with progressive efforts in gender equity, unlike the United States which is falling woefully behind in awareness and equity legislation (Powell et al., 2012).

Demaiter and Adams (2009) cited women in their study who refused to attribute problems with their male co-workers to gender and simply regarded the problems as personal. Powell et al. (2012) reported a certain level of arrogance of women who liked being different and simply accused other women who could not cope as weak or incapable. According to a quantitative study conducted by Cech and Blair-Loy (2010), 40% of women in their sample believed barriers existed due to meritocratic reasons. The others in the study believed in structural explanations which basically pits ability versus circumstance (Cech & Blair-Loy, 2010). Their study sample included 306 women professionals enrolled in a nonprofit professional association for women in science, technology, and allied fields. All of the study participants held either mid-level management or C-level positions. Using multinomial logistic regression, researchers captured data to predict subjects' opinion regarding the primary factors holding women back from advancement. Two coefficients read as logistic regressions were organized in two columns; one column which was the chance a subject favored structural reasons like bias and discrimination and the other column in which the subject favored meritocratic reasons like lack of motivation or ambition. Results indicated 60% believed structural reasons to be at fault for women not advancing, while 40% hold to meritocratic reasons. In concluding remarks, Autio (2013) noted several factors contributing to those who held

meritocratic views including higher level positions, excessive work hours, and marital status. In these situations, the female executives were blind to any issues of gender bias.

Cech and Blair-Loy (2010) also found women refused to see the problem of inequality and therefore reinforced meritocratic ideology. Jackson, Hillard and Schneider (2014) reported another unfortunate consequence of repeated gender bias is the failure to actually recognize egalitarian beliefs. If gender discrimination occurred in natural course of daily interactions, it was often ignored. Nobel Prize winner and author, Amartya Sen (1992) described female inequality acceptance as "entrenched deprivation" (p. 10). Sen described situations wherein repeated denial of position or privilege based on gender were met with coping strategies which involved taking pleasure in small rewards. In other words, entrenched deprivation would cause a woman to feel grateful for small rewards instead of feeling slighted. The unfortunate repercussion is settling for less than she deserves. In these situations, women focused on attainable goals rather than hoping for more (Sen, 1992). Women stayed away from technology because they sensed their aspirations would be met with limitations and thus chose to concentrate efforts in other fields (Cozzens, 2008). Demaiter and Adams (2009) stated the female technology leader should be aware of gender disproportionality in the technology field so that it is not ignored by those who have managed to be successful and now have influence to affect change and educate future generations of women interested in technology as a career.

Another study by Demaiter and Adams (2009) referred to women behaving as conceptual men at work in an effort to blend in with the male dominated environment. These women would assimilate by compartmentalizing life at work which included dropping feminine ideals and dressing to adopt masculine behaviors and activities like

golf (Demaiter & Adams, 2009). These findings suggest women can be part of the problem because women tend to conform to the male dominated organization (Miller, 2004). Miller (2004) noted female assimilation to masculine systems as unintentional reinforcement of masculine hierarchy. Women cited in the study denied that gender is salient and avoided female actions like displays of emotion or empathy towards colleagues (Miller, 2004). Perception data could educate women regarding organizational inequalities and it would help to break the glass ceilings kept in place by women who are just trying to survive (Demaiter & Adams, 2009).

Problem Solving Strategies

Richman, Van Dellen, and Wood (2011) cited the importance of a female role model as the primary strategy to overcome feelings of inadequacy for a girl considering a high-tech field. Powell et al. (2012) reported female career decisions centered on other influential people, social and financial rewards, and the potential enjoyment the career could provide. Saucerman and Vasquez (2014) defined influential people as parents, teachers, peers and media personalities. The combination of positive reinforcement from these people and a growth mindset showed statistical gains in female participation in technical fields (Saucerman & Vasquez, 2014). Instructional strategies like collaborative learning, project based learning, and relevant career connections were cited as countermeasures for negative perceptions (Dugan, Fath, Howes, Lavelle, & Polanin, 2013). Also, noted in the study was the inclusion of leadership efficacy enhancements directed towards persistence and career success, which included philanthropic endeavors, mentoring, and club leadership activities (Dugan et al., 2013). Leadership development stimulated inherent attitudes conducive to technical fields like sustained curiosity, love of

learning, and the need to make valuable contributions (Wentling & Thomas, 2009). With these problem-solving strategies in place, females were more likely to choose technology fields for their program of study.

Research conducted by Fritsch (2015) reported women who worked in a male dominated environment used the strategy of strict separation of personal life from professional to distance themselves from gendered social preconceptions. Harris & Giuffre (2010) stated women would even avoid pregnancy to remain viable in their position. Martin and Barnard's (2013) research showed a lack of formal coping strategies, but study participants devised myriad personal strategies specific to their workplace. According to Orser, Riding, and Stanley (2012), common problem-solving strategies to overcome barriers in the technology workplace included working harder than male counterparts, self-confidence building, and networking with other technology peers. Hampton, McGowan, and Cooper (2011) also found female networking was a primary strategy among female entrepreneurs. In their study, women were comfortable and competent with expanding their circle of control to foster community and bring new ideas and perspectives (Hampton et al., 2011).

Jackson et al. (2014) discovered implicit gender bias workplace training had statistical improvement in workplace gender discrimination. Men and women who were exposed to common, but often unrecognized behaviors changed their behavior as a result of the training (Jackson et al., 2014). Initiatives that allowed for understanding of differences, bias, and fears were successful and had a positive impact on equity when endorsed and enforced by the organization's human resource division (Jackson et al., 2014; Cozzens, 2008).

While workplace training and policies can enforce gender awareness, Goman (2011) recommended that men can learn leadership skills from women that could augment their own leadership ability. She suggested male leaders could gain insight from female leaders who interactively shared information, expressed empathy, and allowed staff members to be heard because male leaders generally avoided uncomfortable, emotionally charged situations leaving staff members feeling discounted. Goman also noted female leader ability to foster collaboration through openness, inclusiveness, and respect (Goman, 2011). Ibarra and Obodaru (2009) indicated collaboration allowed female leaders to organically develop organization vision. In this process, the female leader did not take personal credit for vision, but rather acknowledged the collective effort (Ibarra & Obodaru, 2009). Goman (2011) indicated all leaders have the ability to collaborate and truly connect with their organization, but female leaders "do it more naturally" (p. 1).

These are the kinds of strategies, when properly communicated that might narrow the gap for females in technology. Additional perception data from successful females in technology may shed light on new ways to break down barriers and bring more women to the technology field.

Feminist Theory

Feminist theory evolved from political, cultural, and economic movements to raise awareness and recognition of women's rights and protections (Stephens, Jacobson, & King, 2010). While there is some division within the feminist community regarding the exact battle lines, the hardline feminist theory revolves around the concept "any occasion where female specific forms of marginalization are overlooked is a form of

exclusionary practice" (Stephens, Jacobson, & King, 2010, p. 554). Steeped in politics and ideology, feminist seek to reverse situations wherein women have less opportunity.

Numerous theories were cited in Code's (2000), *Encyclopedia of Feminist Theories*. Theories vary in primary focus, associations and political strategies to reverse situations of exclusionary practice. Theories often overlap and allow females to be able to identify with more than one ideology and pursue divergent narratives of female experiences. According to Gray et al. (2015), the common threads of understanding female experiences, improving women's lives, and equalizing power exist in feminist theory. Theories not only pinpoint the problems, but they also elevate the discourse regarding understanding the female workplace experience as unique and specific and the subsequent development of their self, voice, and mind (Belenky, Clinchy, Goldberger, & Tarule, 1997; Gray et al., 2015; Rosser, 2005; Shakeshaft, 1999).

While many different feminist theories have been developed in the last century, Sue Rosser's (2005) study focused on feminist theories aligned with the challenges in the technology industry (Belenky, 1986; Butler, 1990; Code, 2000; Grosz, 2010; Sen, 1992). Rosser wrote an article featuring eight different feminist theoretical perspectives to examine the relationships among women, gender, and information technology with specific emphasis on workforce, use, and design. Her application of postmodern feminism revealed the female experience as unique and specific to her nationality, class, and culture (Rosser, 2005). This approach to feminism maintains no generic agenda for females because various women will have various reactions (Rosser, 2005). According to Rosser (2005), "postmodern feminism parallels the description of the complex and diverse coevolution of women and computing" (p. 12). Like technology, postmodern

feminists operated in a fast-paced, ever changing environment which was impossible to universalize (Rosser, 2005).

Postmodern feminist theory was coined by Judith Butler in *Gender Trouble* (1990). Butler's theorizations of postmodern feminism included a specific analysis of female performative identity which is the idea that gender is not just biological, but also constructed through repetitive performance of the gender (Butler, 1990). In these performances, gender becomes a social construct which is not always constructed the same way by every woman (Butler, 1990). As a result, exclusion of women has no single cause or cure (Butler, 1990).

The postmodern feminism idea that every woman is different and every situation is different was an idea explored by Sen in her book, *Inequality Reexamined* (1992). Sen (1992) detailed the definitions of equality as it relates to females and revealed the need to pinpoint the exact nature of the problem. For example, if the problem was equal opportunity, but unequal compensation, then the discourse should specifically orient to income-centric followed by strategies to address the infraction (Sen, 1992). In 1986, Belenky wrote a book entitled, *Women's Ways of Knowing* in which 135 women were asked to describe their perceptions of themselves and their relationship to their world. From these individual experiences, the authors compiled knowledge perceptions in contrast to knowledge produced by males (Belenky, 1986). Their work concluded that a woman's way of knowing, also known as feminist epistemology, comes from personal experience and individual insights (Belenky, 1986).

According to Gray et al. (2015), feminist research aligned with a specific theory "heightened" their predisposition and sensitivity to subjects in the research (p. 771).

Grosz (2010) suggested feminist research can reveal the forces that frame actuality. Using feminist philosophy, the positioning of gender difference was not a solution, but a frame by which questions can be asked (Grosz, 2010). Postmodern feminism and the theories of feminist epistemology debunked universal notions for women which can allow open platform to learn from the individual experiences of females in technology (Rosser, 2005).

Gender Role Incongruity

According to Sipe, Johnson, and Fisher (2009), women who were unable to professionally advance were caught below the "glass ceiling," a term associated with workplace gender discrimination. Sipe et al. (2009) reported five reasons why women are unable to break through the glass ceiling which included workplace discrimination, insufficient mentoring, stereotyping, family conflicts, and inadequate funding. Sipe et al. (2009) indicated feminine systems theorists illuminated the issues surrounding the glass ceiling to eradicate the problem in organizations. However, men in decision making positions continued to hire males and maintained stereotypical notions about the value of women in the workplace which hindered female advancement beyond the glass ceiling (Wentling & Thomas, 2009). Research conducted by McEldowney, Bobrowski and Gramberg (2009) suggested the glass ceiling was no longer a concern, but rather the more refined idea of role incongruity which had far reaching implications beyond basic stereotyping.

Eagly and Karau (2002) initially examined the theory of role incongruity, but Brumels and Beach (2008) later defined role incongruity as the inability to meet the obligations, personal skills, morality or expectations set by society for that role. Role

incongruity not only was an evaluation based on alignment with typical social roles made by peers, but it was also an influential factor in how females viewed their capabilities. Henning and Weidner (2008) stated a female in a leadership role may experience self-inflicted stress because the role requirements for leadership conflicted with typical feminine role requirements. Grounded in the family perception of the female role, women tend to seek those career fields that are nurturing, socially important, and extensions of the home (Schmidt, 2012).

Schmidt's study (2012) focused on the strict southern normalization of a woman's role in society as analyzed in the history curriculum in the South Carolina. According to Schmidt (2012), the curriculum included very few women in history and the portrayal of the included women was framed by the deep south view of women as homemakers. In a study conducted by Lublin and Brewer (2003), they found wider pay gaps and poor workplace treatment for the female workers of southern states. Their study compared the status of women in the United States based on a number of categories including employment and earnings. Each of the states were rated with a letter grade, but none of the southern states were given an overall grade higher than a C- (Lublin & Brewer, 2003).

While some studies suggest regional gender role assignments, Layne, Vostral, and Boyer (2010) compiled a number of essays related to feminist technology which stated, Euro-American culture associated technology with masculinity and nature with femininity. Technical knowledge domains are congruent with the male role which prevent both women from wanting to be in the field and men accepting women in the field (Layne et al., 2010). Eagly and Carli (2007) revisited the metaphor of glass

ceilings by stating that it is no longer an accurate portrayal now that there are female chief executives in various industries. However, Eagly and Carli (2007) indicated continued barriers at various stages in advancement. They maintained a better metaphor for female progression is the labrynith which has multiple dead ends, but with persistence, awareness, and analysis can be navigated (Eagly & Carli, 2007).

A study conducted by Saucerman and Vasquez (2014) began with a report on the ongoing situation with the American company Mattel. As reported by the *New York Times*, Mattel had several sexist infractions exhibited in a few of their Barbie dolls and accompanying books (Mattel Says, 1992). In 1992, one of their dolls had a string that when pulled would trigger a recording that said, "Math class is tough. Party dresses are fun" (Mattel Says, 1992). Mattel pulled the doll off the shelves due to negative feedback regarding insinuation that girls were inferior in math (Mattel Says, 1992). In 2010, Mattel released the Computer Engineer as the 126th career doll in their "I Can Be" Barbie doll line (Chang, 2010, p. 1). The Barbie Computer Engineer doll had an accompanying book which portrayed a conversation between Barbie and her friend about the new computer game Barbie was designing (Lorenz, 2014). As the conversation progressed, Barbie clarified that she was only doing the design because she would need the boys' help to make the designs turn into a real game (Lorenz, 2014). According to Kuther and McDonald (2004), toys can affect central identity and gender role association, especially Barbie which has become an iconic American symbol. Environmental and educational influences determined a female's ability to step outside of traditional expectations, as described in Saucerman and Vasquez (2014). Moreover, interaction with women from a

variety of backgrounds and in positions of power allowed females to visualize non-traditional roles (Richman, Vandellen, & Wood, 2011).

Gross (2003) defined feminism as "freedom from the prison of gender roles" (p. 8). She indicated both male and female gender roles were confining culturally imposed prisons (Gross, 2003). Traditional female gender roles were especially destructive of a woman's wellbeing in that women were exclusively expected to nurture the family without equal responsibility of those tasks to males which secluded women and belittled their competence (Gross, 2003). Feminism, according to Gross (2003), was the effort to change oppressive gender roles.

A study conducted by Suter and Toller (2006) allowed participants to characterize how a feminist acted. Results indicated that participants thought that feminists were "independent", "not afraid to be alone," and "having a different way of thinking" (Suter & Toller, 2006, p. 139). They also alluded to the duality of being a feminist who is capable of being feminine. One participant indicated that a woman was capable of being "soft and nurturing" but still able to "stand up" for their viewpoint (Suter & Toller, 2006, p. 139). In their study, feminism and female gender roles were synonymous and they concluded that the feminist movement was still hindered by societal gender role assignments (Suter & Toller, 2006).

Hogg and Knippenberg (2003) wrote *Leadership and Power: Identity Processes in Groups and Organizations* which contained a chapter written by Alice Eagly on the subject of workplace prejudice caused by gender role incongruity. She indicated a "convergence of the psychological attitudes of women and men in traditionally masculine domains" (Hogg & Knippenberg, 2003, p. 89). In this convergence women are becoming

more masculine in order to assimilate in male dominated environments (Hogg & Knippenberg, 2003). Conversely, leadership styles were noted as migrating from authority figures using dominance in the workplace to authority figures using nurturing techniques of empowerment and authentic communication. This convergence showed a leadership as female stereotypical and less male authoritarian (Hogg & Knippenberg, 2003). The conclusion was a possible androgynous middle ground wherein the "characteristics ascribed to women match leadership roles as well as those ascribed to men" (Hogg & Knippenberg, 2003, p. 90).

Gender Equity Policies

There are very few federal laws regarding women's workplace rights in the United States. The first attempt to prevent workplace discrimination can be found in the Equal Pay Act 1963 which addressed an earlier time in American history when women were reluctantly given the opportunity to work in non-traditional industries during the war, but not awarded with the same rate of pay as the male counterparts they were replacing (Fifty Years after the Equal Pay Act, National Equal Pay Task Force, 2013). Gender wage discrepancies continued to plague American businesses which prompted President Obama to sign the Lily Ledbetter Fair Pay Restoration Act in 2009 which allows appropriate compensation for victims who justify complaints for unfair wages (Armani, 2013). Armani (2013) discussed the current debate taking place between sociologists, who believe the gap is due to discrimination, and economists, who cite personal choice as the reason for wage gaps. Economists, cited in Armani's (2013) study, argued men choose highly competitive, stressful, demanding, and consequently

high paying jobs while women tend to choose jobs that are safer and more suitable to their disposition which are devalued by society and often paid less.

The Lily Ledbetter Fair Pay Restoration Act actually amended the Civil Rights Act of 1964 or Title VII which prohibits discrimination against anyone, whether hiring, firing, promoting, or compensation related; based on race, color, religion, sex, or national origin. However, Section 703e1 of this law is the Bona Fide Occupational Qualification (BFOQ) provision which allows employers to discriminate if the basis is "necessary for the normal operation of that particular business or enterprise" (Manley, 2009, p. 171). However, BFOQ does not allow race to be a vehicle of discrimination, but would allow for the denial of employment based on pregnancy or any other female specific condition which they deemed interruptive to normal operation. To address this, lawmakers later included in Title VII an amendment in 1978 called the, Pregnancy Discrimination Act which provided discrimination coverage to women who were or who could possibly become pregnant at any time in the future (Fifty Years after the Equal Pay Act, National Equal Pay Task Force, 2013). Before this amendment, pregnancy made women an easy target for discrimination. Women were denied employment because employers did not want to hire and train an employee who may be out for sustained time or indefinitely due to pregnancy or to raise children (Armani, 2013).

The Paycheck Fairness Act was first introduced to introduced to congress in 2009 to compliment the Equal Pay Act of 1963 with extra provisions for requiring wage transparency, but it has failed many times since; the most recent failure occurred in 2014 (Should congress pass S. 2199, the Paycheck Fairness Act?, 2014). When addressing congress regarding the bill, Senator Barbara Mikulski, Maryland Democrat, stated, "We

want to end the soft bigotry of low wages for women. Equal pay for equal work. No secrecy. No retaliation. No loopholes" (Should congress pass S. 2199, the Paycheck Fairness Act?, 2014, p. 14). Opponents of the bill cited unfair burden on the employers when the problem in female wage discrepancies rested on their own decisions based on competing time demands between life and occupation (Siniscalco, Damrell, & Nabity, 2014). Further noted were difficulties in discerning implicit or overt bias because every woman and employer and job was different (Siniscalco, Damrell, & Nabity, 2014).

In 2013, congress overturned a 1994 Pentagon policy which prevented women from engaging in combat roles (Bumiller & Shanker, 2013). According to Bumiller and Shanker (2013), Pentagon reports indicated previous deployment of women in conflicts and cited more than 800 wounded women and 130 deceased in the course of two different wars. Women petitioned congress to overturn the ban because service in combat was critical in military advancement and the previous ban held them back and restricted career progression (Bumiller & Shanker, 2013). This legislation allows women to die for their country and seek promotions while Paycheck Fairness remains on the table.

Chapter Summary

The major themes found in the literature reveal the historical perspective of the American technology industry; common barriers for females entering and staying in the technology field; feminist theory; gender and role incongruity; and gender equity policies. The literature consistently revealed a gap in skilled workforce to meet the needs of the high growth technology industry. Compared to men, women had disproportionally low participation rates in educational programs and careers related to the technology industry. While the literature points to social and emotional causes associated with

disproportionality, very few researchers explore the political aspects of gender disproportionality in technology fields.

To break through social barriers, would require deprogramming of curriculum and societal views that normalize females as heterosexual wives who prioritize the home over college and career (Milgram, 2011). The new paradigm would be inclusive of workplace challenge and family fulfillment. In the same way war time campaigns enlisted women to work in non-traditional jobs by stating, "Yes You Can!", successful elimination of gender disproportionality today requires a campaign stating, "Work and Family—Yes You Can!" (Milgram, 2011). The research clearly indicates social barriers can be broken when young girls see viable role models working while maintaining family balance (Autio, 2013).

Political barriers may be decreased with increased education and legislation (Morelli, 2015). Many researchers found women in the field do not recognize gender bias. As entrenched players in an unfair field, they are not able to recognize symptoms of the problem and consequently cannot solve the issue (Sen, 1992). Educating women on the commonalities may help to bring the problem to light. Moreover, legislation can follow to provide legal strongholds to ensure workplace fairness. Alstott (2014) supported the inclusion of federal tax breaks to American organizations who meet a specific gender quota and penalties for those who do not. While punitive in nature, the intention is to ensure gender equity which would be beneficial in the provision of goods, services, and innovation for both men and women.

According to the literature, role incongruity and environmental factors are primary causes of disproportionately low numbers of females in technology. The

literature also indicates failing to increase the numbers of females in technology will leave half of the talent and skills base unused which could lead to American job outsourcing to international markets. The role incongruity theory is a framework for understanding how American female technology leaders' understandings and perspectives develop over the course of their experiences entering and rising to leadership in technology. However, this study used postmodern feminist approach in order to explore and challenge ideas about females in technology leadership. Theory examines assumptions like role incongruity in order to effect change and disband unequal power relations especially for women (Glesne, 2011; Patton, 2002). Because women were not perceived as possessing societal masculine traits for technology and leadership, they were often denied access to positions thus becoming victims of a glass ceiling, also called a labyrinth (Eagly & Carli, 2007; Layne et al., 2010; Sipe, Johnson, & Fisher, 2009). Gender roles were examined to determine the extent to which societal roles impact exclusionary practices in personal and professional circles. This study may gain insight from experts in the field who have the unique opportunity to enlighten the social, political and emotional issues surrounding gender disproportionality in technology fields.

Powell et al. (2012) stated the views of women in the field should be considered to aid in bridging the gender divide in the technology field. Previous international studies have investigated various constructs including organizational cultures, stereotypes, and response strategies. However, there is limited research collecting perception data from successful American female technology leaders. Successful women want to see more women in the field, but they believe recruitment should focus on changing the perception

of the technology industry rather than focusing on the social, political, and emotional problems inherent in gender inequality (Demaiter & Adams, 2009).

In conclusion, this narrative inquiry study determined the barriers encountered by females in their efforts to establish a career in technology and become successful leaders. America does not have enough skilled talent to fill technology jobs and there are disproportionately low numbers of female workers and female leaders. Statistics revealed rising numbers of women in the workforce, but significantly low numbers of women in the technical field (Ashcraft, McLain, & Eger, 2016; Harvey Nash CIO Survey, 2015; United States Labor Department, 2015). This study identified the barriers encountered by females in their efforts to rise to technology leadership positions and the strategies they used to overcome barriers. Findings from the study may help the United States Department of Education, state educational agencies, university systems, school districts, and counselors at all levels to promote female participation in technology. The study may also provide information that may assist American technology industries in their efforts to recruit, train, and promote more females in technology positions resulting in opening the talent base for skilled American technologists. In addition, this study may benefit workplace culture by revealing strategies technology organizations can employ to remove barriers for females so they can consider technology as a viable and rewarding career.

Chapter III

METHODOLOGY

America does not have enough skilled talent to fill the jobs made available in the exploding technology field and there are disproportionately low numbers of female workers and female leaders participating in technology careers (Ashcraft, McLain, & Eger, 2016; Moye, 2017; United States Labor Department, 2015; Zweben & Bizot, 2016). Technology ranks second among the ten hardest skilled positions to fill with 24% of surveyed employers reporting a lack of available skilled applicants (Talent Shortage Survey, 2016). Women currently represent 57% of the entire workforce, but 25% in field of technology and 6% participation as technology leaders (Ashcraft, McLain, & Eger, 2016; Harvey Nash CIO Survey, 2015; United States Labor Department, 2015).

The purpose of this study was to determine the barriers encountered by females in their efforts to establish a career in technology and become successful leaders. Findings from the study may help the United States Department of Education, state educational agencies, university systems, school districts, and counselors at all levels to promote female participation in technology. The study also provided information that may assist American technology industries in their efforts to recruit, train, and promote more females in technology positions resulting in opening the talent base for skilled American technologists. In addition, this study may benefit workplace culture by

revealing strategies technology organizations can employ to remove barriers for females so they can consider technology as a viable and rewarding field of study.

Following the introduction, there are nine sections in this chapter. The research design and rationale are sustained by the research questions and a justification of the methods. Participant and setting selection are then explained along with clarification of the researcher role, possible biases, and measures to monitor validity threats. The interview protocol is then explained along with specifics on data collection transcription, data import, and coding strategies. Ethical considerations regarding the use of data collected from human participants are explained as well as the use of findings through the process.

Researcher Design and Rationale

The primary goal of this study was to understand the personal and professional experiences of female technology leaders to draw conclusions about the common experiences that led to them entering and staying in the field. Guiding the exploration of their lived experiences are three research questions (Maxwell, 2013). The first question provided background and childhood experiences which states, "What are the life experiences of identified female leaders prior to participating in technology careers as workers and leaders?" The second question was, "What barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders?" This question focused on why women enter high tech careers and what issues they face if they choose to remain in the career. The last question was, "What strategies did identified female technology leaders use in their efforts to

participate in technology careers as workers and leaders?" The implications of this question may inform strategies for successful female inclusion in technology leadership.

A qualitative approach resolves the core issue which indicates a lack of research to "adequately explain the phenomenon" of disproportionally low numbers of female technology leaders (Merriam, 2002, p. 5). The questions are best answered through a narrative inquiry study. According to Ary et al. (2014), narrative inquiry allows the researcher to examine the participants' past with the present in order to gain understanding of the "essential" experience. According to Clandinin and Murphy (2007), the information derived from narrative inquiry leads to discovery of new possibilities. In addition to personal interviews, first-hand field notes in the native working environment allow for details about the natural setting and interactions in that environment (Clandinin & Murphy, 2007; Patton, 2002). Participants' feedback provide data for "developing casual explanations" which will be appropriate to satisfy the goals in this study (Maxwell, 2013, p.31).

Using feminism as a framework for data collection, gathered information was examined through a theoretical lens that is mindful of gender inequalities (Bierema & Cseh, 2003). The feminist focus allows for a deeper understanding of the central concept for this study which is gender role incongruity. According to Brumels and Beach (2008), gender role incongruity is the role occupants' inability to meet the obligations, personal skills, morality or expectations set by society for that role. The researcher explored female technology leaders' extensively to achieve understanding of how societal gender roles impact women in male dominated positions (Powell & Sang, 2015). The narrative inquiry design facilitates a partnership between the researcher and participants that allows

for new understandings (Clandinin & Connelly, 2000). Merriam (2002) indicated the research process must be justified with a unique case for investigation. Using the unique experiences of the participants and researcher strengthens narrative inquiry personal, practical and social justification (Clandinin, 2007).

According to Pinnegar and Daynes (2007), all qualitative researchers are interested in understanding, but the niche of narrative inquiry can be distinguished by the assumption that the story is the "fundamental unit that accounts for human experience" (p. 4). In the past twenty years, narrative inquiry has developed as a way to gain insight and meaning about a human experience (Lyons, 2007). According to Daiute (2014), narrative inquiry focuses on the "experience and the meaning of the experience" (p. 8). The specific methods a narrative inquirer uses to examine stories is determined by the kinds of phenomenon they intend to study. The type of narrative inquiry chosen to examine participants' experiences was Daiute's (2014) dynamic narrating diversity principle. This type of narrative inquiry aligns with the purpose of the study in that the participants and researcher were "interacting with each other" and the story of the female technology leader was "defined by the perspectives of people in positions of different influence, cultural familiarity, practices, and resources" (Daiute, 2014 p. 28).

Using a constructivist data collection approach, the primary focus was to personally gather and interpret information for the purpose of understanding context and setting (Creswell, 2009). The researcher utilized inductive data collection sources (interviews and memoing) that were a continual process of reflection framed by relationships and surroundings (Creswell, 2009). Interviews, commonly used in feminist focused studies, allowed participants to answer research questions based on their own

perceptions and experiences whereas field notes allowed connections between perception data and behavioral memos. Using multiple data sources allowed for a stronger study and avoid systematic bias (Ary et al., 2014; Maxwell, 2013).

The researcher employed Daiute's (2014) significance data analysis which "identifies narrator individuality" by analysis of unique patterns (p. 28). This type of analysis allows for the use of evaluative devices for subtle nuances that can go beyond the study of what was said to a study of how it was said and in what context (Daiute, 2014). Narrative inquiry diversity principle was the ideal qualitative principle for this study in that data analysis must be dynamic in the same way the narration of experiences is dynamic (Daiute, 2014).

Setting

This study was conducted in a southeastern United States metropolitan city. Purposeful sampling procedure was utilized to select an area of interest to increase opportunity for comprehensive investigation (Merriam, 2002). The qualitative researcher must consider accessibility when addressing an issue that has implications throughout the United States (Maxwell, 2013). Statistics gathered during the time of initial research design indicated that this southeastern United States metropolitan city is considered one of the fastest growing technology sectors in the country (Fatemi, 2017). According to Miguel and Roeder (2016), this southeastern United States metropolitan city had 46.7% growth in technology occupations from the time span between 2010 and 2016. The mayor of this southeastern United States metropolitan city indicated the city intends to aggressively compete in many different technology specialties to be considered the foremost technological leader in the Southeast (Trubey, 2016). The Cyberstates 2017

report issued by CompTIA (2017) indicated this state ranked 12th in the nation for technology employment with a total of 207,865 workers who constituted 4.9% of the total workforce in this state. The Cyberstates 2017 (2017) report also included gender distribution statistics of 76% male and 23.9% female in technology occupations. Considering logistics, this southeastern United States metropolitan city is the closest city to the researcher in a list that includes San Francisco, Washington D.C., Seattle, New York and Austin as top technology markets (Miguel & Roeder, 2016). This researcher studied female technology leaders in this southeastern United States metropolitan city to gain a deeper understanding of an area which has a growing technology occupations market with a skilled workforce shortage (Bluestein, 2015).

The main purpose of this study was to determine the barriers encountered by females in their efforts to establish a career in technology and become leaders; therefore, the main criteria in site selection involved an area in the United States with ample opportunity for a technology career and subsequent rise to technology leadership. To avoid accessibility issues and to maximize efficiency, participants were selected in the southeastern United States metropolitan city which has close proximity to the researcher and has a growing technology occupations market with a skilled workforce shortage (Bluestein, 2015; Karkaria, 2013; Maxwell, 2013).

Role of the Researcher

According to Kawulich (2005), the extent to which a researcher is involved in the culture of the participants is directly related to quality of data collection. This researcher took on the observer as participant stance. This approach allows for researcher interaction with a group to improve the quality of observation field notes and a more

thorough understanding of the participants' lived experience (Kawulich, 2005). Establishing a peripheral relationship allowed the researcher to build trust and identity with participants when observation field notes and interviews were taking place (Adler & Adler, 1994). The observer-participant stance allowed this researcher and her purpose to be known to the group, engage with the group, but maintain separation to offset bias and obtain legitimacy (Adler & Adler, 1994; Maxwell, 2013; Merriam, 2002). Clandinin (2007) suggested in a relationship between narrative inquiry researchers and participants, "both parties will learn and change in the encounter" (p. 9). Rather than attempting a completely objective view, this researcher adopted a relational view of the researched with complete understanding that the participants exist in a specific context which can have influence on the researcher (Clandinin, 2007). Aside from initial approval by supervisory figures, this researcher engaged in "responsive and interactive ways" with participants for acceptance and camaraderie to protect the fidelity of the study (Adler & Adler, 1994; Clandinin, 2007, p. 13). Participants who do not feel at ease with the researcher or understand the nature of the study might be inclined to unconsciously adjust their narrative based on what they believe the researcher expects them to say, also referred to as subject effect (Ary et al., 2014; Daiute, 2014). This researcher became an accepted group member as an observer participant through friendly, professional conversations to co-construct participants' stories (Adler & Adler, 1994).

Group and Participant Selection

Five female technology leaders who work in various corporate institutions in the southeastern United States metropolitan city were selected to participate. According to the Seidman (2013), participant selection must be "sufficient numbers to reflect the

population so that others outside the sample might connect to the experiences" (p. 58). These participants were selected based on purposeful sampling which is suited to the unique aspects of qualitative research (Ary et al., 2014). First contact, as recommended by Seidman (2013), was established with participants through a Women in Technology Networking event in a southeastern United States metropolitan city on April 19, 2017.

The proposed research site was in each participant's natural workplace setting during working hours. According to Ary et al. (2014), interviewing and observing participants in the actual environment allows the researcher to understand human behavior by exposure to the environment. The following criteria was used to select participants for this study.

a) Each participant must hold a technology leadership position based in the growing technology sector of the southeastern United States metropolitan city. Technology leadership positions specified in this study included Chief Information Officer (CIO), Chief Technology Officer (CTO), and Chief Information Security Officer (CISO), and senior staff positions within a company completely devoted to technology services or products.
b) The women were between the ages of 35 to 65 and have a minimum of three years of experience in a technology leadership position and an overall work experience of at least 10 years in a technology related position.
c) The women varied in ethnicity, socio-economic background, and education.

Understanding of the plight female technology leaders in this area would provide information to American education and technology industries to open the talent base for skilled American technologists and address the issue of insufficient Americans to fill

technology jobs (Ashcraft, McLain, & Eger, 2016; United States Labor Department, 2015; Zweben & Bizot, 2016).

Qualitative studies are synonymous with copious amounts of information that place emphasis on obtaining a comprehensive understanding until no new substantive information is available on the phenomenon (Ary et al., 2014; Trochim, 2006). In-depth interviews were conducted with a group of five women. The field of possible participants was narrowed down to women who are currently in technology leadership roles and based in the southeastern United States metropolitan city. This selection is not meant to be completely generalizable since "the search for lawful generalizations that are valid across contexts has proven to be more difficult than expected and may be a misdirected search" (Mishler, 1979, p. 17). However, given their background and experience within the booming technology sector of the southeastern United States metropolitan city, their input was valuable data for the study. Formal gatekeeper consent was used to ensure participants met the professional criteria, agreed to on-site interviews, and allowed the 90-minute interviews. Gatekeepers may include supervisors or administrators with authority to grant access (Seidman, 2013). Participants were compensated for their time and input.

Data Collection

My epistemological stance on the relationship between the participant and I fall within the constructivist perspective wherein knowledge of the relationships and experiences of female technology leaders are co-constructed through interaction and feedback (Clandinin, 2007). Data collection for this study was guided by constructivism and a feminism interpretive framework which is mindful of gender inequalities and

gender roles (Bierema & Cseh, 2003; Denzin & Lincoln, 2005). Gender role incongruity, a central concept for this study, is the inability to meet the obligations, personal skills, morality or expectations set for a specific gender role by society (Brumels & Beach, 2008). Through the interview process and collection of female technology leaders' stories, the study helped understanding of how societal gender roles impact a female in a male dominated position (Powell & Sang, 2015).

The interview technique is the "most popular method of collecting data in feminist research" since it allows the participant to tell their story in their own voice (MacNealy, 1999, p. 237). During the interview, it was appropriate to respond to participant narratives with sharing my own similar experience to relay understanding and allowed the participant a chance to clarify if there is discontinuity (MacNealy, 1999). Conducting interviews with the analytic strategy of feminism interpretation ensured data collected are inclusive of gender specific issues (Daiute, 2014; Denzin & Lincoln, 2005). For this reason, this study employed Daiute's (2014) diversity narrative inquiry principle. This principle requires a study design "based on diversities between groups distinguished by categories like gender" (Daiute, 2014, p. 25). With the diversity inquiry model, the study narrative is "defined by perspectives of people" in this case, female technology leaders (Daiute, 2014 p. 28).

Instrumentation

In qualitative research, the researcher can be considered an instrument measuring every detail in the subjects' context (Patton, 2002). Qualitative researchers generally seek to achieve personal, practical, and intellectual goals (Maxwell, 2013). As a female technology leader, this researcher is personally, practically, and intellectually interested

in discovering the experiences of females in technology. Qualitative researchers also seek to examine and illuminate the nature of a practice (Piantanida & Garman, 1999). This researcher intended to employ an in-depth account which illuminates lived experiences through exploration and explanations of details that may provide perspectives regarding the phenomenon of being a female leader in technology (Freeman, 2007; Seidman, 2013). In this study, the researcher and participants shared the experience of female technology leadership which substantiates the inclusion of diversity narrative as an underpinning for the narrative inquiry (Daiute, 2014). Because I am a female technology leader who studied other female technology leaders, the intent of narrative inquiry directly connects with how I brought meaning to the shared experiences of researcher and participants. Through interviews and memoing, this study explored female technology leaders' past, present and learned experiences. A semi-structured approach allowed for adequate data to illuminate research questions while allowing for follow up on specific areas (Brinkman, 2018; Miles et al., 2014). Moreover, the researcher and participants become active in knowledge production which is not bound by a preset interview guide (Brinkman, 2014).

Interview

Seidman's (2013) "Lived Experience as the Foundation of 'Phenomena'" (p. 17) and the subsequent three-interview model align with the purpose of this study and is the basis for instrument development. As participants answer questions, they revealed detailed textual evidence of the lived experiences of female technology leaders and what constitutes their essence or phenomena (Seidman, 2013). According to Seidman, 90 minutes is an appropriate length for a personal interview (Seidman, 2013). Seidman's

model recommends the first interview frame the past experiences of the participant. This corresponds with the first research question in this study which asked participants to describe their life experiences (Seidman, 2013). Specifically, participants were asked, "I would like you to tell me the story of your life. Please begin as far back as you can remember and include as many details as possible" (Brinkman, 2014 p. 578).

In Seidman's protocol for the second interview, the current experiences are explored, keeping with the second research question which asked participants to describe the barriers they face in the profession (Seidman, 2013). To model Brinkman's (2014) suggestions for semi structured interviews, participants were asked to tell about their current experiences and to include as many details as possible.

Seidman (2013) refers to the third interview as "reflection on meaning." This is connected to the third research question which asked participants to describe successful strategies to overcome barriers (p. 22). Like the previous questions, the participants were asked to describe successful strategies to overcome barriers throughout their career.

Each 90-minute interview took place in the participants' office or workspace and spaced no more than one week apart. According to Seidman (2013), conducting all three interviews spaced no more than one week apart keeps the information fresh in the minds of the participants as the lived experience of the participant is illuminated through textual evidence.

The foundation for the female technology leader phenomena is based on their lived experience narratives. The interview questions and structure is appropriate for this study. According to Seidman (2013), the in-depth interviews should replace concerns regarding generalizability with "compelling evidence of an individual experience" (p.

55). The questions guided the process, but active listening and strategic follow-up questions were utilized.

Participants willing to be interviewed were contacted via email to establish a date and time for each interview. The informed consent form allowed participants to understand the format and require them to set aside the required time for the interview. The interview was recorded through a digital audio recorder and transcriptions of the interview were generated. According to Seidman (2013), it is important to avoid data analysis of the interviews until all three have been completed. A copy of the transcription was sent to participants for member checking within three days of the interview (Maxwell, 2013).

Memoing

Research memos augmented interviews as a written record of reflections and assisted in the analysis on important findings (Maxwell, 2013; Miles et al., 2014). Reflections may include thoughts, reactions, or methodology concerns and were documented in a field journal and coded for organization (Charmaz, Thornberg, & Keane, 2014; Maxwell, 2013). Memos taken in the natural setting reinforce constant researcher immersion and engagement through the recording of an additional layer of details and insights which can confirm and explain results (Maxwell, 2013). Memos were recorded immediately following site visits and captured reflective interactions, possible biases, or significant events (Maxwell, 2013).

Observations are detections of unstructured interactions and participant activities in the natural setting or workplace which provided data on qualities of their consciousness that "constitute narrating in the first place" (Diaute, 2014, p. 229; Patton,

2002). I was an outsider who was not actively engaged in the natural setting (Patton, 2002). Field notes included as many details regarding setting, behaviors and interactions as possible. Setting description accuracy was critical and strengthened the study by recording experiences, subtle occurrences that otherwise may be missed, and learning communication through body language (Patton, 2002). Detailed notes of interactions and unique communications were recorded through field notes, while memoing included important researcher reflections (Daiute, 2014; Maxwell, 2013).

Organizational Policies

Collecting the current organizational policies for hiring and promotion for each of the participant's place of employment provided additional information to corroborate participant feedback regarding barriers. Formal gatekeepers were asked to provide human resource policies and the documents were used along with interviews and memos to triangulate information and strengthen data analysis (Merriam, 2002).

Data Analysis

According to Daiute (2014), significance analysis is one of the recommended data analysis strategies when using her diversity principle for data collection. This is an especially beneficial analysis strategy for this study of female technology leaders. Daiute (2014) warned that participants' unconscious conformity to sociocultural patterns will be revealed through explicit statements, but also revealed implicitly through the "evaluative phase of meaning" (p. 150).

The explicit statements, the actual words and narratives of participants, were transcribed from the audio recordings and then imported and managed using computer software. The data collections for this study included interviews, observations, memos

and field notes. Any material collected for this study was imported into the software for organization. Post-interview procedure included a review and analysis of memos and notes within 24 hours and included a data import process. Accuracy was checked with repetitive listening and transcription of recorded interviews. The initial transcription reading included an overall reading to determine initial impressions of explicit statements. Detections from the initial reading were recorded in a research journal and included in the data, followed by three phases of coding to analyze the interview transcripts.

During the first phase of coding, the implicit statements, or evaluative devices used by participants, were noted and categorized into psychological state expressions, intensifiers, qualifiers, casual connectors, and negations (Daiute, 2014, p. 156). Each of these were recorded in a table which categorized the explicit statements into one of the evaluative device columns and noted possible frequency. Daiute's (2014) "Significance Analysis Process Checklist" as follows, was used to ensure analysis fidelity (p. 261).

1. Read each narrative; then read it again. Appreciate the narrative; note your reactions.
2. Underline evaluative devices, going through this step several times.
3. Identify evaluative devices, for each device or going through sentence by sentence.
4. Identify frequencies of evaluative devices and different types of evaluative devices.
5. Identify patterns of evaluative device expressions by individual, group, or some other factor relevant to your study, based on frequencies, densities, and

placement of evaluative devices of different kinds. Observe similarity, difference, and change over context, time, or other qualities relevant to your research questions and design.

6. Consider the effects of the significance patterns you identify, first by paying attention to the effects of evaluation on you as a reader and then by considering some of the common functions along with different kinds of evaluative devices.

7. Summarize your findings.

8. Consider how these patterns illuminate narrative meaning, in particular to address our research questions or to suggest other questions.

The goal for significance analysis is to reveal individuality and themes through nuances as recorded through evaluative device lists and frequencies (Daiute, 2014). Using the feminist perspective as the theoretical lens allowed the researcher to "presume the importance of gender" and "orient the study in that direction" (Patton, 2002 p. 129). The principles of feminist theory center on the relationship of the researcher and participants, recognizing female intuition, and contributing new knowledge to affect positive change (Patton, 2002). According to MacNealy (1999), feminist research endeavors to "find meaning in interactions and kinesics" (p. 239).

The second phase of coding was aligned with Seidman's (2013) suggestion to organize the volume of transcript data into focused categories which are then connected to possible themes. The evaluative devices identified in the first coding phase become categories and are assigned provisional codes (Miles et al., 2014). The overall data analysis was a continual process of reflection to "make an interpretation of the larger meaning of the data" (Creswell, 2009, p. 183). To avoid unnecessary and unimportant

data and to maintain the integrity of using Daiute's (2014) "Significance Analysis Procces Checklist," early categorization was avoided by following my intuition (Daiute, 2014, p. 261; Seidman, 2013). Categories, including those revealed through the evaluative device analysis, denoted possible areas of concentration (Seidman, 2013). The emergent themes, as discovered in the data analysis and subsequent presentation of findings, answered the research questions and illuminate the life and culture that created female technology leaders (Patton, 2002).

The third coding phase was an integrated cross-case comparison to establish relationships between categories and a deeper understanding of the phenomenon (Ary et al., 2014). The most important aspect of data analysis was the inclusion of rich descriptions that do not muddle interpretations (Merriam, 2002). Interpretations occurred after a thorough data analysis (Creswell, 2009). Patton (2002) indicated data analysis converts the pieces of transcripts, observation field notes, and documents into whole findings which allow for better understanding.

Issues of Trustworthiness

Credibility and Dependability

Determining how closely aligned data are with an accurate picture of a situation is paramount to credibility and dependability (Creswell, 2009). Credibility and dependability was established with triangulation, rich data, and member checking.

Triangulation ensures multiple data collections confirm one understanding of the phenomenon (Merriam, 2002). Consistency was checked among the three major sources of data collected which include transcribed interviews, memos, and organizational policies. A detailed and all-inclusive context description ensured rich data and possibly

transferability. Respondent validation is another critical piece (Maxwell, 2013). Allowing female technology leaders opportunity to review and attest to the accuracy of the data, not only augmented credibility and dependability, but also gave participants peace of mind through the process. Post-analysis member checking and discussion to verify transcripts, observation field note data, and thematic coding was an important aspect of the study (Maxwell, 2013).

Bias and reactivity, two common threats to validity, were closely monitored in my study (Maxwell, 2013). I certainly ran the risk of biasing and influencing the study by inserting my own opinions and interpretations. According to Maxwell (2013), researchers should embrace their subjective influence and learn to use it to benefit the study. I am not an innocent bystander in that I am currently in the trenches and I am very passionate about the lack of females in technology leadership. According to Clandinin and Connelly (2000), narrative inquiry is a "collaboration between researcher and participants" wherein stories are lived and then told to make meaning (p. 20).

Transferability

Because all female technology leaders are unique, provisions of rich descriptions were be used to establish transferability (Miles et al., 2014). Each participant was provided an image of the phenomenon. I provided a detailed cross-case analysis to illuminate the phenomenon and influence other readers and groups to discover new understandings (Ary et al., 2014; Merriam, 2002).

Confirmability

Approaching the project with the intent to discover how my conclusions may be wrong enhanced the project (Maxwell, 2013). By collecting data from different

individuals and sources, systematic bias can be avoided. Ary et al. (2014) noted when multiple sources similarly conclude, "a stronger case is made" (p. 561). Because I am very close to and passionate about the topic, bias and reflexivity were threats that must be grounded and tested by these important validity checks.

Ethical Issues

According to MacNealy (1999), the nature of feminist research is deeply personal and sensitive. Bringing to light painful narratives can be difficult and must be met with empathy rather than objectivity (MacNealy, 1999). A powerful combatant for ethical considerations is the fact I am also a female technology leader and my personal experience allowed me to "understand and empathize with those being researched" (MacNealy, 1999, p. 241). Because I can relate to their situation, I feel greater responsibility to protect participants' confidentiality. The researcher sought approval from the Institutional Review Board (IRB) of Valdosta State University. Under those regulations, I was eligible for exemption of 45 CFR 46.101(b)(2) part 46 requirements (Office for Human Research Protections, 2016). Participants were willing female technology leaders in the southeastern United States metropolitan city, but their identity was protected and an alias name was used in the place of a real name by which they can be identified. Included responses did not place them at risk for criminal or civil liability and damage financial standing, employability, or reputation (IRB, 2016).

Through the informed consent process, participants understood their rights and protections through the process. This agreement formalized interactions at a level that allowed participants to be in control of the information they share and how it is shared with the rest of the world. All participants read and gave verbal consent before engaging

in the study. Participants were given an explanation of the study to include a description of the purpose, methods, duration, and risks with an opportunity for questions and answers.

The participant identities remained confidential as detailed in the informal consent document and they were reminded they are not required to provide any information that would jeopardize their current employment. I was the only researcher and all information was entered and accessed by me. As such, there were minimal risks for participants in this study because they were in control of the information they are willing to share. Conversely, the benefits were minimal for participants in that study results may only benefit others who are considering the field of technology.

Data collection and security protocol protected the anonymity of the participants and the confidentiality of their data. Equipment which stores recordings and data was password protected and locked in a secure area. At the end of the process, data storage devices were cleaned and all data removed no later than one month after final university approval.

According to Patton (2002), the strength of qualitative research methods often lies in the informality between the researcher and participant, but the responsibility of informing the participants of the process is paramount to ensuring ethical considerations. Honesty and transparency regarding the collected information, how it was analyzed, and how it will be disseminated are crucial pieces for a qualitative study (Diaute, 2014). Moreover, trust between the researcher and participants needs to be established in order for the participants to actively engage in the project. Trust building included co-

constructed data with member checking, privacy protection, and collegial professionalism throughout the study (Miles et al., 2014).

Chapter Summary

This researcher approached current female technology leaders with the purpose of discovering lived experiences to include the barriers they encountered in their rise to technology leadership through an examination that is cognizant of the cultural inequalities that affect the lives of women (Bierema & Cseh, 2003; Denzin & Lincoln, 2005). The research site was in the technology aggressive area of the southeastern United States metropolitan city and the study employed purposive sampling to enlist female technology leaders currently working in that area. Using a constructivist approach within a feminism interpretive framework, the research design was a partnership between the researcher and participants. Seidman's (2013) three step interview process was used to collect rich, meaningful data in the natural setting. Daiute's dynamic narrative inquiry diversity principle along with significance analysis guided the data collection and analysis process. Data coding revealed emergent themes. Study credibility and dependability was girded with rich data, triangulation, and member checking, while bias and assumptions were checked through self-reflective memos. While generalizations are difficult, rich descriptions may persuade readers to pursue further study. The ultimate goal was that the female technology leaders participating in the study will find the process enlightening and meaningful. By sharing their experiences, other females may benefit from lessons learned and consider the field.

Chapter IV

NARRATIVES OF FEMALE TECHNOLGY LEADERS

America does not have enough skilled talent to fill the jobs made available in the growing field of technology and there are disproportionately low numbers of female technology workers and female technology leaders participating in technology careers (Ashcraft, McLain, & Eger, 2016; Moye, 2017; United States Labor Department, 2015; Zweben & Bizot, 2016). The purpose of this narrative inquiry study was to reveal the experiences of identified females in their efforts to participate in technology careers as workers and become technology leaders. Qualitative narrative inquiry methods were utilized to understand the shared experiences of females in technology. The researcher administered in-person and phone interviews based on participant choice. All of the participants elected to meet in-person for the first interviews. Subsequent interviews were either in-person or by phone. A flexible interview structure allowed for a basic questioning structure which was augmented by occasional clarifying and elaboration questions. After each interview, participants were asked to verify transcripts and bring to light any errors. Study findings addressed the following research questions:

RQ1: What are the life experiences of identified female leaders prior to participating in technology careers as workers and leaders?

RQ2: What barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders?

RQ3: What strategies did identified female technology leaders use in their efforts to participate in technology careers as workers and leaders?

Using purposive sampling, five current female technology leaders in a southeastern United States metropolitan city were selected to participate in interviews which followed Seidman's (2013) three step interview model. The first 90-minute interview required participants to provide a detailed account of participant life experiences including family, school, college, and career leading to their current position. These experiences are summarized in the participant profiles at the beginning of this chapter. Data from the second and third interviews focused on the experiences and reflections of the participants and will be part of the participant profiles, but detailed in the following chapter (Seidman, 2013). Initial contact and verification of participant criteria occurred at a Women in Technology Networking event in a southeastern United States metropolitan city approximately eight months prior to data collection and analysis.

After the interviews, participants sent documentation specific to their organization which was compared to observation memos and interview responses to enhance accuracy and credibility of the data. Reviewed documents included organization charts, policies, and any other relevant documentation as provided by the participant or located on the organization website. Participant identities were protected using confidential pseudonyms which each of them chose. Table 1 includes basic information for the five study participants.

Table 1

Participant Demographic Information

Pseudonym	Gender	Ethnicity	Age	Years in Technology Leadership	Current Position
Anne	Female	White	67	16	Chief Information Security Officer
Grace	Female	White	57	10	Chief Executive Officer
Summer	Female	White	57	11	Chief Information Officer
Celine	Female	White	53	27	Chief Information Officer
Margaret	Female	White	45	16	Chief Information Officer

The following participant profiles provide detailed background narratives including details regarding their family, school, and work experiences.

Profiles of Participants

Anne

I met Anne at a Women in Technology event. In casual conversation, I told Anne about my study and she was immediately interested in participating. She was particularly interested in sharing her story to upcoming young women. I interviewed Anne in her office located in a densely populated commercial section of a southeastern metropolitan city with numerous multi-story office buildings. Anne's multi-story building is home to

several technology startup companies, a major technology company, and the hospitality organization for which Anne worked. Exclusive parking and two points of security proceeded my entry into the large, well equipped conference room used for in-person meetings and video conferencing with access to web cameras, microphones, data ports, and laptops. Anne and I met in the conference room for our first interview, but the second interview was in her office down the hall. A large computer monitor, typical office supplies, and a book entitled, *Paradigm of Dependable Security*, were neatly arranged on her desk and over her right shoulder were framed certificates, achievements, and a picture of the Information Technology division of the company.

Anne was a 66-year-old, wife and mother of one daughter. She discussed her age specifically as she revealed her current employer hired her at the age of 62. She said her company valued age and wisdom "unlike many American organizations which try to encourage early retirement to older employees." At the time of the interview, Anne was in her 39th year of her working career and had 16 years in technology leadership as her current position was Chief Information Security Office for an international hotel organization. Anne was born in Atlanta, but graduated from college in Minnesota and began her career there. Her dad was a math and science teacher who later worked for a major computing company. She referred to her mom as a "traditional home-maker." She had two sisters and two brothers with whom she learned "team skills, conflict management, and loyalty." Anne's career choice was inspired by her father whom she discussed throughout the interview process.

> I remember my dad took such an interest in our math homework and made it fun not just for me but my brothers…[he] had a very good career with [large

> computing company] and it was always a dream of my dad for me to work at [large computing company].

Anne also mentioned several other men in her career who were influential mentors.

> I've been able to treat men the way I treated my brothers…it's a friendly relationship. It's also a relationship that permits you to have conflicts. That family kind of experience as a child I think is one of the intangibles that has helped me. All of my mentors in my career have been men, so even though I've had these narrow-minded men in my career, I have also had men who are good. Those mentors I've related to more as fathers.

Anne was "a good student" throughout her years in school. She achieved Salutatorian distinction as a high school graduate. She "was particularly good in math, …loved to read, … and played piano." After completing high school, she enrolled in college to study elementary education because she did not have "awareness of careers for women…teacher, nurse, or airline stewardess" was all that she knew. She recalled, "even though there was data telling me that I had particular qualities or strengths, my emotions and my mindset were more about being a wife and a mom…I defaulted to the only thing I really knew, which was to be a teacher." When she finished her degree in elementary education, she decided she did not want to teach. Instead, she took a job in a temporary employment agency which afforded her the opportunity to work in a variety of industries including banking, health care, and law. Anne acquired valuable exposure to a variety of people and business acumen in each environment which gave her confidence to apply for a job at a major telecommunications company that had been court ordered to

hire more women. This serendipitous opportunity ignited her career in technology and eventually provided an option to relocate and return to her hometown in the southeast.

Anne's career path included employment with several very large and well-known national and international companies within the telecommunications, financial services, and hospitality industries. Her job roles included systems design and network specialist; and eventually, an executive encouraged her to pursue a management career path.

Anne lamented about previous hostile, male dominated work environments that shunned participation of "a woman in management." She felt compelled to work harder than her male peers and to be careful to "make no mistakes." She "had to be perfect." At one point, Anne was warned by a male co-worker to "watch her back" because another male was "out to get [her]." Anne recalled the warning as justified. She also felt discriminated against with regards to pay and asserted that she "didn't make as much money as men in her same job." Anne partly blamed herself for "not being very aggressive in her salary negotiations." She also noted that women often missed out on higher wages because they were "in a comfortable job" that did not have "challenge" or "demands on their time."

Later, when Anne got married and had her own family, she wrestled with home and work life. She sacrificed time and resources at home in order to achieve her career goals. She stated, "I did get married and had a baby daughter who was seven months old when I was working" [in networking management at a computing company]. At one point, she "became the primary breadwinner for nearly two years" while her husband returned to school in order to make a career change. During this time, Anne felt the full force of work and home pressure, "in moments of weakness, I wanted to run away and

quit, but I couldn't … it was a pressure point for me." Anne turned her challenging situation into an opportunity for self-growth. She stated, "It worked out for me because I learned so much."

Anne was professionally adventurous and eager to explore various work opportunities. In the late 90's, Anne's continuous pursuit of challenging work landed her into an executive role in information security for a hotel organization. In 2009, Anne resigned the position of Vice President of Corporate Risk & Chief Privacy Officer because she said the job was no longer challenging and complained that "there was nothing new." From there, she launched her own successful risk assessment consulting firm, but then returned to work in 2014 after being pursued by an employment recruiter who represented her current employer, an international hotel chain.

While working, Anne acquired several recognized certifications including Executive IT Management; Business Leadership and Strategic Planning; Certified Information Security Systems Professional; and Certified Information Privacy Professional. Each of these distinctions augmented her current role that she described as "making sure the hotel guest is comfortable and secure with sharing their information." She described her primary responsibilities as a policy writer and strategic planner, but "flexible to react to problems and report on and find new solutions." In her last two positions, Anne was the inaugural data security officer. She boasted her outstanding skills in "helping organizations get started with a security plan." Once she had the company on the right trajectory, she would "move on" to find a new challenge.

Although Anne appreciated the "diverse …" and "multilingual …" culture of her current organization, she was disappointed with the gender inequality in leadership

positions which were dominated by men." Dismayed, she pointed to a picture of her Information Technology team on her office wall which showed about 30 people—six were women, but only three held leadership positions. While Anne defied traditional social gender role barriers as she became an executive, she was quick to place partial blame on women for their underrepresentation. She stated,

> There are barriers to women going into those roles… part of it is women not wanting to go into those roles … a lot of women [are] not comfortable [with] the stress and [some] women [have] started their own business …[rather] than dealing with that male-dominated organization culture.

At a personal level, Anne subscribes to both consensual and independent leadership styles. As a consensual leader she seeks to "… engage everybody in the company for it to be successful." She feels the need to "…empower myself to make key decisions" since she was the first person in the role of security officer. In addition, she believed technology leaders need "hard and soft skills" to manage complicated and rapidly changing technologies and also be the communication liaison between highly technical staff members and other staff members within the organization. She believed her interpersonal skills as a woman directly impacted her success. She said, "[a technology leader has to] be able to relate to [technical people] …be their spokesperson and tap into their expertise … women who have done well are all good communicators and all have good interpersonal skills." Anne constantly looked for professional development opportunities like networking in professional organizations including the International Society for Security Administrators, corporate training, and work with an executive coach.

Anne strongly believed women need to grow thick skin and be assertive to survive in a male dominated technology industry. She advised young women pursuing technology careers to "…not be intimidated by being outnumbered [by men]." She stated that her dad gave her the best confidence building advice when he told her, "bad behavior happens to men too…the business world is aggressive." Anne said that "about 80% of what happens is just because of the business culture and about 20% is because there is a hang-up about women." Clearly, gender politics did not slow her down.

Grace

A member of the Women in Technology (WIT) organization told me about Grace. She owned a technology company based in a southeastern metropolitan city. I was introduced to Grace by the WIT member via email and from that point scheduled the first interview.

I interviewed Grace at her office located in an extremely progressive and affluent section of the city also casually known as the southeastern Silicon Valley. Several major technology companies have offices in this area as well as dozens of technology startup companies. As I approached the top of the stairs to Grace's office, I was greeted by a young woman who directed me to the conference room to wait for Grace. A large conference table and chairs dominated the room, but the room had a casual, but elegant décor. A warm-colored, pine hardwood floor and subtle lighting, created an inviting, home-like atmosphere. On the wall of the conference room was a quote from Helen Keller which read, "The only thing worse than being blind is having sight, but no vision."

When Grace entered the conference room, we exchanged pleasantries and she shared her passion for mentoring young women through various organizations and

committee work. Grace also indicated her path to technology was nontraditional and with that, we started the interview.

Grace was a 57-year-old woman, married with a son and a daughter. At the time of the interview she had been the Chief Executive Office and co-owner of a technology company for 10 years, but she had previously worked full-time as a lawyer for nine years.

Grace was born in the Washington D.C. area and she had two siblings. Her parents were both educators in the local school district. As a child, Grace was "a helper…Tom Boy… [and] Daddy's girl." Grace credited her dad, a school principal, as a primary influence in her life and career. She said:

> My dad had a high risk taking quotient …seeing my Dad take risks made me…less risk averse and able to take risks. I'm an eternal optimist and that's how my dad was and I am like him in that regard.

At the age of nine, Grace and her parents relocated to Greece where they served as educators in an international school. Grace recalled this move as "risky," but synonymous with her dad's propensity for adventure and change. Grace shared fond recollections of her international experiences at the Grecian school and her travels all over Europe. This experience exposed her to international cultures. She said, "I learned about diversity of thought and background." While overseas, Grace increasingly became more self-assured and confident. She expressed gratitude to one female teacher who encouraged her to participate in school plays. Her participation in these activities helped her "…develop self-confidence and speak in front of others."

When Grace was approaching high school age, her parents decided to move back to the United States. Grace remembered not wanting to leave Greece and being surprised

by the race issues that she witnessed at her new school in the Washington D.C. area. Throughout school, Grace "loved to read." She actively participated in many different competitive sports including, "cheerleading, gymnastics, and skiing."

Grace enrolled at a college in Virginia where she met her husband while attending this college. Grace earned a degree in English, and followed her future husband to the Washington D.C area where she waited tables at an oyster bar. In an effort to break into the legal profession, she took this opportunity to network with influential lawyers who frequented the establishment. Grace realized the importance of networking to get ahead. She stated, "you have to know somebody…you couldn't get in the prosecutor's office or the solicitor's office or any of the government jobs or internships or clerking for a judge unless you knew someone." She also knew she had to be outstanding to be noticed, therefore she made it a point to memorize their favorite drink and provide the best service. Her efforts paid off and the men shared information and support she needed to expand her opportunities into the legal sector. She was soon awarded a prestigious scholarship that enabled her to attend law school with promises of employment if she made it through the first year. Grace received the scholarship and attributed that success to the men she networked with in the bar. She earned her law degree in 1987.

In 1987, Grace moved to Texas to be with her husband who had begun working in a time intensive technology job. Grace found work in a law firm which she recalled had a "toxic environment." She shared an anecdote about a time she "hid her pregnancy for four months" to avoid being excluded from cases at work. Although Grace was prepared to fight gender politics from undermining her career, she was unhappy and homesick.

She and her husband decided to leave Texas so she could stay home and spend more time with their children.

Grace was a nurturing and caring mother who "loved being a mother and staying home and helping with the children's school." Through her work with the school Parent Teacher Association (PTA), Grace became a legislative chair for the state PTA. In this capacity, she worked on public education and child welfare/safety issues and coached parents all over the state on how to be advocates. As a parent, she frequently assumed mother/father roles as her husband traveled to advance his career. In 2007, her husband suddenly lost his job forcing them to start their privately owned family technology company.

Grace soon realized she needed a special certification from the Women's Business Enterprise National Council so she could legally own 51% of the company and take advantage of women owned business tax credits. Grace and her husband secured financing for their company from a community bank. As a startup entrepreneur with limited funding, Grace had to learn many aspects of running a business. Grace had to "Figure out balancing books…human resources…I was wearing every hat." Grace and her husband worked hard to establish a "non-toxic…wonderful place…and build our own culture where we would look forward to going to work every Monday and work with wonderful people." Although Grace desired to establish a diverse organization with 50-50 women, she was painfully aware of the difficulty "…to recruit people …to recruit women engineers or women in technology at all. They're just not as interested as the guys."

Within two years her hard work paid off and their company, started winning technology and local business and growth-related awards. Grace set up a scholarship through the Women in Technology organization for underprivileged girls who want to study technology. She strongly believed developing and hiring talent benefits the company. Her overall strategy was to help clients achieve success using technology with a specialty in using data "to get ahead of their competition and to determine suitable data storage solutions. Our primary investment is in storage and network engineers." Grace described her primary focus on "networking with potential clients", being a "cheerleader" for employees, serving on multiple boards including Women in Technology, a local technical college, local city and state chambers, and speaking at events and on panels which address issues like how to improve gender disparities in the workplace.

Grace stated her employees and clients generally had a high socioeconomic background with college educations and were "able to reach high levels." Though she desired a diverse work environment, the current company numbers reflected 13 women out of 31 employees and few minorities. Grace said, "It's hard to find people…I want smart people… [so I can] gather information from many sources to make decisions."

Grace described herself as a collaborative leader who, "could recognize talent, nurture talent, identify a team player, and when someone doesn't fit, move or remove them." She added that these skills are particularly important in technology leadership which requires heightened skills of imagination and creativity since technology was always changing. Grace warned the survival of a woman in technology depends on their ability to work well with men because "…the field is mostly men." She believed she had the attributes women require to be successful in a male dominated profession. She stated,

"I'm not sensitive, not too sexy, can hang with them and drink and cuss if I need to." She also believed women have an advantage over men with regards to interpersonal skills and the ability to resolve disputes. Specifically, she often used her softer, more feminine interpersonal skills to intercede in employee disputes as evidenced in the statement, "I am going to be the best at solving things … I speak [their] language and [they] trust me … So, that's going to be a challenge for [the new male Chief Technology Officer]."

Grace conceded the technology industry was a "boy's club" which had a reputation of "not being safe for women." She noted this problem was also prevalent in other sectors including the legal industry. Grace admitted "I acted, dressed, conducted … with drinking and smoking … like a man" in order to succeed in her career. Despite the challenges she has encountered on her career trajectory, she was confident women can still be successful if they take advantage of the changing social environment and their recognition of women as serious partners in the technology industry. She encouraged prospective female technology leaders to:

> Be true to yourself—don't change—[you] don't have to act like a man, but be tough like a man. The world is your oyster because women are needed in technology. You don't need a program; the company will train you—college training may be obsolete. If you are curious, this is the field for you. It can be unwelcoming for women, but it is getting better because companies are more cognizant of safety, respect and value [of women]. Find a mentor or sponsor to look out for you.

Grace plans to continue her support of females in technology within her company and in the community. She also plans to ramp up her political and local activism role in the future.

Celine

Celine was introduced to me via an email sent from a board member of the area Women in Technology (WIT) organization. Planning the initial interview required scheduling with Celine's administrative assistant who had some difficulty finding time in her busy calendar for the lengthy interviews. Ultimately, a date was chosen and the location set at her office near the heart of the southeastern metropolitan city.

The multi-story, modern office building located in an affluent area of the city, had recently been renovated. After producing identification and receiving a guest badge from security, I was escorted by Celine's administrative assistant to her office. Multiple cubicles flanked the outer walls while Celine's office was located near the center of the floor. Behind Celine's desk was a computer, to her left was a large interactive panel, and to her right was a shelf with books, folders, and a collection of family pictures.

Since this was our first meeting, we took time for small talk and to discuss the study. Quickly, Celine revealed she was battling a serious illness and her treatments were, in part, to blame for scheduling difficulty. At the time of the interview, Celine was a 53-year-old divorced woman and mother of two daughters. She was completing her 34th year of total work experience, the 27th year as a technology leader, and the fourth year as a Chief Information Officer for a large educational organization in a southeastern metropolitan city.

A New York native, Celine was the youngest of four siblings, but her parents divorced, and her mother's remarriage to her step father included six more siblings—three girls and three boys. Her biological father was a veterinarian and was "not supportive" of Celine financially or emotionally. Her mother had a Master in Business Administration degree and worked for a major publishing company as a liaison between the business and technology departments. Although Celine said her mother gave her insight into a technology career, she did not feel supported by her mother. Her mother made her feel undervalued and told Celine her pregnancy with her "was a mistake," but she still felt determined to "make a difference." Celine spoke of her step-father, a chemical engineer, as the "biggest influence" on her life and career choices. She reminisced about a gadget he had given her when she was about nine which she considered to be a motivating factor for her interest in technology tools. She showed me the rather small, calculator-type device with great pride and said, "I loved this thing. I took it everywhere with me. It doesn't seem like much now, but I loved it." She said her step-father "had a huge impact on my life … a lot of the reason that I'm successful is because of him." Celine had a physically and emotionally competitive relationship with her siblings. She recalled a general lack of warmth in family interactions noting that she was "not complemented." However, she felt the "difficult childhood made for a resilient adult."

Despite family challenges and "tough" experiences, Celine found success and affirmation in school. She attended a "unique elementary school" which was on the cutting edge of differentiated and accelerated learning. She said, "I was a good student—not social, but well behaved." She alluded to herself as "self-sufficient" and a "Tom Boy"

who loved and was skilled in many different sports including field hockey, volleyball, softball, skiing, tennis, and golf. Her school experiences and affinity for learning allowed her to finish high school early.

When considering college majors during the late 90's, Celine said, "Computer science was not available. Computers were still these big things with dual floppy disks. Computer programming seemed like fun, but it wasn't a career." Celine chose Political Science as her undergraduate major and then started her Masters of Science in Policy Analysis and Management; finishing both at 22 years old. Celine was awarded a Presidential Management Internship which gave her experience in many federal agencies.

She also had several opportunities that broadened her skill set in technology including a consulting job in the Middle East with her step-father who worked for a major fuel industry. Her experiences increased her knowledge in computer set up, networking, and storage. According to Celine, "in these jobs I earned my computer science degree."

A subsequent position with a major vacation industry was where "I learned to be a Chief Information Officer. I went from being a doer to a team builder with a focus on processes." Celine then continued her growth and development through consulting. During this time, she worked with different kinds of businesses and "learned a lot and got a broad view." These experiences solidified her personal mission to make a contribution to an organization, but also to use job experiences as vehicles for personal growth. She said, "Every day—every job—consider the value you deliver and what you can learn."

Early in her career, Celine married and had two daughters. Although she continued to work and progress in her career, her marriage soon turned out to be a

professional impediment. Her husband was not supportive of her professional aspirations. She complained, "I helped him with all of his dreams and funded his dreams … and he knew from the beginning how important my career was, but he still wouldn't do what I needed to move forward." Consequently, she had to choose between two competing priorities; her family and her career. She stated, " … I had to leave him, leave my kids…to have a place where I could be who I am supposed to be." She lamented not having her daughters with her in the city to nurture them and for them to support her during her current health crisis. But Celine decided to push the boundaries of societal expectations for a traditional wife and mother. She justified her choices by saying, "I've had to overcome … [and] do what I think is right for me and the world. It … isn't about money. It's been the hardest thing in my life to not be with my children all the time." The inner conflict is evident as she wavered between regret and reconciliation regarding the choice of career over family. She said comparing, "… this job versus being with my children… even that is so sexist …men move all the time and work out of the state … but you are the mom … so everybody would criticize me … because I'm the mom." The dichotomy of career over family caused consternation. "It's been hard--been extremely hard and I'm not going to sugar coat it."

In spite of emotional turmoil regarding work and life choices, she accumulated several recognized certifications through her career including Project Management Institute certification, Women in Technology Woman of the Year, and she recently was honored as the Chief Information Officer of the Year in a major southeastern city. Celine was proud of this achievement as this particular distinction recognizes her current work which she described as "using technology tools to help students reach their full potential

as productive citizens through personalized learning and improved data warehouse processes." She described her primary responsibilities as a strategic planner, project leader, mentor, and communicator. She said, "Technical people are not good communicators," so she helps with relating technical processes to the people who need to use it. In the past three years, Celine has expanded and improved network functionality and multiple processes within the educational organization.

Celine used collaborative leadership in "developing people and letting them shine." To this end, she spent a significant amount of time coaching others and building capacity. She believed technology leaders had to be "mindful of politics and operations with specific goals and planned processes to get there." She also promoted constant participation in professional development opportunities like networking in professional organizations including a board position with Women in Technology, Georgia CIO Leadership Association, Tech Bridge, and the Technology Association of Georgia.

Celine felt that females in her current organization were underrepresented in senior management positions. She asserted this was the first organization wherein she felt there was a "male/female bias." She stated of 7 cabinet positions, only two were held by women, even though all seven of the publicly elected board members were women. She also shared an anecdote demonstrating her own personal experience with a male superior who seemingly valued a male voice over her voice. Celine said,

> I explained what it was and then he looked at me like I was speaking Chinese and then he looked over at the [male second in command] who I now report to and then he basically repeated what I said and the [chief executive] said, 'Oh. OK. Got it.' I don't think he realized, but it was not the first time.

Celine offered salient advice to young women pursuing a technology career. She said to:

> Overcome any of the challenges you have and anything that feels discriminatory or things that feel sexist--overcome those … it is just so critical for women to stay in technology, to persevere, to excel, to drive their organization forward … If you're a woman and you're in technology, there's not enough of them. You have an advantage.

Celine plans to seek a Chief Operating Officer role in the future. At the time of the interviews, Celine was honored as the Chief Information Officer of 2017 in the southeastern metropolitan city where she lived and worked.

Summer

A Women in Technology member introduced me to Summer via email. Summer had recently taken the Chief Information Officer position with a law firm in a southeastern metropolitan city. At the time of the interview, Summer was a 57-year-old wife and mother of one son and one step daughter. She had been in technology leadership for 11 of the 34 total years in insurance related organizations.

Our first interview was in her office which was located in one of the busiest business districts in the city, but also a place where young progressive professionals called home. The skyscraping office building towered over adjacent shopping areas. Guarded parking and lobby required clearance before entering the elevator to the office reception areas. The lobby of the law firm rivaled any chic, photographic spread in *Architectural Digest* and the floor to ceiling glass windows allowed a magnificent view of the city adorned in beautiful autumn leaves.

Summer met me outside of the elevator and escorted me to her office. Along the way, suited businessmen and women were talking in and around their offices, taking little notice of a new person on the floor. Summer's office had a view of the fall splendor, a large computer monitor, typical office supplies and a shelf of family pictures behind my chair.

Summer was born in Ohio to Duke University alumni parents. Her mother did not work outside the home and her Dad was in the Navy prior to holding an administrative position in a well-known, national tire organization with an office in a southeastern metropolitan city. She had three brothers, the youngest of whom was ten years older than Summer. She referred to herself as an, "Oops…the only girl and spoiled rotten." Her dad was an inspiration in her life and exposed her to traditionally male hobbies. She said, "My dad …taught me to deep sea fish…camp…we did a lot together."

At an early age, Summer became increasingly aware of gender dynamics wherein her father had precedence over her mother. Summer remembered her dad somewhat minimalized her mother when he would bring home clients at the last minute and expect her to be the "executive's wife who would have to get dinner ready."

Summer was a "… good student;" skilled in playing the clarinet, saxophone and piano; and an excellent swimmer. Despite a busy schedule of extra-curricular activities and coursework, she valued academics and graduated 23rd out of a high school class of 600. In her senior year, she was offered a swimming scholarship at a private college in Pennsylvania and committed there to study Biology and Chemistry.

Summer encountered life challenges and tragedies which required her to be resilient and make difficult choices early in her life. Her father tragically died when she

was just ten. In addition to her father's death, her mother's second marriage to a man whom Summer was fond, "… also died suddenly and then it was "just me and my mom." Two years into college, a difficult challenge tested Summer's family again when her mom fell and broke her hip. Because her brothers were unable to leave their current responsibilities, Summer quit college to take care of her mother and later, her grandmother, who was diagnosed with Alzheimer's Disease. Within a very short period of time, Summer transitioned from a young underclassman to a full-time caregiver and breadwinner. To make ends meet, Summer took a job as a claims adjuster with a major, national insurance company with an office in her Ohio hometown.

While working for this company, Summer participated in corporate professional development. She found her niche in training because she "… loved the training … loved interacting with people … [and] so I became their corporate trainer." During this time, Summer committed to corporate life instead of college. Summer regretted her sudden departure from college and said, "I always had intentions of going back to school, but [the company] was taking me in a different direction."

In 1986, Summer faced another important crossroad that would impact her career. She was managing accounts for a well-known, international beverage and entertainment organization in a southeastern metropolitan city, but the organization closed that particular office and asked her to relocate. At the time Summer was pregnant and did not want to prioritize her career over her family by uprooting them to follow her company. She told them, "Thank you, but no thank you," and declined the career advancement opportunity. After staying home with her infant son for about a year, she eventually took a job with a start-up technology company that "wrote software for payer organizations."

As Summer progressed in her career, she had to cope with serious issues at home. During this time, her husband was having some success in his corporate life, but resented her career achievements. According to Summer, "He became totally crazy. He was a control freak. One night I locked the door and he took it off the hinges…the next day I was going to see an attorney and I filed for divorce." As a single mom, Summer had parenting challenges with a young son who had "inherited anger issues." She discussed her commitment to her son's development as she sought therapists, doctors, and other professionals to help with his problems. After five years she married again, but her second husband became fatally ill with blood plasma cancer. At this time, Summer was moving up in her company and had recently been asked to run the "sales processes, territory management process, tool management … I had a team of people." However, she asked the company to place her in a position less demanding so that she could care for her dying husband. Given the difficult life circumstances, she requested professional accommodations which her company supported. She made no apologies for prioritizing her family over her career when she said, "My job is a means to an end. It doesn't define who I am … Everything that I have been through in my life … has defined who I am." When recalling life events that caused her to stop, slow, or change her career, she said, "I have never sat in a corner and asked, 'why me?' I've always said, 'What can I learn from this?' 'What am I supposed to do with this?'"

Summer eagerly accepted and conquered new leadership challenges by using her experience with adversity to her advantage. When personnel changes in the company prompted an executive to ask Summer to take the Chief Information Officer (CIO) position in the company, she remembered her response as, "Okay, you know I have never

done this, [but I] have supported every part of the business and I love technology and I know how to bridge the gap, so I'm going to do it." Because Summer has experienced so much hardship, she felt she could relate to others making her an " … empathetic leader … people call me the 'People's CIO' because I walk around and I want to know what people are going through…what I can do to help support them."

As a leader, she realized the importance of "relationship building" and she focused on relationships in the first two years as a CIO. She said, "I was developing relationships with my other peers, the CIOs in the business unit and I was the only female CIO at the table." She said she made a concerted effort to, "establish relationships … I didn't want to come across hard like a bitch … I didn't want to feel like I had to prove myself. I deserve a seat at the table. I'm there. I've earned it." She recalled having some frustration with the group in regard to their focus and she went to her superior to discuss it. His advice to her was to "keep influencing your peers." Within a couple of years, Summer helped to develop an enterprise architecture team, a data intelligence team, a project management team and data governance.

Throughout her career, Summer sharpened her leadership prowess in adaptability, communication, vision, and collaboration. When asked to take on different job roles, Summer adapted quickly and "wore a variety of hats including marketing, sales, and product documentation." Ultimately, she spent the majority of her career in a major healthcare supply corporation as the communication "bridge between the product development organization and customers." At the time of the interview, her position as Chief Information Officer required vision and strategic planning specifically focused on data security. She felt "teamwork" created a collaborative environment that empowered

her staff to work together to "understand the strategy … and how technology can support and help a business drive revenue." Summer demonstrated incredible initiative to continuously add to her skill set and leadership ability as she accepted more responsibility through the years.

Summer felt female leaders had better interpersonal skills, but were less assertive than men. She repeatedly compared men and women with noticeable favor to female tendencies to promote positive personal interactions, but she also thought women could be more effective if they incorporated more male assertiveness. She said the previous CIO was a "self-absorbed male [who led by] dictator style," while Summer reported the use of a "calm" tone with her staff and coworkers. She surmised that while female leaders were "relationship oriented," they were "afraid to ask for things." In her opinion, men did a better job at "talking about the great things they've accomplished." Summer stated, "Women look at job descriptions and say, I only have 50% of those things … men look at it and say, I only have 30% … , but I'm going to do it anyway and I'm going to get it." Summer felt women did not assertively seek jobs like men. She said "… [we] don't put ourselves out there … we don't talk about our successes … we don't go after the next step."

Throughout the interview, Summer's stories had a consistent thread of nurturing and caring. Summer preferred professional development opportunities which allowed for networking, supporting, and learning from others as opposed to highly technical training with rote instructions. She subscribed to learning from her peers and through networking in organizations like, Tech Bridge, Women in Technology, and Georgia Chief Information Officers. She shared her passion for helping others be successful as the most

rewarding aspect of her job. Summer has also made time to mentor young women in their technology careers through college career groups and shadow programs and Science, Technology, Engineering, and Mathematics (STEM) programs. Her efforts have been awarded recognitions including enterprise leadership awards, International Women in Technology Woman of the Year, and a power award.

Her advice to young women pursuing a technology career was to "Look forward … stay strong, learn and align with other strong females in technology. Get male advocates in technology … diversity is catching on … be innovative and think outside of the box."

Summer plans to seek a Chief Executive Officer role in the future. She has no plans for retirement in the near future.

Margaret

Margaret was introduced to me via email by a Women in Technology board member in a southeastern metropolitan city. Margaret was the youngest professional in the study at age 45, with 23 years of work experience in variety of industries; 16 years in technology leadership. At the time of the interview, she was the Chief Information Officer for a national insurance organization. She was married with two young sons.

I interviewed Margaret in her office located in close proximity to Summer's office building. The multi-story office building was one of three in a suite of buildings dedicated to various businesses. Security clearance proceeded my entry into the elevator that I took to the tenth floor. The floor receptionist's desk was located just outside of the elevator and behind her was an incredible view of the city's fall foliage. Offices and cubicles lined the hallways throughout the floor. Margaret met me at the receptionist's

desk and escorted me to her well-appointed, neat, and orderly office. The company mission statement, oriental collectables, and decorative soda bottles adorned the shelves behind her.

She was born in Macon, Georgia, but her parents settled the family in a small town in southeast Georgia near other family. Both of her parents graduated from the University of Georgia. Her dad was a salesman who traveled often, while her mother worked several different education technology leadership roles, including Business Education teacher, student information system coordinator, and now, a Chief Information Officer for a small education publishing company. When Margaret was a senior in high school, her dad was diagnosed with cancer and died in less than a year. As a result, she turned to other members of the family for support. Her mother inspired her and "made me have a love for technology… [and to] really understand the business process and not just the technical." Margaret's cousin, who was like a brother; her great aunt, who was a local college professor; and grandmother, a strong, hard-working woman were also positive and available influences in her life.

Margaret enjoyed success in her ethnically and socioeconomically diverse, southeast Georgia public school. She recalled being a "good student" who "loved math," and was involved in several extracurricular activities including school newspaper editor, student government, and captain of the cheerleaders. Margaret stated her experiences in South Georgia "shaped" her as professional. She went to school with the "poorest kids, the richest kids, and really learned that everybody is a person and has their own story … I learned to listen because people have things to contribute regardless of their background, color, or sex."

Margaret's dad's death strengthened her resolve and resiliency. Margaret said, "[my dad's death] …made me who I am…my mom had to take on more … She reinvented herself. I saw her have a passion and a love for what she did…I just saw how hard she worked." She adopted her mom's resolve to rise above unfortunate circumstances and accepted shared household responsibility in her father's absence. She said, "I ended up getting a full scholarship to the community college in my hometown [in] South Georgia and I decided to go there to be near my mom after my dad passed away." His death gave her motivation to pursue her education because she "wanted to make my dad proud," but it also made her realize the importance of being able to support herself. She said, "I got focused in college … that became really important to me. I graduated with honors from Georgia with a degree in Management of Information Science."

After college graduation, she was unsure about her career path. She chose to explore different career options by working for a consulting firm. She landed an opportunity with a large consulting firm which invested in a 12-week leadership program for new employees that exposed her to Dale Carnegie public speaking and business etiquette. Other consultative jobs exposed her to the computing, networking, supply chain, and insurance industries. She finally found a career path when she was encouraged by a male executive to pursue her first technology leadership position with a major insurance organization in 2001.

Margaret's rise to the highest point in her career included occasional fear of discrimination and outright discriminatory practices. While she was the Director of Technology for a major insurance company, she hid her pregnancy for five months

because “I didn’t want to be held back.” Eventually, Margaret was asked to step into a higher technology leadership role that a male colleague vacated. However, Margaret recalled they would not “give me the title he had … they did give me a little bit of a raise, but not the title.” When she questioned this discriminatory action, executives said, “We want to see how you do [in the role].” While Margaret was trapped by the glass ceiling of gender discrimination, she decided to prove to them and to herself that she deserved the position and title and so she kept working despite the discrimination. Sen (1992) described female inequality acceptance as “entrenched deprivation;” coping with denial of position or privilege based with coping strategies like taking pleasure in small rewards. In Margaret’s case, she only had to wait one year before the company gave her the title and full benefits it afforded.

Margaret attributed her ability to balance life and work challenges to a supportive husband who shared responsibilities with her. In one position, Margaret worked as a Senior Information Technology Director for a major, international beverage organization headquartered in a southeastern metropolitan city with responsibility for data process teams in Latin America, Asia, and Mexico. The extended travel and incredibly time-consuming responsibilities were difficult for Margaret’s family which now included a second son. While Margaret was breaking the glass ceiling by becoming an executive, her husband was “super supportive” and flexible with his work which enabled him to be with their young son while Margaret worked long hours and traveled. At one point, Margaret took on the stress as the primary breadwinner for a couple of years while her husband attended law school. She was proud that both of them accomplished their career goals while maintaining a good marriage and raising their children.

Margaret subscribed to a collaborative leadership style which allowed her to incorporate natural instincts of nurturing and caring to build relationships and be transparent. She "loves seeing people being successful." Margaret shared specific stories about how she would "dig in and find out" about people and their job satisfaction to move them to other places or help them be more successful by positively relating to them. She said, "I think if I tried to be more tough … I'll use the 'B' word, I wouldn't be true to who I am." She felt that her transparent and genuine approach "… helped me be successful in my career … [because] my teams would follow me into battle any day because they know that I'm not asking them to do anything I wouldn't do myself." She described her primary responsibilities as Chief Information Officer as "supporting the organization, removing obstacles, and providing guidance." Support beyond the organization also concerned Margaret as she deeply cared about her impact as a potential "role model for kids… [because] there aren't that many women in technology—especially leadership."

Margaret perceived professional development and education as a process for technology leaders that required highly technical knowledge and interpersonal skills. To this end, she committed herself to continuous reading about technology trends and carefully selected networking in professional organizations like the Technology Association of Georgia, Chief Information Officer Roundtables, Women in Technology, and board membership at the University of Georgia College of Business and Kennesaw State University augmented her success. Margaret asserted technology leaders needed a "balance of super techy and soft skills. The strongest CIOs understand both business processes and technology ... the challenge for technology leaders is constant change."

She felt that continuous professional development would allow leaders to stay ahead of change.

Her advice to young women pursuing a technology career was to "kill them with kindness. Don't be discouraged or listen to stereotypes. Take risks. Don't just take jobs that you are 100% qualified for. Be true to yourself."

Margaret plans to pursue a Chief Operating Officer role in the future. She also considered working for a larger corporation in the future.

Chapter Summary

In this chapter, I have provided narratives to encapsulate the three ninety-minute interviews with the five study participants. These narratives are intended to provide an overview of the participants' family, education, career experiences and some of my own observations. The information provided a foundation for data analysis and the development of emergent themes discussed in the next chapter.

According to Daiute (2014), constructing a narrative involves "creating meaning and a sense of who they are" (p. 12). These narratives revealed the personality and identity of study participants (Daiute, 2014). Rich, meaningful feedback from participants and my observations created a collective account to make meaning of participant experiences.

Chapter V

DISCUSSION OF THEMES

The following provides the findings that emerged during data analysis of interview transcripts, memos, and organization documentation. Daiute's (2014) dynamic narrating diversity data collection was used which requires a study design grounded in diversities between groups and categories like gender. Daiute's (2014) significance data analysis and recommended phases of coding provided the guidance data review that revealed individuality and themes through subtle nuances. Attention was given to not only what was said, but how it was said.

During the first phase, data comprised of interview transcripts, document review, and researcher memos was reviewed to form an initial list of codes. The implicit statements, or evaluative devices used by participants, were underlined and grouped according to frequencies, similarities, and differences (Daiute, 2014). The evaluative devices identified in the first coding phase became the categories and were assigned provisional two-letter codes placed beside each segment in the second phase of coding (Miles et al., 2014). The third coding phase was an integrated cross-case comparison to establish relationships between categories and a deeper understanding of the phenomenon to illuminate meaning as it related to the research questions (Ary et al., 2014).

Each of the 15 transcripts was approximately 13 single-spaced pages of rich data. With careful line by line transcript reading, codes were written at the end of each line or a

specific section based on the content. Each of the organization documents, observation notes, and memos were also read and coded. Preliminary codes were established initially in accordance with concepts of the study, while other codes emerged and were assigned subcategories. In some cases, codes were changed entirely as I remained flexible to modification based on the readings.

The three study concepts used for preliminary coding included: growth mindset [GM], gender role [GR], and work/life balance [WLB]. New codes emerged as reading progressed which often augmented an existing code. For example, looking for data aligned with gender role [GR] supported the need to analyze data through the theoretical lens of gender inequalities. However, as I read the data, I opened the general category of gender role [GR] to also include more specific assignments of male mannerism [MM], female mannerism [FM], and neutral mannerisms [NM]. An example usage of the more specific gender role code occurred when Grace said, "… I felt like I had to act like a man … with how I dressed, how I conducted myself." I initially coded this as gender role [GR] since she was referring to a societal expectation of a gender role assignment for men. I changed the code from gender role [GR] to male mannerism [MM] to specify the female taking on the societal expectation of gender role assignment for men. When Grace said, "… be true to yourself. You need to be in your own skin and own it …," this was quoted as female mannerism [FM] because Grace was purporting behavior for women which aligned with the societal expectations of gender roles assigned to women. A list of sample codes are presented in Table 2.

Table 2

Examples of Some of the Initial Codes Used

Initial Codes Used	
Growth Mindset (GM)	
Code	Code Description
PL	Passion for Learning—participant has passion about a specific academic discipline or learning new information.
IN	Innovative—participant found new solutions, followed a nontraditional path.
RM	Inspiration—participant was influenced by the values and behaviors of a specific person.
LS	Leadership Style—participant ascribed a leadership style conducive to professional growth.
Gender Role (GR)	
Code	Code Description
NU	Neutral—participant behaves in a manner that is gender neutral.
MM	Male Mannerism—participant acts, dresses, or behaves in a manner generally associated with males.
FM	Female Mannerism—participant acts, dresses, or behaves in a manner generally associated with females.
Work/Life Balance (WLB)	
	Code Description
DS	Discrimination—participant is met with discrimination that disrupts home or work
SG	Struggle—participant encounters a challenge that disrupts home or work.
SC	Sacrifice—participant indicates a sacrifice at work or home.

After coding all transcripts, repetitious codes consistently emerged. Consistent codes developed into categories which were grouped thematically. Themes were substantiated with supporting and relevant participant quotes. Thematic comparisons of participant experiences connected the data codes to illustrate commonality. The data yielded four major themes: climb your ladder, know your worth, discover your career,

and nurture your vision. The sub-theme, firm foundation, emerged within the major theme of climb the ladder. Table 3 includes major themes and supporting commentary.

Table 3

Themes with Supporting Commentary

Themes	Participant	Supporting Commentary
Climb Your Own Ladder	Anne	I think it's widely known that as women, we feel like we have to have to be fully qualified in the way a job is described to us when we're job seeking and men think, "Well, I can do most of that. The part that I don't know, I can learn." The truth is that the job description is a wish list…the ideal candidate may not include all of that.
	Grace	… get in at any level. There's so many different ways. It's never too late. Look at me. I didn't start until I was in my 40s. You don't have to be a coder or developer and you can learn so much on the job. So many companies will train you to give you the knowledge you need.
	Celine	Stick with it. Overcome any of the challenges you have and anything that feels discriminatory, things that feel sexist, overcome those. It is just so critical for women to stay in technology, to persevere, to excel, and to drive their organization forward.
	Summer	Don't look back. Look forward. Keep moving. Keep staying strong. Learn and align yourself with other strong females in the technology industry. Get your network. Have a strong, supportive network. Get male advocates because we're in a man's world in technology. Never give up.
	Margaret	Go for it and constantly keep trying to learn and take on challenging roles and take on risks. Don't wait until you

		know the job perfectly to ask for the next role or promotion. Don't just apply for jobs that you fit 100% of the qualifications because the way you grow is to take those risks, go to places that are uncomfortable, and then master those places, and then move again, and then move again.
Know Your Worth	Anne	Any time you go into a field that is predominately female, which may be more comfortable, you can count on it being lower pay.…they were thinking, "Here's someone who's qualified, she's a woman, and she'll accept a lower salary."
	Grace	I felt like I had to act like a man in a lot of ways with how I dressed, how I conducted myself, salty language, drinking, looking to be like one of the boys instead of being myself.
	Celine	… there's a male-female bias in technology. I'm the highest-ranking female and I don't have a lot of female support.
	Summer	… they really lowballed [me] … I know the enterprise CIO … they're not going to pay me more than him.
	Margaret	I wanted to be seen [for] my mind and my ideas … I really made the conscious decision to wear more conservative suits.
Discover Your Career	Anne	At first I did temporary jobs with an agency and then there was another agency that I worked for too. Even though this may sound unrelated, that was a great experience because I had different jobs, and they were more like clerical jobs, simple jobs, but it took me into different environments.
	Grace	So I'm still in awe that I've winded up as a CEO of a tech company because it there wasn't even computer science degrees going on at the time. And so I don't know if I would have changed anything, but I just love the fact that life

		has taken me in this unexpected direction
	Celine	I don't know what my path holds. I have learned over and over that the best way to make God laugh is to make a plan. Life doesn't go according to plan. But I truly believe that a great path for CIOs, especially in business, is a Chief Operations Officer.
	Summer	What I learned about technology individuals is that we have very little career path for technology-- we promote them in management.
	Margaret	I feel like I made adjustments [in my career] so that I know that I'm keeping myself very marketable, I'm keeping myself very competitive and sharp and I position myself for other options if I want them in the future.
Nurture Your Vision	Anne	I think you will see that CISOs and CIOs that women who have done well in these roles are all good communicators and all have good interpersonal skills. It is a key to success.
	Grace	Every industry needs IT to succeed and those industries and companies are constantly adopting technology to help them reach their business goals.
	Celine	I think that you are better leader because your people trust you. Technical competencies are important but leadership is even more important.
	Summer	I do want their opinion, but I'm not afraid to make the decision and communicate that with them. Once we make a decision, I'm the one that helps them work through it.
	Margaret	One of the reasons that I moved out of more of a technical track is that I love seeing people be successful. I really do. I do think it's really important if you want to lead teams or organizations to have a passion for that.

Note. These serve as extracts of themes that emerged from the study.

Description of Themes

Participant perception, my experiential knowledge, and the study purpose generated the study themes (Merriam, 2005). Four major themes emerged after data analysis that include climb your own ladder, know your worth, discover your career, and nurture your vision. Within the theme of climb your ladder, the sub theme of firm foundation emerged that included the value of role models and mentorship. For analysis purposes, I approach the themes as analytical isolates, even though the same phenomenon may be reflected in multiple themes simultaneously. The following presents descriptions of the themes and sub-themes.

Climb Your Own Ladder

This theme examines how female technology leaders overcome discriminatory societal and political barriers as they rise in position or title within an organization also referred to as climbing the corporate ladder (corporate ladder, n.d.). According to Eagly and Carli (2007), a female's career progression does not rise up a ladder, but rather navigates through a labyrinth with multiple dead ends and challenges that require persistence to successfully traverse. The technology industry is particularly difficult for females as American technology industry recruitment and employment has targeted mostly males (Ashcraft, McLain, & Eger, 2016; Dermody, 2012; United States Labor Department, 2015; Whitney & Ames, 2014). Large technology corporations like Google employ 17% females with technical roles (Whitney & Ames, 2014, p. 28). All of the participants overcame societal and political discriminations by accepting new growth

opportunities, facing prejudices, and enduring life challenges in their own unique and persistent ladder climb.

Female technology leaders were hindered by societal gender role assignments which favored nurturing and predictable career fields, but they overcame the obstacles by accepting new growth opportunities and challenges (Schmidt, 2012; Suter & Toller, 2006). For Anne, Celine, Summer, and Margaret, challenge was not just something to overcome, but also something they aggressively sought. Each of them shared that if there was nothing new to learn at a company, they would seek another job. The overarching challenge for all of the participants was learning new skills associated with the rapidly changing technology industry. All of them also noted it was no longer enough to just know technology, but also the business side of the company. Margaret said, "… business and technology are getting so much more intertwined." Lisa stated, "… you can find people that with a technical background, but you need people that can relate to the business and really help drive revenue." Participants in this study would actually walk away from a job if it no longer provided challenge or learning opportunities. Summer said, "… [in all that] I have been through, I learned. I challenged myself; challenged my thinking; challenged what was important to me." They all shared a passion for learning that stemmed from childhood school success and then continued to increase as they persistently pursued growth opportunities. Female technology leaders were hindered by societal gender role assignments that favored nurturing and predictable career fields, but they overcame the obstacles with a passion for learning in new opportunities, and a growth mindset when faced with challenges.

While each participant faced growth challenges in her job, they also faced inherent political challenges associated with workplace gender discrimination. Lynn talked about a man in the organization who resented a woman in technology leadership. She said he was, "… hostile [she had to] work harder, be better, know more, outthink him and outsmart him" –all strategies revealed in research conducted by Orser, Riding, and Stanley (2012). Grace and Margaret both hid pregnancies to avoid discriminatory exclusion from workplace projects. Several researchers have reported on hiding pregnancies as a strategy to remain viable in their position especially in fields like technology and engineering (Harris & Giuffre, 2010; Powell & Sang, 2015). Celine and Summer reported unequal gender representation in technology leadership which is supported by national statistics that indicated 6% female participation in technology leadership (Ashcraft, McLain, & Eger, 2016; Harvey Nash CIO Survey, 2015; United States Labor Department, 2015). Sallie said, "The biggest challenge has been when I moved into role [previously held by a man] and not given the recognition that I'm doing that role until I've proved myself." Each of them addressed these challenges with the notion that persistence, in spite of politically discriminatory practices, insured their success.

While participants faced external barriers associated with societal gender role assignments and political discrimination, they also faced internal struggles steeped in societal expectations for maintaining a balance between their work and life. This was a deeply personal struggle—different for each participant—that required each of them to be more creative with constraints and better with building boundaries centered on knowing when it is time to plow forward in their careers and when it was time to shift their

priorities at home. With each decision, participants had to be self-assured that it was acceptable to make work and life balance choices that may not match societal expectations for women. Celine did not allow the roles of 'mom' or 'wife' to be excuses for not moving to the top. She pushed the boundaries of societal expectations for a woman and moved away from her daughters to follow her career path. In the process, she and her daughters redefined the role of 'mom' and found their own happy balance on their own terms and not by society's standards. She said, "I've had to make some huge trade-offs between family and career to be in this position… and I think that's part of the challenge." On the other hand, Summer quit college and changed her career on several occasions to be the primary caregiver to one of her family members. In spite of choosing family over career, Summer landed the role of Chief Information Officer in a major organization. She said, "I have a very strong faith, a personal relationship with God, my husband is my second priority, my children, my family… my job is a means to an end." Margaret proved to be a true picture of work and life balance as she and her husband supported each other in their career goals. She said, "I've done it. I have a good marriage and I have two kids that know me and I'm involved and care about their lives. I have had to sacrifice … there are gives and takes on both sides." Each of the participants did not let life challenges stop them; they simply climbed their ladder another way, which allowed them to stay true to the moms, wives, sisters, daughters, businesswomen, and friends they wanted to be. Overall, support systems for women who desire a balance of work and family life do not exist in the time-consuming technology sector (Cukier, 2009).

Firm Foundation

Most of the study participants cited a father as a primary influence in their life which ultimately provided a firm foundation for each of them as they climbed their ladders. Margaret's father died when she was still in high school, but she said she was motivated by wanting to "make her dad proud." Each of them said they felt supported, encouraged, or guided by a father figure which ultimately gave them the confidence to succeed in a male dominated career path. Most of them also cited male mentors on the job who sustained them in their careers. In fact, Summer advised upcoming female technologists to seek out a male advocate since the technology was still male dominated. The message here is that supportive men are an important ingredient in success for females in technology. However, Celine and Margaret both reported strong female mentors who encouraged them along their path. For participants, mentorship is not dictated by gender.

Recent research indicated female role models allow girls considering a high-tech field to overcome feelings of inadequacy (Richman et al., 2011). For this reason, all of the participants are heavily involved in mentorship opportunities with other women and young girls considering the field of technology. According to Grace, "The most important thing is to be able to find a mentor … They say that 8 out of 10 men [have mentors] and only 3 out of every 10 women have a [mentor]." Grace has leveraged her company funding to start a scholarship for disadvantaged girls who have interest and skills in science, technology, engineering, and mathematics. Lisa mentors through an organization called, Pathfinders that partners her with another female technologist for an entire year while Margaret mentors young alumni from the University of Georgia. Celine

reported several mentorship experiences, but she also stated she often learns from the young people she mentors because "… everybody has value."

Know Your Worth

I construe worth to primarily be compensation from an employer to an employee, but worth can also be more generally defined as the value a person brings to an organization or feels for herself. This theme focuses on the study participants shared experiences of feeling undervalued both professionally and personally.

The United States government attempted to address workplace discrimination and unequal compensation with the Equal Pay Act of 1963, the Lily Ledbetter Fair Pay Restoration Act in 2009, and the proposed Paycheck Fairness Act (Armani, 2013; Fifty Years after the Equal Pay Act, National Equal Pay Task Force, 2013; Should congress pass S. 2199, the Paycheck Fairness Act?, 2014). Despite these minimal legislative measures, the burden of providing fair, nondiscriminatory compensation commensurate with job responsibility rests with the employer. According to study participants, prohibitive advancement and unequal pay continued to exist in their organizations.

Anne and Summer reminisced a time in their career when they both replaced a male in technology leadership, but were professionally undervalued when they were given less compensation. Anne reflected, "I have made more money than most women make … I can't say I've made as much money as a man with my job [because] there's still quite a bit of inequity in women being paid less than men." She also admitted an unwillingness to research company pay scales and then be assertive in salary negations. Summer, however, actually turned down an opportunity and took another position when she discovered she was being "lowballed" in salary negotiations. All of the women

agreed they made more money than most women and that seemed to be some consolation as they considered the continued inequity among men and women. This was an unfortunate discovery in that women either consciously or unconsciously did not support other women in the workplace. Margaret shared a surprising workplace challenge when she described "females who were not supportive of each other… we really should be working together." A united front for transparent and equal compensation is part of the battle for female technologists to know their worth and receive professional value commensurate with their work performance and responsibilities.

Study participants repeatedly shared experiences that revealed how they felt personally undervalued as a result of societal pressures associated with gender role assignments. Feminist theory and the gender role incongruity theory were the theoretical frameworks study data analysis. While feminism seeks to discard gender role assignments, gender role incongruity theory brings to light the inability to meet the social expectations set by a society for a specific gender (Brumels & Beach, 2008; Eagly & Karau, 2002; Gross, 2003). Female leaders may experience self-inflicted stress because the role requirements for leadership conflicted with typical feminine role requirements (Henning & Weidner, 2008). All study participants relayed stories of gender role incongruity and the need to act or behave in ways typically associated with males in order to succeed and know their worth in the workplace.

Grace and Margaret took on male mannerisms in order to fit in a male dominated workplace. Both of them wanted to be recognized for their intellect and ability rather than their gender. Margaret said, "I'm proving myself… [I am a] strong person that executes and [I] happen to be a female." Grace actually dressed and conducted herself like

the men in her organization in order to relate to the men and be successful in her job. She said, "I had to put up with a lot of sexism, but I could become one of the boys and give it back." Anne also discussed having to take on male hobbies in order to socialize with the male dominated office staff. She said, "They might all go to the gym or play golf or play poker ... As a woman in that kind of work group, it can be kind of awkward … [I thought] am I getting left out?" Demaiter and Adams (2009) studied women behaving as conceptual men at work and found women would assimilate by dropping feminine ideals and dressing to adopt masculine behaviors. Female assimilation to masculine systems could unintentionally reinforce masculine hierarchy (Miller, 2004). Grace recognized she no longer promoted that kind of assimilation and she advised upcoming female technologists to "be true to yourself" and know your worth as a woman. Margaret decided early on in her career to be true to herself. She said, "… if I tried to be … I'll use the 'B' word, I wouldn't be true to who I am." Understanding their personal value as women first and then professionals became the new narrative for study participants who had accomplished enough in their careers to no longer feel personally undervalued by societal standards and be true to who they were as women and professionals.

Becoming the primary breadwinner was another issue shared among participants that directly pointed to their conception of personal value. At some point in their career, each of the study participants became the primary breadwinner in their household; a job typically assigned to the man in the house. Each of them described the additional stress this placed on them personally and professionally. However, each of them had a sense of pride in being the primary breadwinner, even if it was for a short time. The sentiment is that most women are never in this position because they rely on a second income. These

women had to know their worth in their job and at home in order to provide for their family. Lynn said, "I became the breadwinner for over two years. In moments of weakness I wanted to run away or quit, but I couldn't! … that worked out really … but it was just another pressure point on me." Taking on the role of primary breadwinner was another challenge study participants conquered. Through this opportunity, they felt valued and knew their worth personally and professionally.

Discover Your Career

Participants in this study recognized their careers were long and nonlinear. While they spent a number of years in their current technology leadership positions, each one of them had a variety of jobs before that were not necessarily directly related to their current technology leadership positions. Serendipitous opportunities combined with extraordinary fortitude and confidence led to discovering their careers. This theme focuses on study participants who had to be adaptive and innovative to navigate through their winding, often risky, career paths in the evolving technology industry.

The study participants evolved with the technology industry. Participants' birth dates ranged from 1952 to 1971. Technology industry growth began with the introduction of personal computers and subsequent employment opportunities beginning in 1970 (Beckhusen, 2016). Study participants were literally evolving in age and education simultaneously with the United States technology industry which now employs seven million workers in multiple million and billion-dollar companies ("Cyberstates 2017", 2017; Griffith, 2015; Stoller, 2017).

All study participants initially worked in temporary, consulting, or other full-time positions that exposed them to a variety of industries and evolved their skill set as

a female technology leader. Lynn said, "… because I had different jobs, … it took me into different environments ... I met a lot of people and it broadened my thinking." Celine also shared experiences with consultant positions that helped her to "… see what the drivers are, be able to relate to people, uncover the processes of technology … to assess and improve operations and efficiency and achieve results." Margaret indicated "It's more about the quality of the job and the impact I'm making. I do have a more targeted plan of moving and growing this company and changing this industry."

Study participants' education and career paths evolved in a non-linear fashion. Margaret was the only participant who graduated from college with a degree that was directly aligned with her current position as Chief Information Officer. Her Bachelor of Science degree in Management of Information Science and her internship role in a university computing center gave her the education background needed for her current position. All other study participants graduated from college with degrees unrelated to technology including political science, elementary education, and even a law degree. Each of them indicated their primary education came from authentic workplace learning or corporate professional development. A nonlinear education background was coupled with a nonlinear career. Julie and Summer indicated their career path evolved in a series of twists and turns. Julie said,

> It's been a winding road and the final destination is so different from where I could have imagined myself 30 years ago … I'm still in awe that I've winded up a CEO of a tech company because computer science degrees [were not available] at the time [I was in school] … I just love the fact that life has taken me in this unexpected direction.

Summer supported this idea when she said, "What I learned is that we don't have a clear career path for technology … the development [of a technology leader] will be not only continuing to understand the technical industry's path, but also having a high level of business knowledge."

All study participants exhibited extraordinary tolerance for discomfort and risk. According to Cozzens (2008), ordinary women opted for careers that seemed safer and attainable rather than choosing risky, male dominated careers. A comfortable career choice also fulfilled society's gender role predetermination that women should be nice and incompetent not competent and cold (Armani, 2013). Female technology leaders in this study were not bound by society's labels as they worked in often uncomfortable situations in order to advance their careers. Celine was particularly outspoken about her tolerance of discomfort when she stated she had the opportunity to work for a large, well established computing corporation that would have been financially stable and secure. She said, "… I may be able to work for [unnamed corporation] for the rest of my life, but I will not be able to work for anybody else … not learning anything new was like the kiss of death for me." Celine indicated her growth potential was directly related to her ability to be uncomfortable in the job. She said, "… when you are uncomfortable, that is when you're learning. So, I've always put myself in a position not of comfort but of stretch."

Margaret also reported feelings of discomfort when growing, but she added the ability to take risks as key to advancement. She said, "… the way you grow is to take those risks, go to places that are uncomfortable, and then master those places, and then move again, and then move again." Grace spoke often of risk since she was an

entrepreneur owner of a technology company. She said, "… you have to be a little risk-adverse. You've got to not be too afraid of bad consequences. You've got to be ready to fail."

Being adaptive and innovative were the primary characteristics common in each participant as they navigated their winding technology career paths. Saucerman and Vasquez (2014) showed statistical gains in female participation in technical fields when their participants exhibited a growth mindset (Saucerman & Vasquez, 2014). Although each of the participants were innovators in their own right, Anne was an innovator and pioneer in the field of security. Anne recalled the major shift in her career from networking to security in 1998 when she "… began installing firewalls." From this point, Anne served as the first Chief Information Security Officer in two corporations—her experience was from the inception of information security. When considering her ability to adapt to the ever-changing technology industry, Anne said, "It's like a competitive sport … you have to know what your strengths are and you have to be aware of your weaknesses, but not to the point of it eroding your confidence."

Celine shared how she would adapt to a professional role by "… being the right hand person of the leader … always look[ing] for what can I contribute … what can I learn …what skills can I pick up?" Grace suggested the technology industry demanded adaptation. She said, "… it takes imagination and being able to change on a dime because what works one year, doesn't work the next." Summer stated the role of Chief Information Officer also had to adapt to the organization. She shared, "The role of the CIO has changed over the years … we're supposed to be using technology to drive our business results … We take technology and figure out how to open up new markets."

Nurture Your Vision

According to Ibarra and Obodaru (2009), professionals with vision could identify inadequate current practices and then passionately communicate new possibilities to stake holders. A true visionary sees the patterns in big ideas and new initiatives, creates a name or brand for the pattern, and then aligns strategies to bring the new idea to life or to move forward with a new initiative (Ibarra & Obodaru, 2009). This theme focuses on how study participants went beyond collaboration to nurture a collective vision.

Study participants felt transparent communication was critical to collaborative leadership and each one of them believed they were especially adept with being the communication liaison between technical and business operations. Anne stated, "… you have to relate to [technical] people and be their spokesperson … tap into their expertise and their high skill level … but respect them … women who have done well are all good communicators and all have good interpersonal skills." Summer underscored the importance of communicating a technical vision since decision makers generally had little technical knowledge. She said, "I have to be able to influence people, their thinking, and attitude. I have to be able to inform and persuade people … that's what being a CIO is about." According to John Maxwell (1991), effective leaders do not allow their ideas to dominate, but through collaboration, they allow the best ideas in the group to prevail and move the company forward. Each participant shared this belief and frequently referred to their own collaborative leadership style. Women excel with expanding their networking community to bring new ideas and perspectives (Hampton et al., 2011). All of the study participants were involved with multiple networking organizations and

mentoring groups. At the heart of getting input from team members, was the participants' desire to nurture others and organization goals.

Society expects women to be more nurturing than men (Cejka & Eagly, 1999; Eagly & Carli, 2007; Eagly & Karau, 2002; Layne, Vostral, & Boyer, 2010; Paustian-Underdahl, Walker, & Woehr, 2014). In accordance with this perception of the female role, women tend to seek those career fields that are nurturing (Schmidt, 2012). Participants in this study were able to connect nurturing with the technical knowledge domains generally congruent with the male role through contributions to the organization and helping others to professionally grow (Layne et al., 2010; Wentling & Thomas, 2009). Anne felt tremendous pride and said, "I have a real sense of contributing to the success of the company and I have good relationships." Grace felt proud to be a part of moving a business forward. She said, "… it's a challenge and it's so fulfilling …[to] think about the value that you are contributing." Celine remarked on how everyone in the organization could feel like a valuable contributor when she said, "You have value. Even if you're just coming out of school, you can do things well." Summer and Margaret both remarked on nurturing others to grow professionally. Summer said she wanted, "… people [to] feel valued and learn new things to grow and be excited." With animated expression, Margaret shared her passion for nurturing growth. She said, "… I definitely love helping to see people be successful." She also remarked that females instinctively nurture others to reach their potential. This thought was summarized by Grace when she said, "… great leadership requires a cocktail of one-part inspiration and one-part encouragement … [you have to be] able to recognize talent and to nurture that talent to pull out the best in a person." A study conducted by Hogg and Knippenberg (2003)

revealed the workplace was migrating from authoritarian leadership to collaborative leadership. This progression indicated nurturing and caring leadership techniques typically synonymous with females were becoming the workplace new normal for men and women (Hogg & Knippenberg, 2003).

Study participants favored nurturing the people and purpose of the organization to create a collective vision. According to Ibarra and Obodaru (2009), female leaders are not known for being visionaries because unlike men who can quickly develop a vision, female leaders require grounded and concrete facts and input from a wide network to create a vision. Part of this stems from the pressure to "be perfect" as Anne stated. Female leaders preferred gathering information from the team, outside intelligence resources, and trusted peers to organically develop the vision which also helped to develop the team individuals (Ibarra & Obodaru, 2009). Celine shared,

> I really believe in developing people …l etting them help with the vision … building the capacity of individuals … helping them see what process means and how are all interconnected and interrelated and how we have to work together … a good CIO knows how to lead, how to motivate people, how to develop their vision, plus [good] technology skills.

Nurturing the development of the individuals was equal to creating the collective vision for the organization which goes beyond workplace collaboration just to develop a new idea or start a new initiative. The female technology leaders in this study defined a new category of leadership. They were nurturing leaders who used care and collaboration to truly unite a team and create a collective vision.

Chapter Summary

This chapter included a discussion of the emergent themes revealed in data analysis of interview transcripts, memos, and organization documentation. Daiute's (2014) significance data analysis and recommended phases of coding allowed for a thorough data review that revealed the following themes: climb your ladder, know your worth, discover your career, and nurture your vision. The sub-theme, firm foundation, emerged within the major theme of climb the ladder

Each theme pointed to a concept which was critical in understanding the experience of female technology leaders in relation to the barriers associated with choosing and staying in the field of technology. The climb your ladder theme showed how the participants overcame societal and political discriminations by accepting new growth opportunities, facing prejudice, and enduring life challenges through persistence. The sub theme of firm foundation portrayed the participants' strong father figures, male mentors, and female role models as important influencers in their lives. In the know your worth theme, participants shared common experiences of feeling undervalued both professionally and personally. In the nurture your vision theme, participants went beyond collaboration to nurture a collective vision for the organization.

The data analysis and subsequent thematic development showed, although participants demonstrated persistence and passion to conquer new career challenges, there were also subtle differences in their perception of work and life balance, their coping strategies for discriminatory practices, and ability to create a collective vision. The themes and sub-theme will be connected to the research questions in the following chapter.

Chapter VI

DISCUSSION AND CONCLUSION

America does not have enough skilled talent to fill the jobs made available in the growing field of technology and there are disproportionately low numbers of female technology workers and female technology leaders participating in technology careers (Ashcraft, McLain, & Eger, 2016; Moye, 2017; United States Labor Department, 2015; Zweben & Bizot, 2016). Statistics reported by The United States Department of Labor Bureau of Statistics revealed women currently represent 57% of the workforce. However, women face a significant gender gap as evidenced by a current 25% participation rate in the field of technology and 6% participation as technology leaders (Ashcraft, McLain, & Eger, 2016; Harvey Nash CIO Survey, 2015; United States Labor Department, 2015). Trends in the last twenty years indicate a steady decline in the percentage of females in technology (Ashcraft, McLain, & Eger, 2016). The purpose of this narrative inquiry qualitative study was to reveal the experiences of identified females in their efforts to participate in technology careers as workers and become technology leaders. According to Powell, Dainty and Bagihole (2012), the perceptions of females who currently hold technology positions should be considered to reveal common barriers associated with choosing and staying in a technology career. I conducted the study in a southeastern metropolitan city which was ranked as a leading technology market (Miguel

& Roeder, 2016). Five female technology leaders were recruited to participate in this study. The intention was to illuminate the experiences of participants in order to develop shared concepts and themes. The research questions proposed for this study were as follows:

RQ1: What are the life experiences of identified female leaders prior to participating in technology careers as workers and leaders?

RQ2: What barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders?

RQ3: What strategies did identified female technology leaders use in their efforts to participate in technology careers as workers and leaders?

Seidman's (2013) three step interview process was used to collect meaningful data in the natural setting. Daiute's dynamic narrative inquiry diversity principle along with significance analysis guided the data collection and analysis process. Interview transcripts were sent to participants for member checking and to identify errors (Maxwell, 2013). Data analysis also included organization charts, policies, and any other relevant documentation as provided by the participant or located on the organization website.

Data analysis began with an initial list of codes. Qualitative narrative inquiry research instruments included a semi-structured approach, memoing, document review, and an in-depth accounts of the female technology leadership experience through Seidman's (2006) series of three interviews. During the first phase of coding, the implicit statements, or evaluative devices used by participants, were underlined and grouped according to frequencies, similarities, and differences (Daiute, 2014). The evaluative

devices identified in the first coding phase became the categories and were assigned provisional two-letter codes placed beside each segment in the second phase of coding (Miles et al., 2014). The third coding phase was an integrated cross-case comparison to establish relationships between categories and a deeper understanding of the phenomenon to illuminate meaning as it related to the research questions (Ary et al., 2014).

Four major conceptual themes and one sub theme emerged from the data and was discussed in the previous chapter. The following includes the research question discussion, study's limitations, implications, and recommendations for future research.

Research Questions: Final Discussions Summary

In this section, the research question are aligned with a summary of the findings in the themes, sub theme, and conceptual framework. RQ1: What are the life experiences of identified female leaders prior to participating in technology careers as workers and leaders? Although each participant had unique childhood experiences, there were a few striking commonalities that emerged. All of them shared a passion for learning that contributed to school success. They cited specific strengths in math and a love for reading. Anne was salutatorian of her high school class and Celine accelerated and achieved a master's degree before she was 22 years old. Participation in competitive extracurricular activities united all participants and each one was recognized for her prowess in her chosen sport or musical instrument. Summer was awarded an athletic scholarship; Grace and Margaret excelled in many different sports. They all reminisced feelings of accomplishment when recalling a competitive event. Gross (2003) found that society valued competition over gentleness and therefore, successful individuals would seek accolades in competitive arenas. Her research also found competition and

aggression was typically associated with the male role, but was more prevalent across gender lines in today's fast paced society (Gross, 2003). Another interesting commonality was that all participants shared the experience of an influential father figure. A number of researchers have reported on the importance of role models with specific emphasis on female role models, parents in general, and teachers (Powell et al., 2012; Richman et al., 2011; Saucerman & Vasquez, 2014). Study participants' experiences aligned with this research in that they also had influential female role models and teachers, but it was the focus on the father's influence that stood out as they described their childhood experiences. Anne and Grace mentioned their fathers on many occasions when discussing specific career choices. Summer and Margaret also spoke of their father's impact on their lives even though both of their fathers passed away at a fairly early age. Celine recalled her step father as a primary influence and she said, "[he] had a huge impact on my life … a lot of the reason that I'm successful is because of him." Experiences with role models and mentors closely aligned with the sub theme of firm foundation. In this theme, the importance of role models was discussed as a primary influencer for women considering the field of technology.

Analysis of the life experiences of identified female technology leaders also aligned with the theme of climb your ladder. As described in this theme, all participants overcame societal and political discriminations by accepting new growth opportunities, facing prejudices, and enduring life challenges in their own unique and persistent ladder climb. Each of them worked in a number of different industries and encountered some type of gender discrimination. All of them were primary breadwinners for the family at some point in their career. Participants aggressively sought challenge and persistently

overcame personal and workplace barriers. Anne, Celine and Margaret sought employment at different companies fairly often to seek more experience or another challenge. Grace and Margaret did not change jobs as often, but they always took risks to broaden their skill set or to improve their work and life experiences. All of them cited collaborative leadership styles and felt they were especially adept in communication between technical and business interests. Personality traits inclusive of persistence, sustained curiosity, love of learning, and the need to communicate and make valuable contributions have been synonymous with females in technical fields (Dugan et al., 2013; Wentling & Thomas, 2009).

Reflecting on their life experiences and career progression gave participants personal pride. All of them felt that every turn, even a wrong turn, led to a better path. For example, Grace recalled the difficulty and risk associated with starting her own technology company, but she looked back on the hardships as necessary building blocks for her successful company. Even as participants discussed discriminatory incidents, they quickly turned the subject to a more positive tone. An example of a negative discriminatory memory turned to a positive statement was when Margaret said:

> In one of my reviews, [my supervisor] asked are you thinking about having a baby? … and I feel like he didn't put me on assignments because of [possible pregnancy]… I was getting hurt because of my sex … and I thought, this is so wrong, but I'm just not going to let it bother me…things are getting better … I'm setting an example and changing people's mind as they come through my career.

According to Cech and Blair-Loy (2010), women in their study refused to see the problem of inequality and referred to unsuccessful females as not working hard enough.

Participants in this study did not explicitly reference meritocratic reasons for female technology leader disproportionality, but an implicit message was that any female could succeed if she worked hard enough and persisted through challenge. Celine said, "…[women] have to work harder, be better, and they do have to brand themselves more than men do because the role of those female characteristics feeding into their mentality." Margaret stated her simple formula for success, "All I had to do was focus on it and work hard, and I could make it happen."

RQ2: What barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders? All of the barriers revealed by participants were common barriers noted in previous studies on females in technology and/or in male dominated careers. Barriers specific to study participants included difficulty with balancing work and life demands, discriminatory incidents, and having to formulate a masculine gender role. Barriers encountered by identified female leaders as they participated in a technology career closely aligned with the theme of know your worth. As described in this theme, participants shared common experiences of feeling undervalued both personally and professionally.

According to researchers, the most prevalent challenge for females choosing or staying in the field of technology centered on personal barriers and the perception that the time consuming technology field did not allow for a balance of work and family life (Cukier, 2009; Orser et al., 2012). All participants in this study struggled to maintain a balance between work and family life, but there was an interesting spectrum of coping strategies which ranged from putting family first to putting career first. On several occasions, Summer would stop or interrupt her career in order to care for a family

member; while Celine felt compelled to follow her career and maintain family life remotely. In both instances, the women have landed Chief Information Officer positions and in both instances, they wished they could have been able to have both and not have to sacrifice family for work or work for family. However, these female technology leaders proved that a balance between work and life can be achieved so young girls considering the field will have a viable role model (Autio, 2013).

Some of the study participants revealed personal femininity as a barrier. In order to succeed, they felt they needed to conform to masculine behaviors which caused them to disassociate with their true identity as a woman. Grace, Margaret, and Anne all indicated dressing, acting, or participating in behaviors typically associated with men. Grace said, "I felt like I had to act like a man in a lot of ways with how I dressed, how I conducted myself, salty language, drinking, looking to be like one of the boys instead of being myself." These women did not necessarily subscribe to what Armani (2013) described as society's role for the female as delicate, incompetent, and nice; but, they recognized at this stage in their career they should have been allowed to dress, think, and act like an individual who happened to be a female. Powell and Sang (2015) warned that by trying to fit in with male colleagues, they were perpetuating homosociality, a term used to define male dominance (Powell & Sang, 2015).

Another barrier for female technology leaders included specific incidents of professional discrimination and bias. Autio's (2013) study results indicated 60% of the females surveyed believed structural reasons like discrimination and bias to be at fault for women not advancing. Margaret confirmed the stark reality of this study and the glass ceiling when she was not given the title befitting the job requirements (Sipe et al.,

2009). Anne faced a hostile situation wherein a male coworker did not like a woman in leadership. Grace and Margaret both hid pregnancies so they would not be left out of projects or cases. According to Armani (2013), women have been denied employment because employers did not want to hire and train an employee who may be out for pregnancy or to raise children. Participants in this study revealed instances of implicit bias and feelings of occasional discomfort as a female in a male dominated technology field; a common complaint of participants in other studies (DuBow, Farmer, Wu, & Fredrickson, 2015). Anne recalled several experiences in her male dominated organization when events were planned that implicitly biased female employees. She said, "We had a couple of employee outings--one of them was a whiskey tasting … one of them was a gun range … so as a woman, it can be kind of awkward to participate in that, but am I getting left out?"

RQ3: What strategies did identified female technology leaders use in their efforts to participate in technology careers as workers and leaders? The inspirational women whose voices are projected in this study have broken the glass ceiling in technology leadership. They deliver passion and creativity to the field, helping generate innovative services that augment their industries. Findings from this study suggest these women are just as adept as men, as shown by the strategies they employed to participate in this male dominated career. All women leaders were unique and brought their own set of strengths and weaknesses to the job. As a whole, they exhibit outstanding leadership traits, including vision and inspiration. The strategies used by identified female technology leaders in their efforts to participant in technology careers aligned with the findings in the

themes discover your career and nurture your vision. In these themes study participants had to be adaptive, innovative and collaborative to nurture a collective vision.

Study participants clearly articulated the mission and purpose of their prospective organizations, but they also had a clear vision for their department and the ways in which they could support the organization. Margaret shared her vision as a collective collaboration that encompassed all aspects of the organization. She said, "… It's in how we want to build our teams, how we want to work together, and the kind of organization that we want to be. We've really instilled that in our strategic plan that has our goals and objectives." Authenticity is integral in this practical and collaborative approach to vision. The vision is authentic because it is shared. The vision is shared because the female leader has inspired others to contribute and work together for the good of the organization. This was confirmed by Ibarra and Obodaru (2009) who found female leaders preferred gathering information from the team to develop the vision. Collaboration creates serendipitous inspiration because everyone has ownership.

Female technology leaders in this study used intrinsic motivation augmented by personal persistence, passion for learning, creativity, and efficiency as a key strategy to overcome barriers in the technology field. Researchers have suggested exposure to leadership efficacy enhancements directed towards persistence to foster career success (Dugan et al., 2013). Likewise, Wentling and Thomas (2009) discovered leadership development that stimulated self-confidence, sustained curiosity and love of learning, would promote inherent attitudes conducive to technical fields. The inherent persistence of participants in this study and the research regarding other female technologists indicated a strong correlation. Celine shared, "… [It is] critical for women to stay in

technology, to persevere, to excel, and to drive their organization forward. In order to be successful, female technology leaders need to be persistent, confident, and passionate about learning."

Participants in this study recognized in order to get the same recognition and rewards, they needed to do twice as much, never make mistakes, and constantly demonstrate their competence. Anne mentioned this several times and said, "I had to be perfect." Her need to be strategically perfect was confirmed by Ibarra and Obodaru (2009) who reported female leaders require "concrete facts and irrefutable analysis" to make decisions as opposed to men who act instinctively, protected by a "presumption of competence" not freely given to women (p. 1). Often, they were met with discriminatory practices that forced them to strive for near perfection. Margaret alluded to this when she described how she was given the responsibilities of a leadership position, but not given the title until she proved herself. The fortunate repercussion of striving for perfection was accolades from state and national organizations that recognized their exemplar service. Each of the participants received industry recognized state awards, a few were given national awards, and one participant was internationally recognized. Celine was honored as a state leadership council's Chief Information Officer of the year for 2017, a competitive award with four other male CIOs in the running. As participants moved up the ladder in their organizations and industries, the more positively they were perceived. Sharing their valuable thoughts and insights in these venues resulted in a high regard for their ability and opinion.

Another strategy included the women's ability to leverage soft skills that allowed them to lead openly with empathy, humility, approachability, and transparency. Grace

said she, rather than her co-owner and husband, would talk to employees in difficult situations. She stated, "Whenever there is an issue…I am the person that tries to walk [them] down… to try to change [them]." Leaders with these type of soft skills tend to adapt quicker, network well with others, think well on their feet, determine how to triage problems quickly and calmly, and innovate the workplace to move the organization forward. Summer said, "when you're dealing with IT…nothing goes perfectly…at crunch times, I actually get more calm…My voice gets softer and I present a calming factor…I try to keep the stress level low." The participants reiterated the absolute requirement for technology leaders to be excellent communicators with their team and especially between the technical realm and the business side. They would instinctively use their soft skills to bridge the gap between the two worlds for the benefit of the organization. Summer shared, "we communicate very different from men…[women] can be short and to the point and [women] can be very relationship and conversation oriented." Wentling and Thomas (2009) indicated female technology leaders in their study needed to make valuable contributions. Participants in this study connect with the need to contribute and care for the organization goals and people which was evidenced by meaningful and authentic communication with their team and other departments. Hogg and Knippenberg (2003) echoed this finding in a study that revealed nurturing and caring leadership techniques were typically synonymous with females was becoming the workplace new normal for men and women.

All participants excelled in nurturing competencies such as developing others, motivating others, relationship building, collaboration, and teamwork. With honesty and integrity, study participants would effectively accomplish goals and deliver results.

Celine shared, “I’m not their boss. I’m someone that can give them honest feedback.” Through honesty, Celine and other participants like her nurtured the talent in her team. Although each participant alluded to taking on behaviors typically associated with the male gender role in order to assimilate with male dominated environment, they spoke more freely and often about their willingness to nurture the people and purpose of the organization. Grace said, “I felt like I had to act like a man in a lot of ways…to be really tough and give it back.” But moments later she contradicted herself when she shared her advice to females today is to “be true to yourself.” This contradiction may suggest women no longer want to give up their authenticity or femininity. Like a mother who wants a better life for her child, Grace wanted future female technology leaders to be true to themselves. Grace asserted her nurture leadership as she strove to develop the next generation of women to be comfortable in their own skin. Celine also asserted her nurture leadership as she repeatedly referred to “nurturing” diversity, specific people, and concepts. This suggested study participants leveraged the female gender role of a nurturing mother to enhance their performance. They had developed into a nurturing leader. Hampton, McGowan, and Cooper (2011) also found women felt comfortable and competent with expanding their network of influence to foster community, develop new ideas and listen to new perspectives (Hampton et al., 2011). Study participants collaborated with a wide network of people, sought feedback and made changes based on that feedback. All participants discussed participation in a variety of professional organizations which augmented their success.

Willingness to take risks was another strategy to overcome barriers. Each one of them worked in a variety of different industries and roles. Many people are unwilling to

step outside of their comfort zone. Anne spoke frequently about moving from one job to another simply to have an additional challenge—this was a risky proposition she was willing to take because she wanted to grow and stretch her learning. Grace took on the ultimate risk of entrepreneurship that left her unprotected by company benefits and security. Margaret took risks in a job she did not feel completely qualified to do, but learned the required skills and used the opportunity to continue to progress in her career. All women took on the risk of becoming the primary breadwinners in their careers. This was not a risk that promoted feminist strongholds, but rather a circumstance that arose. Each of them considered the challenge a growth opportunity for their career and their family. Saucerman and Vasquez (2014) indicated participants in their research possessed a growth mindset needed for female participation in technical fields. By taking risks, study participants progressed in their career. As a result, risk became a primary strategy to overcome barriers.

The most prevalent strategy to overcome barriers was the influence of role models, mentorship with a coworker, and networking with other women in the field. Grace emphatically stated, "The most important thing is sponsorship ... find a mentor … somebody that you can call … find a mentor in each area of your career." Richman, Van Dellen, and Wood (2011) cited the importance of role models to mitigate feelings of inadequacy for young females considering a high-tech field. Powell et al. (2012) stated female career decisions were directly related to other influential people, social and financial rewards, and the potential enjoyment the career could provide. Participants in this study had strong influences, primarily a father figure, but also other coworkers and

females in the field. Moreover, participants in this study were willing to pay it forward and mentor other young women.

Implications and Discussion of the Study

This study focused on the shared experiences of five female technology leaders in a southeastern metropolitan city in the United States which was ranked as a leading technology market (Miguel & Roeder, 2016). The study has broader implications for females considering technology as a career in any city in the United States because this study brings to light concepts that transcend a specific region or technology industry. Potential female technologists may glean valuable insights about choosing a program of study and the technology specific job roles in various industries. Moreover, female technologists may understand the challenges of work and life through a lens that is mindful of the female experience. According to Powell, Dainty and Bagihole (2012), the perceptions of females who currently hold technology positions should be considered to reveal common barriers associated with choosing and staying in a technology career.

Over 45% of United States employers reported difficulty filling technology related jobs due to the lack of talent or specific skills, also referred to as the "skills gap" (Bessen, 2014; Talent Shortage Survey, 2016). More Americans could fill the skills gap, but the industry overlooks talented women, African Americans and Hispanics (Rodriguez, 2017). The technology industry needs additional female talent to narrow the skills gap in the United States (Ashcraft et al., 2016). More women are also needed in technical managerial positions. The Harvey Nash CIO Survey (2015) reported the percentage of female Chief Information or Technology Officers in the United States as 6%. This study includes the perceptions of Chief Information Officers who have multiple

years of working experience to bring to light issues that contribute to the "digital divide" which encourages the current patriarchal structure of the technical industry (Pujol & Montenegro, 2015, p. 1).

Four major themes organically emerged from the data in this study: climb your ladder, know your worth, discover your career, and nurture your vision. The sub-theme, firm foundation, emerged within the major theme of climb the ladder. The narrative of climb your ladder answers research question one: What are the life experiences of identified females prior to participating in technology careers as workers and leaders? The climb your ladder theme explores the life experiences which included social and political discrimination and prejudice, life challenges and growth opportunities. Research question two asked what barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders. This question was answered by the theme of know your worth because it described the common barriers associated with the experience of feeling undervalued both professionally and personally. The information in the themes, discover your career and nurture your vision, answered research question three: what strategies did identified female technology leaders use in their efforts to participate in technology careers as workers and leaders. In the theme discover your career, the strategies described were the ability to be adaptive, innovative and able to take risk. The theme, nurture your vision, illuminated the strategies associated with collaboration, nurturing, and leadership.

Concepts and themes revealed in this study indicate personality commonalities among female technology leaders. Females considering the field may look to this study to determine if their personality aligns with the desire for challenge, ability to persevere,

urge to be assertive, or the courage to discover a new path as revealed in the participants in this study. As Anne indicated, a female in technology will not have a "comfortable career." A female in this field will be challenged to learn and adapt on a consistent basis. This study may also have relevance for administrators who formulate organization policies with specific emphasis on professional training or workplace conduct. In recent studies, gender bias workplace training had statistical improvement in workplace gender discrimination (Jackson et al., 2014). Findings from this study support the idea organization culture can be positively impacted by diversity. Professional training that exposes employees to understanding of unrecognized behaviors, bias, and fears may positively change behavior especially if it is endorsed by the organization (Cozzens, 2008; Jackson et al., 2014). According to Gross (2003), looking only through the lens of a feminist perspective that seeks to eliminate marginalization or exclusion of females as a result of gender would not solve the issue of gender inequality. She suggested men would need to be able to culturally critique gender role assignments for men and women (Gross, 2003). Through this work, men and women could learn to appreciate the leadership styles of men like Gandhi rather than aggressive men. Workplace gender training sensitive to gender role scrutiny goes beyond the scope of the feminism lens or the gender role conceptual framework to embrace acceptance of personality traits that are conducive to the success of the organization.

Most of the data in this study confirmed previous studies as cited in the literature review. However, three unique concepts emerged from the data that was not noted in previous studies. Unique concepts determined in this study included the significance of

father figures, the emergence of a new leadership style, and the favor of balance over equity.

All study participants pointed to a significant father figure in their lives as evidenced in the participant narratives and the climb your ladder theme. I found this especially interesting because the literature included in this study pointed to need for a female role models for young girls to become interested in a science, technology, engineering, or mathematics field. The search parameters for previous studies centered on females entering technology field. With these parameters, the literature indicated female role models as a primary influence for females entering a technical field. However, in contrast to those studies, participants in this study pointed to a strong father influence. With broader search parameters, I found other studies about the general impact of fathers on a girl's career choice. According to a 2009 study from the University of Maryland, women are three times as likely to follow in their father's career footsteps these days than they were a century ago (Sayer, 2014). Only 6% of women born between 1909 and 1916 went into their father's business, compared with roughly 20% of generation x and y (Sayer, 2014). All of the study participants had fathers who were aggressive leaders in their fields. Some of them were in a computing related field, but all were in a scientific field. Finding suggest study participants did follow in their father's footsteps. In a study conducted by Hellerstein and Morrill (2011), they confirmed the fact that with the increase numbers of women in the workforce, fathers had become more interested in investing in their daughters. However, their study did not find conclusive evidence of a correlation between a father's influence and the daughter's career (Hellerstein & Morrill, 2011). Findings in this study may suggest a more recent

study would reveal that within the cohort age range of this study's participants and even younger cohorts, there could be a correlation.

These findings may suggest a new style of leadership that occurs naturally to women, but may be useful for male leaders. Although female leaders in this study purported to be collaborative leaders, their experiences suggested a more holistic collaborative leadership style that went beyond simple collaboration. Their form of collaboration incorporated nurturing their team members and organization goals. More specifically they tended to nurture their protégées in the same way a mother would raise her children. As described in the theme, nurture your vision, all participants took subordinates under their wings and provided nurturing environments for them to grow and develop professionally. Gross (2003) confirmed caretaking and nurturing are instinctively part of the traditional female role, whereas aggression and toughness fell within the confines of the traditional male role. Her work indicated there was "not enough feminine energy" in society (p. 17). As reported in this study, females assimilate male behaviors in an effort to participate in male dominated environments, but compelling evidence as cited in this study suggests being a nurturing leader encourages team building and organization success.

The lived experiences of study participants favored balance over equity. Feminism, part of the conceptual framework for this study, seeks to improve women's lives by equalizing power (Gray et al., 2015). Gender role incongruity, another essential element in the conceptual framework, examined societal assumptions for gender role in order to effect change and disband unequal power relations especially for women (Glesne, 2011; Patton, 2002). While feminism and gender role theories seek to equalize

power, study participants spoke often of balance. It was not critical for them to feel equal in title or in pay, but they struggled to find their own balance within the organization and at home in ways that were not judged by politics or society. While equal pay was an issue of fairness, they did not connect this issue to feminist equal rights. Celine stated, "Equity is not fair." Margaret said, "… I want to be known as a strong person who happens to be a female." In both of these statements, participants asserted desire to be valued as unique individuals and treated with fairness. However, the idea of equity as it is explained in the discourse of feminism is out dated and does not reflect the true desire for balance in the workplace and at home rather than equity.

The overarching implications of this study suggest that a qualitative study illuminating the lived experiences of females in technology revealed valuable information for the field of technology and those who seek to enter or stay in the field.

Limitations of the Study

Study limitations must be identified in qualitative research to provide credibility and trustworthiness (Patton, 2005). Purposive sampling and the Seidman's interview process yielded a body of rich data, but limited number of participants impacts the generalization of study results (Patton, 2005; Siedman, 2006). Participants included four Chief Information Officers who ranged in technology leadership experience from 11 to 27 years. The fifth participant was a Chief Executive Officer of a technology company with 10 years of experience. All of the women were Caucasian. Each of the women worked in different industries which included an international hotel, education organization, law firm, insurance company, and a privately-owned technology industry.

The study did not address other industries nor different ethnicities. As a result, transferability to groups not represented could be a study limitation.

Data was collected over a three-month period. Study conclusions pointed to female technology leaders in a southeastern metropolitan city in the United States. The primary goal of the narrative inquiry qualitative study was to present an in-depth account that may provide perspectives regarding the phenomenon of being a female leader in technology. I presumed all participant feedback was accurate and complete. However, I cannot rule out the possibility of embellishments on the part of participants. Maxwell (2013) indicated the researcher cannot be responsible for inaccuracies as conveyed by participants.

All of the participants met with me face to face in their office for the first interview. All of them met with me face to face for the second interview in their office except for one who participated in the interview over the phone. The last interview was conducted over the phone with all participants. According to Seidman (2006), phone interviews are acceptable and for this study, did provide rich and meaningful data. My presence with participants may have affected their responses, but Maxwell (2013) stated the researcher has no control over these factors.

The dominant limitation centered on the bias of the researcher. I am a female who has spent the majority of my career in technology leadership. As a result, data analysis may have been biased and impacted the overall analysis. However, Maxwell (2013) stated researchers should embrace their subjective influence and learn to use it to benefit the study. I certainly shared a passion about this topic and my participants that resulted in a "collaboration between researcher and participants" (Clandinin & Connelly,

2000, p. 20). The format of the interviews allowed for ample time to build relationship and trust between the participants and me. I do not believe any of them concealed their true feelings or opinions because they were talking to a new person. However, I cannot rule out the possibility that my interaction with the participants led them to emphasize one issue while understating another. As their profiles indicated, each one of them boasted of being excellent communicators and they showed this during the interviews. Because this study does not allow for triangulation of other stakeholder input, I must default to the inherent ability of each participant to communicate their positions openly and accurately.

I consistently addressed subjectivity that arose during the study by writing researcher memos to capture my thoughts (Maxwell, 2013). I would also interject my thoughts during the interview which was captured in the interview transcript. In spite of limitations, study results may benefit females who are considering the technology field. The findings may aid the United States Department of Education, state educational agencies, university systems, school districts, and counselors at all levels in efforts to promote female participation in technology. The study findings provide knowledge that may assist American technology industries in their efforts to recruit, train, and promote more females in technology positions, resulting in opening the talent base for skilled American technologists. Study findings can benefit workplace culture by revealing practices technology organizations can employ and policies they can include to remove barriers for females so they can consider technology as a viable and rewarding career.

Recommendations for Future Research

Possible future research opportunities developed through the course of data analysis. First, a larger sample would provide even more information to strengthen study findings and conclusions. Second, a similar study focused on a specific minority ethnicity would illuminate issues specific to racial and gender barriers. Third, a study focused in a different metropolitan city would provide comparative data to ensure study results are generalizable. In fact, a study which included an international sample would bring to light issues that face females in technology around the world. I also think it would be beneficial to include the perspective of males regarding female leaders in technology. Since each of the participant pointed to a strong male role model, inclusion of the male perception may point to unknown barriers and strategies to overcome them. It may also be beneficial to interview subordinates who serve under female technology leaders regardless of gender. This study is valuable because the perceptions of females who currently hold technology positions should be considered to reveal common barriers associated with choosing and staying in a technology career (Powell et al., 2012).

Final Conclusions

America does not have enough skilled talent to fill the jobs made available in the growing field of technology and there are disproportionately low numbers of female technology workers and female technology leaders participating in technology careers (Ashcraft, McLain, & Eger, 2016; Moye, 2017; United States Labor Department, 2015; Zweben & Bizot, 2016). Powell, Dainty, and Bagilhole (2012) stated the views of women in the technology field should be considered to aid in bridging the gender divide in the technology field. Researchers discovered a disconnect in the young female

experience and her ability to view technology as a viable field of study, but interaction with women from a variety of backgrounds and positions of power allowed her to visualize a different career (Richman, Vandellen, & Wood, 2011; Saucerman &Vasquez, 2014). This study gave voice to five female technology leaders in a southeastern metropolitan city which may allow other women to practically apply strategies to their own experience.

This study also revealed gender equality at the top could benefit employers and individuals (men and women). Employers should create an equitable workplace culture, with flexibility and fair expectations for both men and women, and they should enforce fair policies through tools like diversity training and blind resume screening. Technology companies that included female technology leaders and gender diverse employment strategies reported financial gains as compared to similar companies without female technology leadership (Adams & Funk, 2012). Implicit gender bias training wherein men and women were exposed to common, but often unrecognized behaviors statistically improved behavior (Jackson et al., 2014). Cozzens (2008) also cited a positive impact on equity when supportive human resource, research, and innovation policies were enforced. According to Glynn (2012), American companies should include women in technology related professions to remain competitive in a global economy. Organizations that perpetuate gender inequality in male dominated fields will not benefit from the female sector of the market. As a countermeasure, men and women should shift stereotypical ideas centered on societal gender roles. Just as the status quo is holding women back from leadership roles, it is holding men back from embracing caretaking and support roles which can increase productivity and profit margins. Moreover, reversing gender

roles at home can be good for families, whether they rely on women as the sole breadwinners or share a two-earner income. The benefit of blurring social gender roles is a diverse, talent pool of American men and women who will be highly competitive in a global economy.

The study suggested that in order to remain competitive in the global economy, United States policy makers must continue to propose and pass legislation that benefit female workers. Proposed but not yet passed legislation like the Paycheck Fairness Act, would ensure salary transparency and subsequent fair compensation to all employees (Should congress pass S. 2199, the Paycheck Fairness Act?, 2014). Organizations should embrace aggressive diversity policies that require diversity percentages appropriate for the industry and geographical area of the country. At the very least, organizations should include diversity training programs which promote gender sensitivity and gender bias which have been proven to yield statistical improvement in workplace gender discrimination (Jackson et al., 2014).

This study makes an original contribution as a qualitative narrative inquiry study conducted by an American female technology leader with portraits of five American female technology leaders. According to Bloom (1996), qualitative researchers use their experience and subjectivities as necessary components of the inquiry process. My experience with this study was closer to Clandinin's (2007) assertion that "the researcher and researched … are in relationship with each other and both parties will learn and change in the encounter" (p. 9). As a female technology leader, I was able to quickly discern evaluative devices like causal connections regarding technology initiatives because I had shared experiences; however, I asserted my knowing from a position of

objectivity even though I was personally very interested (Clandinin, 2007; Diaute, 2014). Through the perceptions of female technology leaders in the field, a voice was given to a minority within the technical field and consequently contributed to the broader discourse of gender equality in the workplace. For me, the study validated my journey and gave me a complete understanding of my role as a professional woman in the technology field.

Study data yielded four major themes: climb your ladder, know your worth, discover your career, and nurture your vision. The sub-theme, firm foundation, emerged within the major theme of climb the ladder. Each of the themes aligned with the research questions for the study. The climb your ladder theme explored the life experiences which included social and political discrimination, life challenges, and growth opportunities. The theme of know your worth illuminated the common barriers associated with the experience of feeling undervalued both professionally and personally. In the theme, discover your career, the strategies described were the ability to be adaptive, innovative and able to take risk. The theme, nurture your vision, detailed the strategies associated with collaboration, nurturing, and leadership. Concepts and themes revealed in this study indicate personality commonalities among female technology leaders like the desire for challenge, ability to persevere, urge to be assertive, or the courage to discover a new path. My findings confirmed previous studies as cited in the literature review. However, three unique ideas emerged that can have far reaching implications. Study results indicated significant impact of a father figure on the career choice for a female, the emergence of a new leadership category, nurturing leader, and the favor of balance over equity at home and work.

Wanting to be like their dads or, as Margaret said, “make my dad proud” allowed participants to consider careers outside of the typical societal roles associated with females. They chose a hard science—technology. A field with quantifiable skills that build on ability, specific training, and hands on experience. However, each chose to lead with her soft skills—interpersonal connection with team members to develop their hard and soft skills. Participants did not subscribe to masculine assertiveness, nor did they subscribe to feminist equality. They favored a balance that incorporated aspects of both genders to nurture the development of individuals, the team, and the organization. My study uncovered a new leadership style that could be explored and shared with individuals who want to be successful in technology leadership. The nurture leader, as exemplified by my study participants, mitigates the rule oriented technical field with soft interpersonal skills attentive to the growth and development of individuals, the team, and organization.

As supported in this study, the perceptions of females currently in the technology field illuminated social, political and emotional issues. Their views may be considered to bridge the technology field gender divide and decrease disproportionality. In addition, this study may assist in bringing the issue to the forefront so that the problems of inequality are not forgotten or discounted. According to Demaiter and Adams (2009), the female technology leader should be aware of gender disproportionality so that she leverages her influence to affect change. By participating in this study and with the mentoring work each of them is committed to accomplish, female technology leaders featured in this study exceeded the standard for female technology leaders helping other female technology leaders.

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APPENDIX A

Participant Consent Agreement

Valdosta State University

Consent to Participate in Research

You are being asked to participate in an interview as part of a research study entitled ***"A Qualitative Narrative Inquiry Study Investigating the Life Experiences of Identified Females in Their Efforts to Participate in Technology Careers when America Needs More Technology Workers and Technology Leaders,"*** which is being conducted by Emily Nichols, a student at Valdosta State University. The purpose of this study is to reveal the experiences of identified females in their efforts to participate in technology careers as workers and become technology leaders. Qualitative narrative inquiry will be used in the study. Using purposive sampling, five current female technology leaders will participate in three 90 minute interviews. The interviews will be audio taped in order to accurately capture your concerns, opinions, and ideas. Once the recordings have been transcribed, the tapes will be destroyed. This research study is confidential. No one, including the researcher, will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to participate, to stop responding at any time, or to skip questions that you do not want to answer. You must be at least 18 years of age to participate in this study. Your participation serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

Questions regarding the purpose or procedures of the research should be directed to Emily Nichols at ehnichols@valdosta.edu. This study has been exempted from Institutional Review Board (IRB) review in accordance with Federal regulations. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-259-5045 or irb@valdosta.edu.

APPENDIX B

Interview Guide and Questions

Interview Guide and Questions

First Interview: Demographic information and background

RQ1: What are the life experiences of identified female leaders prior to participating in technology careers as workers and leaders?

1. What is your name, age, gender, race, and years of professional experience?

2. What factors influenced your decision to choose a career in technology?

    a. Describe your life experiences.

        i. Family background and dynamics

        ii. Family's geographic and living

        environment

        iii. Socioeconomic background

        iv. Educational attainment of members in your family

        (grandparents, parents, siblings)

3. Describe your educational background.

    a. Describe your school experiences.

        i. Elementary school.

        ii. Middle school.

        iii. High school.

        iv. College

    b. Were the schools public or private and why were those schools chosen?

    c. How did these schools influence your choice of becoming an female in

    technology?

4. Describe your current family make-up and dynamics and how these relationships influence your career and work decisions.
    a. Education of family members
    b. Socioeconomic status
    c. Current geographic and living environment
5. Describe the progression of your career to the point where you are now.

Second Interview: Career experiences, barriers, and significant events and people.

RQ2: What barriers, if any, did identified females encounter in their efforts to participate in technology careers as workers and become technology leaders?

1. What is the primary mission of your organization?
2. Tell me about your current role and responsibilities ... If you had a young person spend a day with you at your work place, what are the daily activities that you think she/he will report on?
3. How does technology impact your organization?
4. How would you describe the socio-economic background of your business community?
5. What is the gender mix and professional qualifications of your employees and other support staff in your company?
6. Describe your organizational culture.
7. Can you give a brief description of a staff member who is your vice CIO or right hand?
8. Was your predecessor female or male? Do you know anything about his/her relationship with employees and other business stakeholders? Please share in

confidence some of the things you know about the relationship of your predecessor with employees, customers, and other external business agencies.

9. If you were to describe how you make decisions, do you make them after consultation with subordinates, or do you make them yourself and then communicate them to your team-what do you say is your leadership style?
10. As "____" (job title), how would you characterize your relationship with employees?
11. Can you tell me a personal story that shows how female employees relate to you?
12. Can you tell me a personal story or an event, which you think, shows how male employees relate to you?
13. Can you tell me a personal story which shows how business associates relate to you?
14. Can you tell me a personal story which shows your relationship with customers in your business?
15. Are there any special features that you think tech leadership has which distinguishes it from the other forms of leadership?
16. Other than scheduled meetings with the tech association, which other social activities outside the organization do you participate in? Do you think these social activities have a beneficial role in your company?

17. Would you like to share any stories that reveal unique challenges for you in your role?

Third Interview: Reflection, Professional Development, and Mentoring

RQ3: What strategies did identified female technology leaders use in their efforts to participate in technology careers as workers and leaders?

1. Look back on what we have discussed thus far and reflect on your career to this point.
2. How do you help others in their day-to-day work?
3. To what extent are you involved with organization's strategic planning?
4. Is continuous professional development an important part of determining the future of our industry? If so, what kind of professional development are you engaged in and what roles do you play in professional development for your staff?
5. What role do you play in contributing towards the development of some of the future tech leaders—particularly the younger ones?
6. Can you describe a scenario that was particularly difficult and how you navigated through the issue?
7. What are the most rewarding aspects of your job?
8. Now that you have talked about how you became CIO, what does it mean to you?
9. Given what you have constructed in this interview, where do you see yourself going in the future?
10. What advice do you have for young women considering the field of technology?
11. Could you provide a copy of your company policies and organizational chart? Are there any policies that you have helped to create and/or implement?

12. Are there any questions that you would like to ask me?

APPENDIX C:

Institutional Review Board Approval

Institutional Review Board (IRB)
For the Protection of Human Research Participants
PROTOCOL EXEMPTION REPORT

PROTOCOL NUMBER:	**03551-2017**	**INVESTIGATOR:**	**Ms. Emily E. Nichols**
		SUPERVISING FACULTY:	**Dr. Robert "Ronny" Green**
PROJECT TITLE:	***Narrative Investigation of Female Tech Leaders.***		

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is **Exempt** from Institutional Review Board (IRB) oversight under Exemption **Category 2**. You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research.

ADDITIONAL COMMENTS:

- *Research data must be securely maintained (locked file cabinet, password protected files, etc.) for at least three years.*
- *As part of the informed consent process the researcher must read the research statement aloud to each participant. Click the record button and then read the statement – this will become documentation that the participant was informed.*
    - *Please include the reading of the research statement in the transcript.*
    - *Delete the audio taped interview immediately upon creation of the transcript.*

☒ ***If this box is checked, please submit any documents you revise to the IRB Administrator at irb@valdosta.edu to ensure an updated record of your exemption.***