A Qualitative Exploration of the Workplace Culture of Women in Information Technology Careers

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A Qualitative Exploration of the Workplace Culture of Women in Information Technology Careers

A Dissertation by

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Irvine, California
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Submitted in partial fulfillment of the requirements for the degree of

Doctor of Education in Organizational Leadership

November, 2016

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ABSTRACT

A Qualitative Exploration of the Workplace Culture of Women in Information Technology Careers

by Andrea Hemphill (Merrills)

The information technology (IT) industry is one of the fastest growing industries in the United States. According to the U.S, Department of Labor and Statistics (2015), employment opportunities are it is projected to grow by 12 percent from 2014 to 2024. While the number of employed women have increased, this has not been the case in the IT industry where the number of women has been in consistent decline since 1991. In order for the U.S. to be able to fill the demand for IT professionals, it must have access to a talent pool that includes women. There are many talented women that could fulfil these positions, but the attrition rate among mid-career women continues to rise. In addition, women entering college are now choosing majors other than those related to computing options, thereby reducing the number of women in the pipeline for IT careers. There are many factors that may contribute to the reasons why women choose to enter, remain or leave the IT industry. This qualitative study seeks to explore these factors associated with the workplace culture that may have an impact by exploring the experiences of women who work in IT occupations.
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CHAPTER I: INTRODUCTION

Computers and information technology (IT) are an integral aspect of modern life which is centered around the flow of information. The IT industry is the largest of any computer-related industry, employing more than 1.5 million people in 2011 (Csorny, 2013; Peck, 2015). The IT industry is one of the most robust industries in the world. IT, more than any other industry or economic facet, has increased productivity and, as a result, has become a key driver of global economic growth (“IT Industry, Information Technology Industry,” 2010). According to Csorny (2013), employment in IT is expected to grow rapidly over the next decade outpacing similar professional, scientific, and technical industries. In 2014, IT employment grew by 2.4 percent which represents more than 100,000 additional jobs (Synder, 2015).

Careers in IT have seen significant growth, and the opportunities for jobs continue to increase while the number of women in these careers drop at a drastic rate (Corbett & Hill, 2015; Csorny, 2013). The percentage of computing occupations held by women has been declining since 1991, when it reached a high of 36 percent. Women made up just 26 percent of computing professionals in 2013, a substantially smaller portion than 30 years ago when in it was 32 percent, and about the same percentage as in 1960 (National Center for Women & Information Technology [NCWIT], 2016; Corbett & Hill, 2015). This percentage declined to only 26 percent of the computing jobs in 2013 (Corbett & Hill, 2015). Companies such as Microsoft, Google, Facebook and Twitter have become household names in the technology industry. However, the number of women working at these companies is surprisingly low. Microsoft recently reported that 29.1 percent of its workforce consisted of women. Google states that women comprise
30 percent of the company’s overall workforce, but that women only held 17 percent of the company’s technological jobs. Facebook states that fifteen percent of technology positions are held by women, and at Twitter the numbers are even lower with women holding only 10 percent of their technology jobs (Cheng, 2015; Corbett & Hill, 2015; Peck, 2015).

Over the past fifty years, the number of women in the overall workforce has increased significantly. Women have entered into many fields that were previously dominated by men. However, in industries such as IT, their gains have been modest compared to other historically male professions, such as law, business, and medicine (Corbett & Hill, 2015). IT can be a secure field for women just like many of the other industries that had been predominantly male. In 2013, when the overall unemployment rate in the U.S. was 7.4 percent, the unemployment rate for computer and mathematical occupations was 3.6 percent, and for women in these fields, it was only 4.2 percent. (Unemployed persons by occupation and sex, 2013). The representation of women in IT occupations matters. A diverse workforce fosters productivity, creativity and innovation (Corbett & Hill, 2015). According to statistics from the U.S. Department of Labor, women represent 46 percent of the total workforce. The United States cannot afford to disregard the perspectives of half the workforce in future technological innovations (“U.S. Bureau of Labor Statistics, Current Population Survey, 2015 annual averages”, 2015; Corbett & Hill, 2015).

Organizational culture is more widely described as a system of shared assumptions, values, and beliefs, which governs how people behave in the workplace. In its early stages, organizational culture was viewed as an integrated whole (Rutherford,
Cultures tell members who they are, how to behave toward one another and feel good about themselves. Recognizing these critical functions makes us aware why changing a culture is so anxiety provoking (Schein, 2010). Workplace culture can be a major factor in influencing how a woman feels about her career. CEO and co-founder of Textio, Kieran Snyder, interviewed 716 women who held technology positions at 654 companies in 43 states (Snyder, 2014). On an average, these women worked in technology for seven years and then left the industry. Kieran asked the women why they left the technology industry. 27 percent of the women cited discomfort while working in these companies (Marcus, 2015; Wentling, 2009). According to a study by the Center for Work-Life Policy, 74 percent of women in technology report “loving their work,” yet women leave technology careers at a staggering rate. Female attrition is higher in IT than in science and in engineering, but across all three climates, it is considerably higher than men’s attrition (Ashcraft & Blithe, 2010). Many studies have uncovered that attrition increases for women in technology around the age of 35. This is approximately after 10 years of work experience. “The Athena Factor,” a research project launched in 2006 targeting women with degrees in science, engineering, and technology who have embarked on careers in corporations found that 41 percent of women in technology leave the industry, compared with 17 percent of men (Hewlett et al., 2008). The issues of the raise of attrition, underrepresentation, and lack of diversity along with barriers that are faced by women in the IT industry may be influenced by the workplace culture (Rutherford, 2011; Way, 2015; Wentling, 2009).
Background

All through the mid-1900s when computing began, the industry was not identified by a specific gender. Men and women were equally attracted to the industry during these times (Abbate, 2012; Ensmenger, 2010; Koput & Gutek, 2010). While today there are less than one in five women being awarded computer science degrees, and where women only consist of an approximately a fourth of the computing workforce (Corbett, 2015). For most of the past 20 years, employment in IT has grown rapidly (Csorny, 2013; Synder, 2015). The U.S. Department of Labor estimates that from 2010 through 2020, there will be nearly 1.4 million computing-related jobs openings available in U.S. Furthermore, with the current college graduation rates in computing, only 32 percent of those jobs can be filled with U.S. computing graduates (National Center for Women and Information Technology [NCWIT], 2015; U.S. Bureau of Labor Statistics, 2012).

The differences in gender in IT careers appear to be distressing the competitiveness of organizations globally. It is suggested that given the current labor shortage in the IT industry, it has become more important than ever to reduce the factors that attribute to the reduction of women in IT careers (NCWIT, 2015; Ahuja, 2002). Several studies such as those by Gutierrez, 2015 and Way, 2009 examine key areas that impact the attraction, retention and reduction of women in the IT industry. Recent statistics indicate that women are leaving the IT workforce at twice the rate of men (Acholonu, 2013; Csorny, 2013; Dubow, 2010; Way, 2015). Nearly a quarter, 23 percent of women in IT, do not work for a technology company. Instead, these women work for companies in some other industry such as manufacturing, finance or healthcare that have a technology division to support its operations (Hewlett et al., 2008). Perhaps because of
the combination of stereotypes, biases, and values that exist in the IT industry, women often report that they do not feel as if they belong in computing fields (Corbett & Hill, 2015).

The NCWIT contended that highly-qualified women are well-positioned to move into these open jobs; yet, the industry is failing to attract this talent (Ashcraft & Blithe, 2010). Still, women who are already employed in the technology industry are leaving at astounding rates (Ashcraft & Blithe, 2010; NCWIT, 2015; Synder, 2015). Failing to capitalize on this talent threatens U.S. productivity, innovation, and competitiveness. To further strengthen the U.S. position as a technical leader, we need to examine the reasons why the industry is not attracting more people with varied backgrounds, and take action to stem the current tide (Ashcraft & Blithe, 2010).

Underrepresentation of Women in the Information Industry

According to the McKinsey Quarterly (2015), there is a growing consensus among top executives that gender diversity is both an ethical and a business imperative. Yet, progress is painfully slow. Despite modest improvements, women are underrepresented at every level of today’s corporations, especially in senior positions (Barton, Devillard, & Hazlewood, 2015). In turn, there are increasing indications that the underrepresentation of women in IT is a significant factor contributing to the shortage of skilled IT professionals (Freeman & Aspray, 1999; Marcus, 2015; Office of Technology Policy, 1999). A study by Aspray and Cohoon (2006) presented four reasons why it was important to increase the representation of women in IT. The first reason suggests that increasing the number of women represented would in turn increase the labor pool with more qualified workers that the U.S. depends on to drive the innovation and product
development in IT, which is essential to the growth of the U.S. economy (Aspray & Cohoon, 2006). However, looking back at the critical shortage of IT workers in the U.S. during the dot-com era—this was a shortage that could have been avoided if women had been represented at the same levels as men (Csorny, 2013; Freeman and Aspray, 1999).

Secondly, Aspray and Cohoon (2006) suggest that many IT jobs have favorable working conditions and pay well above the national average. Many of these higher-skill, higher-pay jobs are filled by college graduates. Women make up more than half of college graduates, but they occupy less than one-third of these quality jobs. Making IT more gender inclusive will open new opportunities for financial well-being to a large sector of the U.S. population (Ashcraft & Blithe, 2010; Aspray & Cohoon, 2006; Peck, 2015).

Thirdly, Aspray and Cohoon (2006) cited that many researchers have remarked on the value of a diverse workforce. For example, William Wulf (1999), president of the National Academy of Engineering, wrote,

Since the products and processes we create are limited by the life experiences of the workforce, the best solution—the elegant solution—may never be considered because of that lack.... At a fundamental level, men, women, ethnic minorities, racial minorities, and people with handicaps, experience the world differently. Those differences in experience are the ‘gene pool’ from which creativity springs.

Fourthly, with the growing trend of applying computing as a tool for solving big problems is considered critical to the U.S. future and economy to increase the number of women represented.
The National Science Foundation, for example, has recommended investing a billion dollars per year into the Cyberinfrastructure Initiative (Atkins, 2003; Harsha, 2004). More recently, a comprehensive review of current research on gender-diverse teams reveals that despite their challenges, they demonstrate superior productivity and financial performance compared with homogenous teams (Barker, Mancha, & Ashcraft, 2014). Furthermore, achieving a larger representation of women in the IT workforce may enhance creativity, performance and product markets (Corbett & Hill, 2015; Panteli et al., 2001).

**Diversity in IT**

IT companies are experiencing growing pressure to diversify their workforce which is predominantly white and male (NCWIT, 2016). The increased public scrutiny has resulted in some larger tech companies disclosing their employee information, which indicates little progress. A recent survey of the top nine tech companies in the Silicon Valley by Fortune (2015) reveals that on average, women comprise about one-third of the workforce. That gap expands the higher up one goes in an organization, with the best company exhibiting women holding 29% of leadership jobs. In general, companies made slightly better progress on ethnic diversity than they did on increasing their percentages of female employees, although not in leadership roles (Barton et al., 2015).

Many researchers agree that “diversity pays” and represents a compelling interest—an interest that meets customers’ needs, enriches one’s understanding of the pulse of the marketplace, and improves the quality of products and services offered (Cox 1993; Cox & Beale, 1997; Hubbard, 2004; Richard, 2000; Smedley, Butler, & Bristow 2004).
Furthermore, the findings determined that both racial and gender diversity were associated with increased sales revenue, more customers, and greater profits. Technology companies that have a large representation of women in their senior management teams produced a higher return on equity than those companies that had fewer or no women in senior management (Herring, 2009). More importantly, according to NCWIT (2010) diversity fosters innovation, and teams that are comprised of men and women produced the most frequently cited patents—with citation rates that were 26 to 42 percent higher than the norm for similar patents (Ashcraft & Blithe, 2010). These findings demonstrate the potential benefits of diverse teams for improving innovation and productivity (Ashcraft & Blithe, 2010).

**Organizational Culture in IT**

Earlier research on employment gender stratification reveals that the under representation of women in IT is attributed to organizational and social structures, rather than generalities about gender group characteristics (Bartol, Williamson, & Langa, 2006; Trauth, Queensberry, & Morgan, 2004). Workplace culture is defined as the embedded structure of an organization, which is ingrained with the values, beliefs, attitudes, practices, norms, customs, and assumptions held by members of an organization that distinguish a workplace environment (Denison, 1996; McLean, 2003). IT workplace culture has been labeled as having certain unique characteristics in the industry that are defined as being constituents of a white male culture. The IT culture is described as being predominately white, male-dominated, antisocial, individualistic, competitive, all-encompassing and non-physical.
More importantly, this culture has the potential to be an exclusionary environment for women and minorities if they do not conform (Glastonbury & Lamendola, 1993; Roldan, Soe, & Yakura, 2004; Trauth, Quesenberry, Yeo, 2008; von Hellens, Nielsen, Trauth, 2001; Wajcman, 2006). Lemons and Parzinger (2001) discovered that lack of advancement opportunities for women in IT were attributed to organizational culture issues and gender socialization. In a report by Igbaria and Greenhaus (1992), job satisfaction and organizational commitment are the most direct influences on turnover intentions among IT professionals. The researchers found that high levels of career satisfaction improve organizational commitment, since employees who are satisfied with their careers perceive greater benefits in remaining in their organizations than employees whose careers are less gratifying (Ashcraft & Blithe, 2010; Peck, 2015).

Furthermore, a study by NCWIT cited that women who are isolated in the workplace are not only less committed, but are also 13 percent more likely than women who do not report isolation to also report being displeased with their job (Ashcraft & Blithe, 2010). Women who are not satisfied with their jobs are 22 times more likely to leave than women who are satisfied. Likewise, women without mentors or sponsors are also more likely to leave their companies.

Bartol Major, Morganson, and Bolen (2012) attempted to examine the predictors of occupational and organizational commitment outcomes among IT professionals and explored gender differences and similarities in the relative importance of predictors. This was in order to understand the characteristics of the IT workplace culture, and specifically, the workplace environmental factors that obstruct or contribute to the career development of women in IT (Wentling & Thomas, 2009).
Studies based on Harrison Trice’s occupational culture framework (1993) and Douglas’s group and grid dimensions (1982) recorded distinct behaviors that IT individuals practiced which is a unique occupational culture (Guzman, Stam, & Stanton, 2008). According to Trice (1993), an occupational culture encompasses a unique cluster of ideologies, beliefs, cultural forms, and practices of individuals who pursue the same occupation. Wentling and Thomas (2009) proposed if companies are to attract and retain skilled women into the IT workforce, they must have an understanding of the personal and workplace environment factors that affect women’s career development in IT.

**Statement of the Research Problem**

The technology industry is one of the fastest-growing industries in the U.S. The United States Department of Labor estimates that by 2022, there will be more than 1.2 million total new computing-related jobs. Technology job opportunities are predicted to grow at a faster rate than all other jobs in the professional sector, or up to 22 percent over the next decade (Barton, Devillard, & Hazlewood, 2015; NCWIT, 2015; Barker, Mancha, & Ashcraft, 2014; Ashcraft & Blithe, 2010). Only 26 percent of the computing jobs are held by women (BytheNumbers, 2015). The specific problem is that if women are not attracted to these positions, the U.S will fail to meet the demand needed to remain a technical leader.

Recent statistics indicate that women are leaving the IT workforce at twice the rate of men (Dubow, 2010). Women are reporting a greater dissatisfaction with their IT career prospects. These women cite unsupportive work environments as one of the factors for their dissatisfaction along with a lack of role models and sacrifices in their personal lives that outweigh personal gain (Hewlett et al., 2008; Peck, 2015).
Highly-qualified women are well-positioned to move into these open jobs, yet the industry is failing to attract this talent. Furthermore, women already employed in the technology industry are leaving at staggering rates. Failing to capitalize on this talent threatens U.S. productivity, innovation, and competitiveness. In order to further strengthen the U.S. position as a technical leader, we need to examine the reasons why the industry is not attracting more people with varied backgrounds and take action to stem the current tide of women leaving the IT industry (Ashcraft & Blithe, 2010; BytheNumbers, 2015).

Solutions to these problems are intertwined in that increasing the representation of women in IT is a mechanism for increasing the resource of IT professionals. In order to accomplish that goal, it is important to understand the factors that contribute to women’s commitment in IT careers as well as the extent to which those factors are similar and different among men and women (Major, 2013). A study by Wardell, Sawyer, Reagor, and Mitory (2005) found that women are nearly three times as likely as men to leave the IT workforce. Furthermore, Wentling and Thomas (2009) revealed that the IT organizational culture is an influential factor in a women’s decisions to enter or remain in the IT industry. A study by Way (2015) stated that further understanding is needed on the factors of the workplace culture in IT that affect the attraction and retention of women.
Purpose Statement

It was the purpose of this phenomenological study to understand how workplace culture impacts the career decisions of women working in IT to enter, remain or leave work.

Research Questions

Central Question

What are the perceptions and experiences of workplace culture on the career decisions of women working in IT to enter, remain or leave IT work?

Sub-questions:

1. What is there about the culture of IT work that attracted you to this work?
2. How would you describe the culture of your organization?
3. How does this culture impact your decision to remain working in IT?
4. What is there about the IT workplace culture that might cause you to consider leaving your position in IT?

Significance of the Problem

It is suggested that given the current labor shortage in the IT industry, it has become more important than ever to reduce the factors that attribute to the reduction of women in IT careers (Ahuja, 2002; NCWIT, 2015). Women make up nearly 57 percent of the professional occupations in the 2014 U.S. workforce (NCWIT, 2015). Numerous researchers during the past decade suggest that diversity in the workforce can improve problem-solving, increase productivity, foster innovation, and ultimately impact the growth of the economy. It is critical to ensure that the future technology that is developed is as broad and innovative as the population it serves (Ashcraft & Blithe, 2010; Barker & Aspray, 2006; Papastergiou, 2008; Wulf, 1999). Recruiting a broad range of talents and backgrounds in the design of IT yields products and services that benefit society as a whole (NCWIT, 2006).

Women already employed in the technology industry are leaving at staggering rates. The productivity, innovation and competitiveness of the U.S. is threatened by this failure to capitalize on the available talent. We need to examine the reasons why the industry is not attracting more people with varied backgrounds and take action to curtail the current surge in order to further strengthen the position of technical leadership for U.S. leaders (Ashcraft & Blithe, 2010).

Women have described the workplace culture in IT as exclusionary, isolating and lacking in support for work-life balance. Tapia and Kvasny (2004) conducted a literature review and discovered that women perceive the IT workplace negatively, and that the environment lacked the equality they required in a job. They framed the work as difficult, isolated, lacking necessary social interaction, and lacking work-family balance. In a study by Way (2015), it was recommended that further research be conducted on the
workplace culture factors that attribute to the rising attrition rate among women in the IT industry.

Examining the IT workplace culture to explore what factors contribute to the attraction, retention and the reduction of women. This may lead to unearthing significant information that organizations can utilize to combat the shortage of talented and skilled professionals. Highly-qualified women are well-positioned to move into these open jobs. Innovation in IT industry will play a crucial role in virtually every area of the U.S. and the global economy. If we continue to fail to capitalize on the talented pool of women, it could result in weakening the U.S. productivity, innovation, and competitiveness in the IT industry.

Definitions

The following definitions were used in this study:

**Information Technology (IT)** can be defined as the utilization of computing through hardware, software, services and infrastructure to create, store, exchange and leverage information in its various forms to accomplish any number of organizational objectives (CompTIA, 2016).

**Information Technology (IT) Industry.** For the purpose of this study, it is the sector of the industry that provides computer related services, support, systems, the development of applications, websites and systems and encompasses the workers that develop, implement, maintain and utilize IT directly or indirectly (CompTIA, 2016).

**Information Technology (IT) occupations.** Computer and information technology occupations as defined by the United States Department of Labor (2015) are those of computer and information research scientists, computer network architects;
computer programmers, computer support specialist, computer system analysts, database administrators, information security analysts, network and computer system administrators, software developers and web developers.

**Intersectionality.** It is important to recognize that women and men are not homogeneous groups and that they vary in important ways when it comes to race, class, sexual orientation, ability, age, and other identity dimensions. This study aims to address some of these intersections. (NCWIT, 2016)

**IT professional** is defined in terms of technology as employees who are responsible for keeping abreast of the latest technological advancements, devising technical solutions for IT related business problems and supporting end users as users employ the technology (Rutner, Riemenschneider, O’Leary-Kelly & Hardgrave, 2011).

**Mid-career level** employees for this study are defined as people who have worked in IT for 10 to 20 years, but have not yet reached high-level leadership or management positions (Ashcraft, Eger & McClain, 2016).

**NCWIT.** The National Center for Women & Information Technology is a non-profit community of more than 850 universities, companies, non-profits, and government organizations nationwide working to increase women’s participation in computing and technology. NCWIT equips change leaders with resources for taking action in recruiting, retaining, and advancing women from K–12 and higher education through industry and entrepreneurial careers (NCWIT Fact Sheet, 2014)

**STEM** (science, technology, engineering, and math) is used to describe the study of and careers in these fields collectively (Science, Technology, Engineering and Math: Education for Global Leadership, n.d.).
**Work-life balance.** Refers to the process of negotiation of time and energy of the job and personal lives (Trauth, Quesenberry, & Huang, 2009).

**Workplace culture** is defined as an organization’s informal climate that defines how the organization develops, forms attitudes and builds behavior (Wang, Su & Yang, 2011).

**Delimitations**

This study was delimited to women in the information technology industry located in the state of California and those who have worked in a position in information technology for a minimum of four years. California has one of the nation’s largest concentrations of high-tech workers (Brookings Institute, 2016).

**Organization of the Study**

The remainder of this study is arranged into four chapters, followed by the references and the appendices sections. Chapter II gives a detailed review of women in IT careers examining the underrepresentation of women in the IT industry, the barriers for women in IT, the attrition of women in IT, diversity, and attracting and retaining women in IT. In addition, a review of the concepts of organizational culture focusing on IT culture and leadership. Chapter III details the methodology utilized for the study in conjunction with the sample, research design, data collection and data analysis procedures. Chapter IV discusses the study findings and data analysis. Chapter V provides a summary of the study along with major findings, implications for actions, recommendations for additional research and conclusions.
CHAPTER II: REVIEW OF THE LITERATURE

This chapter provides a detailed presentation of the significant literature providing a conceptual perspective of the study. The main areas are presented beginning with a review of women in IT occupations with a focus on women’s participation and the underrepresentation of women in the IT industry. Next, the deterrents to women in IT focusing on the barriers, diversity and the attrition of women in mid-level careers in IT is explored. Lastly, a review of the perspectives of organizational culture with a focus on the IT workplace culture and IT leadership influences on workplace culture. A literature review requires a synthesis of different subtopics to come to a greater understanding of the state of knowledge that exist on an issue. A synthesis matrix was created to sort, categorize and organize the literature reviewed for this study (see Appendix A).

Women in Information Technology Careers

Ashcraft, Eger, and McClain (2016) report that 57 percent of all professional occupations were held by women, but only a mere 25 percent of the computing occupations. According to the U.S. Department of Labor and Statistics, employment of computer and IT occupations is projected to grow by 12 percent from 2014 to 2024, faster than the average for all occupations. Yet for women, the participation rates continue to decline (see Figure 1). Since 1991, when it reached a high of 36 percent, the percentage of computing occupations held by women has been declining (Bureau of Labor, 2016). An even more alarming fact in a 2016 report by NCWIT is that there are even fewer women in software development, technology leadership, or other types of key roles that have a substantial influence on the future of innovation in the U.S.
Yet early on, women played an essential role in the IT industry. According to a report by American Association of University Women (AAUW), 2015, women had a significant presence in the early decades of computing. Ada Lovelace, who is considered the first computer programmer, was an early pioneer who lived in the mid-1800s. Women made up the majority of programmers during World War II (Abbate, 2012). Women were also part of the programming staff for the ENIAC (Electronic Numerical Integrator and Computer), America’s first electronic computer. The first programmers were Kay McNulty, Betty Snyder, Marlyn Wescoff, Ruth Lichterman, Jean Jennings, and Frances Bilas (Light, 1999).

Figure 1. Women in Computing Occupations

![Graph showing decline in women in computing occupations from 1985 to 2015.](image)

Figure 1. Decline in number of women in computing occupations. Adapted from Women in Tech: The Facts, 2016 Update by Catherine Ashcraft, Brad McLain, and Elizabeth Eger, 2016.

It is a benefit to society as a whole for women to be included in helping the United States build a strong technology presence, it is essential for America to build a “high tech future drawing from the broadest possible talent pool” (Information Technology Association of America [ITAA], 2005, p. 4). Furthermore, it is this untapped
talent that concerns many researchers (Lang, 2003). It is important to acknowledge that although women are equal consumers of IT products, these “same IT products and services are conceived and designed mostly without women’s input” (NCWIT, 2007, p. 14).

**Women’s Participation**

Ahuja (2002) argues that women make the important choices about selecting their desired career field during the career choice phase, and factors such as work life balance along with social expectations influence this decision. In addition, women are influenced by both industries and educational institutions. As stated earlier, there has been a continual decline of the number of women in IT since 1991, when it reached its highest point of 36 percent (Bureau of Labor, 2016). This is in contrast to other sciences during this same time period that have seen a significant increase in women’s participation (U.S. Department of Education, 2014).

Many studies found a disparity in the types of positions held by women versus men in IT. Hellens et al. (2000) disclosed that women are underrepresented in network and technical support, management and systems operations whereas women were highly represented in areas such as data entry, systems analysis, help desk and programming at a disproportionate level.

*Table 1- Percentage of Jobs Held by Women in Various Computing Occupations, 2015*

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Black/ African American Women</th>
<th>Latin/ Hispanic Women</th>
<th>Asian Women</th>
<th>White Woman</th>
<th>Women in Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer and information research scientists</td>
<td>-</td>
<td>-</td>
<td>8%</td>
<td>13%</td>
<td>19%</td>
</tr>
<tr>
<td>Computer and information systems managers</td>
<td>2%</td>
<td>1%</td>
<td>4%</td>
<td>20%</td>
<td>27%</td>
</tr>
<tr>
<td>Professional Role</td>
<td>2018</td>
<td>2019</td>
<td>2020</td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Computer systems analysts</td>
<td>5%</td>
<td>2%</td>
<td>8%</td>
<td>21%</td>
<td>34%</td>
</tr>
<tr>
<td>Information security analysts</td>
<td>3%</td>
<td>-</td>
<td>0%</td>
<td>14%</td>
<td>20%</td>
</tr>
<tr>
<td>Computer hardware engineers</td>
<td>1%</td>
<td>3%</td>
<td>4%</td>
<td>7%</td>
<td>13%</td>
</tr>
<tr>
<td>Computer programmers</td>
<td>2%</td>
<td>1%</td>
<td>5%</td>
<td>13%</td>
<td>21%</td>
</tr>
<tr>
<td>Software developers</td>
<td>1%</td>
<td>1%</td>
<td>7%</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>Web developers</td>
<td>4%</td>
<td>1%</td>
<td>5%</td>
<td>25%</td>
<td>34%</td>
</tr>
<tr>
<td>Computer support specialists</td>
<td>4%</td>
<td>2%</td>
<td>2%</td>
<td>19%</td>
<td>26%</td>
</tr>
<tr>
<td>Database administrators</td>
<td>2%</td>
<td>1%</td>
<td>4%</td>
<td>29%</td>
<td>38%</td>
</tr>
<tr>
<td>Network and computer system administrators</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
<td>13%</td>
<td>16%</td>
</tr>
<tr>
<td>Computer network architects</td>
<td>4%</td>
<td>2%</td>
<td>1%</td>
<td>8%</td>
<td>12%</td>
</tr>
<tr>
<td>Operations research analysts</td>
<td>10%</td>
<td>5%</td>
<td>2%</td>
<td>37%</td>
<td>51%</td>
</tr>
</tbody>
</table>

Note: Estimates for the above race groups (White, Black or African American, and Asian) do not sum up to the totals because data was not presented for all races. Given the way Department of Labor (DOL) categorizes the data, persons whose ethnicity is identified as Hispanic or Latina may be of any race. Updated population controls are introduced annually with the release of January data. Dash indicates no data or data that does not meet publication criteria (values not shown where base is less than 50,000).

This is adapted from NCWIT (2016) and the U. S. Department of Labor (2016).

**Education in Computing.** The number of women enrolling in university technology programs have remained steady in some areas and declined in others over the last 10 years (Magder, 2012). Women obtain 57 percent of undergraduate degrees but only 18 percent of those undergraduate degrees are in computing and information sciences (Ashcraft, C., Eger, E., & Friend, M., 2012). A study by Croasdell et al. (2011) determined that there are three significant reasons why women choose to pursue a major in information systems. These are (1) a sincere curiosity in the subject, (2) the belief that industry provides many employment opportunities, and (3) a belief that it was a respectable career. These conclusions were also supported in the study by Gutierrez
(2015), which found that as women embraced technology and developed an increased interest in the field, their perceptions that a career in IT offered more opportunities also increased.

A report by AAUW (2010) stated the transition between high school and college is a crucial time when many young women decide not to choose a STEM career path. The majority of college students are women, but they are far less likely than their male counterparts to pursue a major in a STEM. Heinze and Hu (2009) researched the factors that affected college undergraduates’ choice to pursue a major in IT. The study found that attitudes about IT influenced the student’s selection of an IT major. The study suggested that negative stereotypes have a tendency to influence a student’s attitude, and the social aspect of the IT industry should be examined to improve efforts to attract a broader range of IT professionals.

AAUW (2015), reported that women’s representation among engineering and computing graduates is much smaller than among the bachelor’s degree recipients overall, where women reached parity with men in 1985 and earned 57 percent of the degrees awarded in 2013. In comparing the percentages of women receiving degrees in computing in 2013 to that of men (see Figure 2), it is seen that the proportion of women earning computing bachelor’s degrees also varied by discipline. General computer and information sciences is the largest discipline in terms of its popularity, making up more than a third of all bachelor’s degrees awarded in 2013. Only 18 percent of these were awarded to women.

Many qualified women enter STEM majors in college. Both male and female first-year-STEM majors alike take and earn high grades in the prerequisite math and
science classes in high school and exhibit self-confidence in their math and science aptitudes (Brainard & Carlin, 1998; U.S. Department of Education, National Center for Education Statistics, 2000; Vogt et al., 2007).

Figure 2 - Bachelor’s Degrees Awarded in Computing, by Gender and Discipline, 2013


A study by Mosco (2009) suggests that the problem with underrepresentation of women in computing does not stem from what is termed as a “leaky pipeline”.

However, contrary to Mosco (2009), many studies suggest that the lack of women in the computing field is chiefly a leaky pipeline issue which is a concept generally used to
refer to the steady attrition of women throughout the formal computing system, from primary education to decision-making (Beyer, DeKeuster, Walter, Colar, & Holcomb, 2005). A leaky pipeline was also described as the act of women leaving the field after high school, during college, or before beginning a job in the field due to losing interest in IT at a higher rate than men at different stages in their education and entrance into the job market (Gurer & Camp, 2002; Woszczynski, Myers, & Beise, 2003). Some authors suggest that the IT pipeline begins as early as age 11 when girls decide on their interest in math and the sciences (see Table 1), which are essential for pursuing a career in IT (Adya & Kaiser, 2005). In addition, one earlier study suggests that by the end of middle school, students developed the notion that mathematics, sciences, and computing fields were for white males (Clewell & Braddock, 2000). Proponents of the “leaky pipeline” theory generally assert that female interest in technology decreases through college student and early working years (Gurer & Camp, 2002). However, Mosco (2009) suggests that it may not be that females are leaking from the pipeline at greater rates than males, but instead, they may not be entering the pipeline at all. There are many researchers that support that the underrepresentation of women in IT leadership is also related to a reduction in the number of women entering the pipeline in the first place (McKinney, Wilson, Brooks, O’Leary-Kelly, & Hardgrave, 2008; Sumner & Niederman, 2004). Contrary to earlier studies, a study by Gutierrez (2015) suggests that one characteristic of the workplace cultures that was influential to women being attracted to IT careers was a true interest in technology.

Furthermore, these perceptions are found to exist more often for women than for men (Trauth, 2002). Some suggest that this is due to the many school teachers lacking
sufficient training and providing more emphasis on male students than female students; this act is in complicity with the gendered binary of masculine domination in the fields of mathematics, sciences, and computing (Barker & Aspray, 2006). The ideas held by females of who should participate in what field serves as a factor in evaluating the impact of the educational pipeline on the students’ undergraduate years.

Table 2 Percentage of girls interested in pursuing computing versus other selected careers

<table>
<thead>
<tr>
<th>% GIRLS INTERESTED IN PURSUING COMPUTING VS OTHER SELECTED CAREERS</th>
<th>STEM GIRLS</th>
<th>NON-STEM GIRLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine/Healthcare</td>
<td>65</td>
<td>32</td>
</tr>
<tr>
<td>Arts/Design</td>
<td>64</td>
<td>70</td>
</tr>
<tr>
<td>Social Science</td>
<td>60</td>
<td>48</td>
</tr>
<tr>
<td>Entertainment</td>
<td>59</td>
<td>67</td>
</tr>
<tr>
<td>Communications/Media**</td>
<td>58</td>
<td>59</td>
</tr>
<tr>
<td>Physical/Life Sciences</td>
<td>57</td>
<td>15</td>
</tr>
<tr>
<td>Community/Social Services**</td>
<td>57</td>
<td>51</td>
</tr>
<tr>
<td>Education*</td>
<td>44</td>
<td>38</td>
</tr>
<tr>
<td>Business/Finance</td>
<td>43</td>
<td>29</td>
</tr>
<tr>
<td>Law</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td>Engineering</td>
<td>32</td>
<td>3</td>
</tr>
<tr>
<td>Math</td>
<td>31</td>
<td>5</td>
</tr>
<tr>
<td>Architecture</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>Stay-at-home mom**</td>
<td>30</td>
<td>34</td>
</tr>
<tr>
<td>Computer Science/Information Technology</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>Software Development</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>Protective Services</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>Manufacturing/Production**</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Armed Forces</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Construction/Installation/Maintenance/Repair</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

*Significant only at 90% confidence. **Not statistically significant. All others significant at 95% confidence.

Adapted from Girl Scout Research Institute (GSRI), Generation STEM report, (2012).
Underrepresentation of Women in the IT Industry

The underrepresentation of women in the IT workforce has consistently been a problem for the IT industry and academia for many years and it continues today. Gender inequity in IT careers is well documented (Ahuja, 2002; Beise, Myers, VanBrackle, & Chevli-Saroq, 2003; Sumner & Niederman, 2004; Trauth, Nielsen, & von Hellens, 2003; von Hellens, Pringle, Nielsen, & Greenhill, 2000; West & Bogumil, 2001). The IT industry continues to vacillate in approaches to attracting women to the industry, but more importantly it fails in attracting a significant number of women that have sustained interest in IT or computer science and have achieved a formal degree within the field (NCWIT, 2009).

According to Lemons and Parzinger (2007), in spite of the need for qualified IT personnel, women are underrepresented. This is a very critical and current problem that warrants further research as women represent half of the population in many societies, and in addition, women represent half of the labor force but are significantly underrepresented in the IT fields (Trauth, 2011).

The underrepresentation of women in the IT workforce cannot be attributed to a single factor or barrier. There are many factors such as gender stereotypes, lack of mentors and role models, gender bias, self-efficacy and work life balance that can contribute to the underrepresentation of women in IT (Carver, 2000).

Gender Stereotypes

Serva, Baroudi, and Kydd (2009) defined stereotype as a threat that occurs when one person in a group is labeled with certain negative characteristics. Stereotyping has the ability to increase apprehension causing a person to exhibit lowered performance.
According to Heilman (2001), gender stereotyping can be defined as descriptive and prescriptive. Descriptive gender stereotyping describes what women and men are like, whereas prescriptive, on the other hand, describes what men and women should be like and creates normative expectations of the behavior of men and women. Whether descriptive or prescriptive, gender stereotyping produces expectations that may have a negative impact on a woman’s career progress. Gender stereotyping is also coupled with workplace discrimination and unequal success of men and women in the workplace (Eagly & Mladinic, 1994). Such effects are intensified in environments perceived to be masculine (Heilman, 1995).

Numerous research is available addressing different aspects of gender stereotyping of women in the IT field (Duehr & Bono, 2006; Lemons & Parzinger, 2007; Serva, Baroudi, & Kydd, 2009). Jepson and Perl (2002) found that the nerdy image which is perceived as male, of IT people was one of the six reasons that girls did not select IT careers. Duehr and Bono (2006) conducted a study on gender and management stereotypes perceived by students for male and female managers in order to complete a comparison to those evident 30 years ago. According to the study, male managers tended to characterize women as being less passive and submissive and more confident, ambitious, analytical, and assertive than previous years. This study also suggested that women stereotypes might be changing. The men perceived the women as more like leaders than they did 15 to 30 years ago when men viewed women as having fewer characteristics of a successful leader.
Lack of mentors and role models

Mentors and role models are valuable assets required to build strong networks and relationships in organizations. Networks are essential in providing guidance on understanding industry tricks of the trade, accessing potential job opportunities, recommending education and training, and making allies that can foster opportunities to close the gender gap in leadership positions (Cohoon & Aspray, 2006; Ahuja, 2002).

It is helpful to young women to be able to identify with role models who are visible and successful women in IT professions, otherwise a young woman may be less likely to consider a career where there is few or no women in which to associate (Aspray, Cohoon, & McGrath, 2006). If fewer women are in leadership positions, young women have less access to possible role models. According to the 2014 Harvey Nash CIO survey, women held only seven percent of chief information officer (CIO) positions globally, which was down two percent from the previous year. In the 2016 report by NCWIT, eleven percent of CIO positions were held by women in the United States and women made up only four percent or 20 of all CEOs in S & P 500 companies. Furthermore, of the 20 women, five were in tech-related industries (HP, IBM, Yahoo, Oracle, and Xerox).
Figure. 3 - Lack of Role Models

Adapted from the NCWIT (2016) report.

The NCWIT (2016) report also stated that women in the field of technology identified isolation and a lack of mentorship or sponsorship as one of the key blockades to their retention and advancement. In one large-scale study, 30 percent of women in private-sector science, engineering, and technology (SET) jobs said they felt extremely isolated at work (Hewlett et al., 2014). In a prior study, 40 percent of U.S. women in SET jobs reported lacking role models, while nearly half reported lacking mentors, and 84 percent reported lacking sponsors—i.e., someone who would help make them and their accomplishments visible with the right people at the right time within the organization (Hewlett et al., 2008). In another study, more than one-third of women
perceived that the following affected their ability to advance to either a “great” or “very great” extent (Simard et al., 2008):

- Absence of mentors, sponsors, or champions who make their accomplishments visible
- Absence of role models
- Being left out of the key decision-makers’ networks

Also stated in the report was that the experience of isolation reduced a sense of belonging for many females, and it negatively affected their ability to fully develop their talents (NCWIT, 2016). According to The Athena Factor: Reversing the Brain Drain in Science, Engineering, and Technology (2008), isolation is a serious problem because it takes a toll on job satisfaction and engagement. The report stated that women who are isolated are 13% more likely to report being unsatisfied with their job. More importantly, women who are not satisfied with their job are 22 times more likely to leave. Clearly there is a need for further research on the effects of role models, mentors, and isolation on women’s career choices in IT (Aspray, Cohoon, & McGrath, 2006).

**Gender bias**

Gender bias infiltrates the performance review and promotion process in IT organizations. In one study, nearly half (46 percent) of technical women reported that gender bias influences performance evaluations (Armstrong et al., 2012; Hewlett et al., 2008). Likewise, one in four technical women reported that women are often viewed as inherently less skilled than men in their companies (NCWIT, 2016). This is more than in sciences overall, where only 16 percent report this phenomenon (Hewlett et al., 2008). Armstrong et al. (2012) conducted comparative studies of research in 2006 and in 2012
on the perceptions of women working in the IT industry. The study suggested that subtle discrimination toward females existed before and after both data sets were analyzed concluding that this discrimination may lead to stress, decreased organizational commitment, and turnover predictors for women.

There has been extensive research on the candidate selection processes, recommendation letters, and performance evaluations which confirms the prevalence of gender bias in these processes (NCWIT, 2016). In addition, many studies demonstrate that recommendation letters for men, regardless of if written by a man or a woman, tended to be longer and contain more “standout” language (excellent, superb) than letters for women (Moss-Racusin et al., 2012; Trix & Psenka, 2003). In comparison, letters for women included more “doubt-raisers”, phrases such as “she had a somewhat challenging personality” and “grindstone”—adjectives that made a woman appear like a conscientious secretary with attributes such as “meticulous and reliable” (NCWIT, 2016). Likewise, men’s accomplishments were accredited to effort and individual skill, while women’s accomplishments were more likely to be attributed to luck and easy assignments (NCWIT, 2016).

**Self-efficacy**

Albert Bandura (1974) defined self-efficacy as how one perceives one’s capabilities to meet goals that one has established for oneself. Similarly, Michie and Nelson (2006) defined self-efficacy as the belief in a person’s own abilities to perform “job duties and educational requirements associated with a particular occupation” (p. 13). Sumner and Niederman (2004) defined self-efficacy as “the positive expectation that what needs to be done can be done” (p. 30). In addition, Smith (2005) terms
computer self-efficacy as “an important personal trait that influences an individual’s decision to use computers” (p. 15). The problem surrounding self-efficacy for women in IT is that many extremely qualified women found themselves not interested in developing self-efficacy because of their workplace environment (Appelbaum et al., 2011).

It has been found that self-efficacy plays an important factor in student retention in the field of IT, and it is proven to be an essential predictor of how well an IT student continues to be in the pursuit of a career in the IT field (Weng, Cheong, & Cheong, 2010).

The study conducted by Michie and Nelson (2006) included one hundred and forty graduate and MBA students attending a U.S. university who had strong backgrounds in engineering, computer science, software technology, and telecommunications and consisted of forty-four females and ninety-six males. It found that occupational self-efficacy and self-confidence for women had an impact on their ability to advance into IT leadership positions. The study also found that many women in IT who were initially enthusiastic gradually lost their passion for technology, and their self-efficacy declined because of the “repeated exposure to biased environments, negative comparisons to peers, poor pedagogy, and loss of confidence” (Michie & Nelson, 2006, p. 15).

Another study conducted by Croasdell et al. (2011) suggests that women must have a real personal interest in the study of IT in order to make the decision to major in IT. However, Guzman and Stanton (2009) found that the more work-experience a person had in the IT field, the more positive perceptions the person had about all aspects
of the IT occupational culture in comparison to people with less work experience in the IT field. The study also found that those with more experience reported higher self-efficacy or confidence in their ability to meet the demands of the IT occupation, and they had an increased level of integration of IT into activities that were non-work, as they acquired more experience in the IT field which they termed “IT pervasiveness” (p. 176).

**Work Life Balance**

Work-life balance is a vital issue for employees, and it is especially so for women in computing. Researchers have broadly studied work-life balance struggles and its effect on women’s career choices and perseverance (Allen, Armstrong, Riemenschneider, & Reid, 2006; Quesenberry, Trauth, & Morgan, 2006; Reid, Allen, Armstrong, & Riemenschneider, 2010). Trauth et al. (2009) defined the term “work-life balance” as referring to the negotiation of time and energy demands between one’s personal and professional lives. Work-life balance struggles occur when the demands of family life and career result in a negative effect on one’s quality of life. Researchers do not all agree as to how this impacts the culture of IT workers (Ahuja, 2002; Quesenberry, Trauth, & Morgan, 2006).

In a study by Way (2015), the researcher suggests that even though there is available technology that could facilitate women to have flexibility to work outside of the office, but the fast pace of change in technology coupled with the high expectations of the industry puts pressure on the IT employee to work extended hours and to continuously retrain. IT professionals, specifically, are faced with unusual work-life balance struggles because of the prevalence of excessive projects, stringent
deadlines and business hours outside of the normal nine–to-five responsibilities that result in higher rates of turnover as compared to other professions (Borges, 2013).

Similarly, in a study conducted by Kaminski and Reilly (2004) that included twenty participants—twelve women and eight men working in IT careers that ranged from three months to twenty-one years—found that 75 percent of the participants stated that they worked long hours but their schedules were flexible because they could choose when they worked. The study also revealed that IT employees still worked nights and weekends in addition to the traditional hours. An interesting finding from this study stated that 70 percent of the participants were well balanced between work and family life, but the researchers noted that the majority of participants did not have children and were younger which could have possibly distorted the findings. The study also stated that among those who described a good work-family balance, some attributed it to support from the organization, and others stated that they did not sacrifice personal time in exchange for their careers.

According to an extensive study of women working in SET fields, Hewlett et al. (2008) revealed that women working in technology positions in the U.S. worked an average of 62 hours per week and often worked with clients and coworkers in different time zones. In addition, the results of this study stated that technology professionals were more likely to work flexible schedules in comparison to the other two fields examined.

Work-life balance is an important issue for workers, especially women, in engineering and computing. Some researchers argue that rather than work-life balance, the real issue is a “culture of overwork.” Organizational cultures of overwork result in the dissatisfaction among women and men (Padavic & Ely, 2013).
Attrition Rates among Women in IT

Attrition rates among females is higher in technology (see Figure 2) than in science and in engineering. In all cases, the quit rate for women is higher than it is for men. In the high-tech industry, the quit rate is more than twice as high for women (41 percent) than it is for men (17 percent) (Hewlett et al., 2008). A report by NCWIT (2016) suggests that some of the most significant factors that contribute to female attrition from the IT are workplace conditions, a lack of access to key creative roles, and a sense of feeling stagnant in one’s role.

Leaving Technology. A study by Center for Talent Innovation (2008), identified that nearly half of the women who left the SET private sector continued to use their technical training in jobs in other sectors (e.g., non-profit, government, or startup companies). The other 31 percent that remained in the workforce took a non-SET job, sometimes at the same company but more often at a different company (Hewlett et al., 2008).

According to NCWIT 2016, workplace experiences emerge as one of the most significant variances between women who stay in computing and those who chose to leave. In another recent study of approximately 5,500 technical women, Fouad, Singh, Fitzpatrick, and Liu (2012) set out to understand what factors influenced women’s decisions to leave or remain in engineering. Of the women surveyed, among all who held engineering degrees, more than half of them were currently working as engineers, approximately 25 percent had left the field after working for several years, and another 25 percent never entered engineering.
**Attracting and Retaining Women**

IT organizations are gradually working to improve hiring and retention practices to attract and retain larger percentages of women to the workforce, recognizing women’s natural and unique characteristics of paying attention to detail, conflict resolution, creativity in problem solving, and innovation (Adam, 2014; NCWIT, 2016; Way 2009). Companies are seeking ways to retain women in IT because of the demand for women’s capabilities (Gutierrez, 2015, NCWIT, 2016).

**Figure 4. Female quit rate across SET**

![Bar chart showing quit rates for different occupations]

Adapted from the NCWIT (2016) report.

**Organizational Culture**

There have been extensive studies on organizational culture which is described as consisting of a set of shared beliefs, languages and values and expectations inside an organization (Roldan, Soe, & Yakura, 2004; Trauth, Quesenberry, Lemons & Parzinger,
Culture can be defined as “a pattern of underlying assumptions, a pattern that is implicit, taken for granted and unconscious unless called to the surface by some process of inquiry” (Schein, 1985, p. 23). Organizations develop powerful cultures that guide the thinking and behavior of their employees (Denison, 1997; Hofstede & Hofstede, 2005; Schein, 1999). Although there is no clear consensus on a definition of organizational culture (Martin, 2002; Zammuto et al., 2000), and many researchers have adopted Schein’s (1999) three-dimensional view of organizational culture as consisting of the assumptions, values, and artifacts developed within organizations (i.e., Jones et al., 2005), there is an agreement that organizations have subcultures within them (i.e., Hofstede, 1998; Martin, 2002; Schein, 1999; Trice, 1993).

The study by Michie and Nelson (2006) found that cultural factors contribute to women entering, remaining or leaving IT careers, and these effects can be seen as early as childhood. They found that when girls were allowed to play with computers in the home environment, they had a tendency to be interested in technological majors in college. In corporate culture there is a potential for obstacles that prevent the advancement of women in the IT field. Traditionally, young girls are taught to be caregivers and nurturers in contrast to boys who are taught to be competitive and tough. These behaviors, in many cases, carry over to the workplace cultural climate (Lemons & Parzinger, 2001).

Origins of occupational cultures began with the interactions that occur between people, and those people may formulate specific ways of handling occupational challenges that evolve into a group acceptance of practiced and stated work-place cultural norms (Trice, 1993). Subsequently, people who do not practice and endorse
dominant cultural norms become insignificant; thus, they may be disciplined or dispelled (Trice, 1993). Seminal work by Robey and Azevedo (1994) and by Robey and Boudreau (1999) has focused on theories of organizational culture as a way to explain the contradictory consequences of IT within organizations. An important contribution of such literature has been to present the view that IT is symbolic (Feldman & March, 1981; Robey & Markus, 1984; Scholz 1990) and, therefore, subject to the various cultural interpretations of those using it. In addition, according to Trice (1993), given that culture is a common ideology in occupational life, members would begin to embrace ethnocentrism or a sense of togetherness that impels members to form loyal cliques.

Fundamentally, acceptance and belonging to a culture can perpetuate the requirement to follow the beliefs and behaviors of other people. The key idea of consequential belonging stimulates an organizational culture that continues to inherit philosophies that do not account for the differences in the women’s current workplace experiences, and the workplace experiences of members that abide by are considered proponents of the cultural norm (Fortado & Fadil, 2012). However, current views on organizational culture have shifted to being thought of as less of a permanent state to more of an asset that organizations can use to manipulate based on their needs (Fortado & Fadil, 2012).

Frieze, Hazzan, Blum, and Dias (2006) argued that women need a female friendly environment to participate and be successful in computer science. Cultural conditions can attribute to the way men and women related to IT, and are how they are being molded by those people already in the organization. Women may experience a
lack of confidence stemming from the perceptions of the IT organizational culture based on the field being characterized and associated as a male dominated field (Gutierrez, 2015; Way, 2015). According to Heinzl and Leidner (2012), the concept of culture relates to the national, organizational, and professional attitudes, values, goals, and practices of the respective fields involved, and cultural intelligence is an essential skill for avoiding problems along with ensuring a proper fit among the individual, task, and information elements of information systems technology.

In a study by Wentling and Thomas (2009), participants were asked to describe their current workplace culture and environment based on several characteristics, and the researchers found that the ten most frequently mentioned characteristics were male-dominated (“good old boy” culture) (20, 80%), results-driven culture (14, 56%), teamwork oriented (14, 56%), high accountability (12, 48%), diversity not valued (10, 40%), very competitive (10, 40%), challenging, 9 (36%), fast-paced (8, 32%), intellectual, logical thinking, (7, 28%), and problem-solving focused (7, 28%). The findings of this study showed that the workplace culture characteristics identified by the study participants had both positive and negative aspects.

**Information Technology Culture**

A culture may exist within an occupation such as IT (Fu, 2010; Guzman, Stam, & Stanton, 2008; Guzman & Stanton, 2009). An occupational culture comes into place when people in an occupation have a shared set of behaviors and language that is independent of the organization. Once an organization has established a culture, the elements of that culture will be passed on to the members and future members (Louis, 1980; Schein, 1968; Van Maanen, 1976; Van Maanen & Schein, 1979). According to
Guzman, Stam, and Stanton (2008), the field of IT is a unique occupation that has a similar culture that can be found in IT departments across many organizations.

IT occupations exhibit forms, ideologies, and behaviors that uniquely identify its members. These members inhabit a distinct and identifiable IT occupational culture (Duliba & Baroudi, 1991; Guzman et al., 2008; Orlikowski & Baroudi, 1989). Likewise, there are various characteristics of an IT occupational culture (Fu, 2010; Guzman, Stam, & Stanton, 2008; Guzman & Stanton, 2009) aggressive demands for extended work hours, technical jargon that is used by those included in the culture, the necessity for continued technical learning, an increased usage of technology during non-work time and attitudes of superiority over the users of systems they support. These occupational traits were found to exist most often in workers that had more than five years of IT experience (Guzman & Stanton, 2009).

Women must interpret and perceive the organizational cultural of IT as one that provides them with a chance to be effective, proficient and productive in the role of an IT professional. An obvious challenge due to the underrepresentation of women in the IT sector is the lack of self-confidence that is a result of a self-imposed psychological barrier, which is a common psychological development in male-dominated work environments (Appelbaum et al., 2011). Similarly, research from Nielsen, Von Hellens and Beekhuyzen (2004) indicated that the masculine occupational culture within the IT field influences how organizational culture may impact the perceptions of women working in IT.

A study by Tapia and Kvasny (2004) stated that women perceived the IT workplace negatively and felt it lacked equality. The work was described as difficult,
isolating, lacking necessary social interaction, and lacking work-family balance.

Notably, Soe and Yakura (2008) explained that organizational culture and climate are critical to attracting and retaining women. Furthermore, the authors suggested that the higher percentage of men rather than women being hired and promoted in IT organizations indicates that the perception of the IT organizational climate is uncomplimentary toward women.

**IT Leader’s Impact on Workplace Culture**

Leadership is a crucial and influential role that is central to the molding of cultural behaviors. According to Robinson (2001), “leadership is exercised when ideas expressed in talk or actions are recognized by others as capable of progressing tasks or problems which are important to them” (p. 93). Workplace culture contributes significantly to the establishment of norms and expectations about leadership by defining what competent and effective leadership means (Hickman, 1998; Schein, 1992). The relationship between leadership and workplace culture, nevertheless, is complex because leaders themselves also play an important role in the creation, maintenance, and change of workplace culture (Neuhauser, Bender, & Stromberg, 2000; Parry & Proctor-Thomson, 2003; Schein, 1992). The appropriate management of a diverse workforce is critical for organizations that seek to improve and maintain their competitive advantage (McLean, 2003; National Science Foundation, 2004; Society of Human Resource Management, 2005).

Many women in IT described their workplace environments as non-inclusive and that it left them feeling isolated as stated in the NCWIT 2016 report (2016). A supportive, feminine organizational culture values and respects participation,
collaboration, egalitarianism, and interpersonal relationships (Maier, 1999). According to Loden (1985), there is less emphasis on hierarchical control; the supportive organizational culture focuses on group rather than individual rewards and places less emphasis on extrinsic rewards relative to intrinsic rewards. The role of IT leadership is to foster these workplace cultures.

Schein (2010) noted “that culture and leadership are two sides of the same coin in that leaders first start the process of culture creation when they create groups and organizations” (p. 22). The cultural values associated with a supportive workplace culture promote a balance of career and family roles, while competitive organizational cultures’ value commitment to the organization and the expectation that an employee’s career should be given priority over other roles (Maier, 1999).

Cultural understanding is essential to leaders in IT organizations. If elements of an organization culture become dysfunctional, it is the responsibility of the leadership to be aware of the dysfunctional and functional elements in order to manage how the culture will evolve and change so that the organization can survive (Schein, 2010). This is clearly stated by Schein (2010) as “the bottom line for leaders is that if they do not become conscious of the cultures in which they are embedded, those cultures will manage them” (p. 22).

**Summary**

The review of literature exposed that there are identifiable indications of organizational cultural characteristics that serve to influence the career decisions of women to enter, remain or leave the IT industry. The research indicated that the underrepresentation of women in IT might have prevented organizations from obtaining
the number of qualified IT professionals to meet the increasing demand for IT talent (NCWIT, 2016). Currently, with the rapid growth of the IT industry in the U.S., it is critical that organizations find ways to increase the pool of qualified IT professions, and women need to be inclusive in this pool.

The research also uncovered that organizations need to move beyond the obstructing factors that contribute to the underrepresentation of women in IT. The IT industry and the organizational workplace cultures need to find more creative ways to foster environments that allow women to feel included and allow for women to have career advancement opportunities.

One of the primary factors that emerged from the research related to women’s experience of the workplace environment was that women who left were less likely to report opportunities for training and development, support from a manager, and support for balancing work and other competing responsibilities. In addition, they were also more likely to report undermining behavior from managers. This seeks to the need for leadership to be cognitive of the impact of creating workplace cultures where women have opportunities to advance and strive (NCWIT, 2016).

Even though research shows a critical need for a talented pool of IT professionals, the outcome for women consistently over the past years have shown a raise in attrition, a decrease in women entering into majors in computing, and a growing underrepresentation of women in the IT industry. The current research suggests that the IT industry appears propitious, and the literature unfolds many areas where improvement may have a significant impact on reducing the attrition rate among women, increasing the representation of women and fostering an inclusive work culture. Carayon, Hoonakker,
Trauth, Quesenberry, and Yeo (2008), and Weinberger (2003) suggest that workplace
culture can significantly affect women’s ability to enter and remain in the IT industry.
CHAPTER III: METHODOLOGY

Overview

This chapter describes the methodology that was used for the study. The research purpose statement and questions are presented in order to outline the basis for the study. The research method for the study was a qualitative, exploratory case study methodology and design. The phenomenological research method was selected to examine the opinions, feelings and experiences of women who have IT careers and what factors in the workplace culture impacted, influenced or were attributed to them entering, remaining or exiting the industry. Phenomenological research is a qualitative strategy wherein the researcher pinpoints the essence of human experiences about a phenomenon as described by participants in the study (Creswell, 2013).

This study seeks to explore the phenomenon by carefully and thoroughly capturing and describing how the women experienced the phenomenon—how they perceive it, describe it, feel about it, judge it, remember it, make sense of it, and talk about it with others (Patton, 2014). The study may have revealed the meanings of the perceptions that IT women have developed while working within their organizational culture.

Interviews were conducted through face to face, live chat technology, video-conference or telephonic interviews, contingent upon the availability of each participant. All interviews were audio recorded and transcribed. Standardization was maintained by using the same interview questions and sequence with each participant regardless of the format. The interview schedules and research design were approved by the Brandman University Institutional Review Board (BUIRB) prior to data collection (see Appendix
The data-collection procedures were designed to protect the rights of the participants (McMillan & Schumacher, 2010; Patton, 2002). The identities of the participants were available only to the researcher and the chair of the dissertation committee.

Other types of research methods were considered such as ethnography which could lead to investigating the culture of the women leaving IT and exploring their related behaviors and perspectives. Narrative theory could also have been utilized to investigate a woman who has lived the experience of leaving IT. Qualitative analysis encompasses interpreting interviews, observations, and documents, hence the data of qualitative inquiry is utilized to find substantively meaningful patterns and themes (Patton, 2014).

**Purpose Statement**

It was the purpose of this phenomenological study to understand how workplace culture impacts the career decision of women working in IT to enter, remain or leave work.

**Research Questions**

**Central Questions**

What are the perceptions and experiences of workplace culture on the career decisions of women working in IT to enter, remain or leave IT work?

**Sub-questions:**

1. What is there about the culture of IT work that attracted you to this work?
2. How would you describe the culture of your organization?
3. How does this culture impact your decision to remain working in IT?
4. What is there about the IT workplace culture that might cause you to consider leaving your work in IT?

**Research Design**

Phenomenological research design is centered on situations in which the understandings result from the accounts of the lived experiences in order to develop meaning, essences or structures that pertain to those experiences (Moustakas, 1994). A phenomenological study (as opposed to a phenomenological perspective) is one that focuses on descriptions of what people experience and how it is that they experience what they experience (Patton, 2014). Phenomenological research is a design based on inquiry derived from psychology and philosophy where the researcher expresses the lived experiences of individuals regarding a phenomenon as depicted by the participants. This depiction culminates in the heart of the experiences for several individuals who have all experienced the phenomenon. This design has strong philosophical foundations and characteristically involves conducting interviews (Giorgi, 2009; Moustakas, 1994).

This qualitative study seeks to capture the experiences and feelings of women working in the IT industry; therefore, a phenomenological method is suitable for this study. The benefit of using a qualitative research method in the study of IT is its usefulness in gaining knowledge associated with complexities that are connected with introduction, management and utilization within organizations and society as a whole (Galliers & Huang, 2012).

Qualitative research has several core characteristics (Creswell, 2013). The most commonly identified characteristics are natural settings, researcher as a key instrument, multiple sources of data, inductive and deductive data analysis, participants’ meaning,
emergent design, reflexivity and holistic account (Creswell, 2013; Hatch 2002; & Marshall & Rossman, 2011). These characteristics are most commonly agreed on as what constitutes qualitative inquiry (Creswell, 2013).

According to Patton (2015) “Qualitative inquiry is personal” (p. 3). The qualitative method was selected because this study sought to explore the interpersonal experiences of the participants. Qualitative research is a method for exploring and understanding the meaning individuals or groups attribute to a societal or human problem (Creswell, 2013). The objective of the study was to explore the experiences, feelings and perceptions in order to obtain knowledge of the factors that influence women in IT to enter, remain or leave the industry.

According to Patton (2015), “Phenomenology aims at gaining a deeper understanding of the nature or meaning of our everyday experiences” (p.115). It is appropriate to utilize qualitative methodology when a study seeks to understand the influences of a culture on a specific phenomenon (Cooper & Schindler, 2011). The significance of phenomenology is that it allows for the investigation and prioritization of how human beings experience the world (Patton, 2015).

The essence of organizational culture is derivative of shared basic assumptions that impact how behaviors are enacted and how people relate to other people within an internal organization (Schein, 2010). Organizational culture is an imperceptible construct of perceptions that is often an unseen influence in the veracities in the workplace (Schabracq, 2007). Since organizational culture is grounded in the perceptions and understandings of its members, the characteristics are studied more appropriately through a qualitative method (Schein, 2010).
Population

Population is defined by Gay and Airasian (1996) as the group of interest to the researcher, the group for which she or he would like the results of the study to be generalizable. A research population is also known as a well-defined collection of individuals or objects known to have similar characteristics. All individuals or objects within a certain population usually have a common, binding characteristic or trait (Creswell, 2012). In addition, a population is the total of all the individuals who have certain characteristics and are of interest to a researcher (Creswell, 2012).

The population for this study consisted of women who worked in IT in the United States. US Labor and Statistics (2016) states that there were 3.9 million computing and IT jobs, and women held 25 percent of these positions. This suggests that there are 957,000 women working in IT and computing nationwide. In a recent report by Brookings Institute (2016), California has one of the nation’s largest concentrations of high-tech workers. The capacity to access the sources and examples of the phenomenon that exist in a suitable setting is essential to the success of a research study (Marshall & Rossman, 2011).

A target population for a study is the entire set of individuals chosen from the overall population for which the study data are to be used to make inferences. The target population defines the population for which the findings of a survey are meant to be generalized, and it is important that target populations are clearly identified for the purposes of research study (McMillan & Schumacher, 2014). Computing occupations consist of computer and information research scientists, computer network architects, computer programmers, computer support specialists, computer systems analysis,
database administrators, information security analysts, network and computer systems administrators, software developers, and web developers (U.S. Bureau of Labor Statistics, 2015). The target population for this study consisted of women working in IT occupations in the state of California. In a report by CompTIA (2016), the state of California had the highest number of tech industry workers at 1,150,000. According to the U.S. Bureau of Labor Statistics (2015), approximately 25 percent of those workers were females accounting for an approximate population of 287,500. The sample utilized was derived from this target population.

Sample

A sample is a group of subjects from which the data is collected representing a “specific population” (McMillan & Schumacher, 2014, p. 6). To purposefully select participants means to select individuals who will best help understand the research problem and the research questions (Creswell, 2014). According to Patton (2002), purposeful sampling in qualitative research as “selecting information-rich cases for in-depth study” (p. 242). Purposeful sampling was used for this study. A small sample size is generally used by qualitative researchers (Maxwell, 1998), because it is such a rigorous and systematic methodology (Moustakas, 1994). The benefit of qualitative sampling is that a smaller number of participants are studied in depth, which provides multiple insights about the topic (McMillan & Schumacher, 2010).

Identifying a sample is the process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected (Roberts, 2010). As stated by Suri (2011), purposeful sampling strategies were crucial for improving the quality of research synthesis. According to Patton (2015), “A
purposeful sampling strategy does not automatically eliminate the possibility for random selection of cases” (p. 286). A purposeful random strategy was used for this research study. The intent of the study was to interview a targeted minimum of 12 to a maximum of 20 women who worked in IT occupations located in the state of California, and who met the following criteria.

1. Gender was female.
2. Had worked in an IT department at any company or organization.
3. Had held an IT occupation for a minimum of four years.
4. Did not hold an entry level position.
5. Worked in the state of California.

Participation opportunities were solicited via LinkedIn to the WITI (Women in Technology International) Orange County networking group. WITI is a global organization that includes networks of women in IT careers. There are chapters of WITI networks in all parts of the United States, with local chapters in various regions of California. The Orange County Regional Network of WITI was selected as the target population based on access. The accessible population is the portion of the population to which the researcher has reasonable access and may be a subset of the target population. The WITI Orange County networking group included 80 members. Participants were sent a letter of inquiry via email (see Appendix B) to solicit written interest in participation in the study. The letter of inquiry included the criteria for participate selection. Simple random sampling was used to narrow down the population if interested respondents exceeded the maximum of the range of the targeted number of participants which was 12 to 20. A unique number was assigned to each participant that responded to
the letter of inquiry. The sampling designed was utilized to obtain a manageable number of participants which were relevant and informative.

Demographic questions help the interviewer detect the respondents in relation to other people and provide information about the sample (McMillan & Schumacher, 2010; Patton, 2015). The demographic information was collected on age, highest level of education, employment status, whether or not they had children and the job role. This information facilitated in providing a more detailed representation of the sample and population.

**Instrumentation**

In qualitative research, Creswell (2013) states that the researcher is a key instrument because the research collects the data and completes a thorough examination of documents, interviewing participants and observing behaviors. Furthermore, in qualitative research, the role of the researcher as the primary data collection instrument requires the identification of personal values, assumptions and biases at the onset of the study.

The instrument utilized for this study was an in-depth semi structured, open-ended interview (Creswell, 2013) through face-to-face, live chat technology, and telephone interviews. The interview questions (see Appendix B) were broad and open-ended; this allowed the opportunity for the participant’s viewpoints to be expressed extensively (Giorgi, 1997). An interview protocol developed by the researcher and based on themes culled from the literature review was used for asking questions and recording answers during a qualitative interview. According to (Giorgi, 1997), interviewing is a key source
of data that allows for current accounts of events that are described as narrative research or verbal history.

**Background of the Researcher**

The researcher’s contribution to the study setting can be valuable and positive rather than unfavorable (Locke et al., 1987). My perceptions of IT and the workplace culture have been formed by my personal experiences. From February, 1984 to May, 1992, I worked as a member of the Computing Staff at an aerospace corporation. I have worked in various IT positions over the past thirty years, and most recently (2009 – present), I hold the position of an IT systems administrator for a government agency. I believe that my exposure to the various industries and work environments enhances my knowledge, awareness and sensitivity to the many barriers, challenges and issues that many women in IT are currently experiencing. However, due to previous experiences of working in the IT workplace environment, I bring certain biases to this study. Although every effort will be made to ensure objectivity, these biases may form the way I view and understand the data I collect, and they may also influence my interpretation of my experiences.

**Validity and Reliability**

**Validity**

Qualitative validity requires the researcher to check for the accuracy of the findings by employing certain procedures (Creswell, 2014). To ensure the validity of the research, explicit steps were taken in the procedures. The different data sources of information were examined for evidence to build a coherent justification for themes.
The themes were established by converging several sources of data or perspectives from the participants. This process was utilized to add validity of the study (Creswell, 2013).

**Criterion Validity.** To qualify for the study, the following selection criteria was defined:

1. Gender was female.
2. Had worked in an IT department at any company or organization.
3. Had held an IT occupation for a minimum of four years.
4. Did not hold an entry level position.
5. Had worked in the state of California.

The interview site was established based on the media utilized to conduct the interview. This could take place in any of the following locations:

1. Participant’s home
2. Office
3. Virtually through means of face-to-face technology such as FaceTime®, Adobe® Connect, Facebook® Messenger, Skype® or Google Hangouts®
4. A mutually agreed on location

**Content Validity.** Peer debriefing was used to enhance the accuracy of the account (Creswell, 2013). A peer debriefer was established who reviewed and asked questions about the study. This was done so that the account would resonate with people besides the researcher. This strategy provided an interpretation beyond that of the researcher. The qualifications of the debriefer were as follows:

1. Female gender
2. Had worked in an IT role for over four years
3. Was not a participant of the study

**Expert Panel.** An expert panel was used to review the suitability of the interview questions. The expert panel also served as the pilot interview participants.

**Panel membership.** The panel’s membership consisted of two or three reviewers working in the academic, government and private sectors who possessed expertise in qualitative research.

**Pilot Interview.** Pilot interviews were conducted using three sample participants in order to test the suitability of the interview questions in uncovering common themes and patterns. The pilot interview employed the same methodologies used for the main study. The interview questions focused on capturing and exploring the experiences of women working in IT occupations using open-ended questions that prompted detailed responses. The pilot interviews served to test the responses’ worth and to consequently enable the changing or modifying of any question.

**Reliability**

Standardization was established by using the same order and interview questions with each participant (Patton, 2002). Reliability is dependent on the standardization of the data-collection process (McMillan & Schumacher, 2010; Patten, 2012). The different data sources of information were examined for evidence to build a coherent justification for themes.

**Internal Reliability of Data**

To ensure internal reliability of the data, the following strategies were utilized:

1. **Peer examination.** A doctoral student and an IT specialist served as peer examiners.
2. **Clarification of researcher bias.** At the onset of this study, researcher bias was articulated in writing in the dissertation proposal under the heading, “The Researcher’s Role.”

**Intercoder Reliability**

Intercoder reliability refers to the extent to which two or more independent coders agree on the coding of the content of interest with an application of the same coding scheme (Lombard et al, 2004). As Neuendorf (2002) notes, "given that a goal of content analysis is to identify and record relatively objective (or at least intersubjective) characteristics of messages, reliability is paramount. A consistent protocol was used to evaluate intercoder reliability.

**Data Collection**

The interview schedules and research design were approved by the BUIRB prior to data collection (see Appendix E). Data collection often involves observations and interviews (Creswell, 2013). Qualitative inquiry collects data from in-depth interviews, focus groups, open-ended questions on surveys, postings in social media, direct observations in the field, and analysis of documents (Patton, 2015). The type of data gathering method that was used for this study was interview. An in-depth semi structured interview was conducted (Creswell, 2013) through face to face, telephonic or virtual meeting. The interviews were recorded and transcribed. In−depth interviews are a common data gathering method for phenomenological studies (Creswell, 2007). Information from interviews were recorded by making handwritten notes, audiotaping, or by videotaping. Even if an interview was taped, handwritten notes were taken in the event that the recording equipment failed. Information was gathered through a close-up
method that involved talking to a participant, which is a major characteristic of qualitative research (Creswell, 2013).

**Coding and Data Analysis**

Schatzman and Strauss (1973) assert that qualitative data analysis mainly involves classifying people, events, and items and the characteristics of their properties. The different sources of information were examined for evidence to build a coherent justification for themes. The themes were established by converging several sources of data or perspectives from the participants. This process was utilized to add validity of the study (Creswell, 2013). Content analysis was completed to identify the participant’s responses for similar words or phrases. NVivo© 11 software was used as a tool to support inter-coder reliability by providing a means to organize, analyze and find insights in qualitative data such as open-ended survey responses, interviews, articles, social media and web content (QSR International, n.d.). All the transcribed interview responses, observation notes, pilot interview documents were sorted, grouped and then categorized.

**Coding**

Coding is the process of organizing the data by segmenting and linking chunks of text or images and the providing a word to represent the category (Rossman & Rallis, 2012). The use of NVivo© 11 software facilitated in the process of segmenting sentences (or paragraphs) into categories, and labeling those categories with a term (Creswell, 2013, p. 198). The data was sorted for words or phrases related to entering, remaining or leaving the IT industry. Categories were created on workplace culture, IT barriers, IT influences and factors influencing entering, remaining and leaving IT.
**Data Analysis**

Qualitative analysis “examines a story, a case study, a set of interviews, or a collection of field notes” to interpret meaning and draw conclusions (Patton, 2015, p. 570). The primary focus of this study was to better understand the lived experiences of women in IT careers. In this study, data were collected through in-depth interviews which were analyzed for the purpose of drawing conclusions based on the research questions of this study.

The analysis of the data was conducted using a modified version of the Moustakas (1994) methodology from Stevick-Colaizzi-Keen which facilitates seeking the essence of the experience from the participants’ lived expression of their own words to create thematic categories from the data, precise transcripts, data coding and substantial descriptions that express the data.

**Strengths and Limitations**

**Strengths**

The strengths of this study is the potential to contribute to the body of knowledge to better understand possible factors of the IT workplace culture that may attribute to the attraction, commitment, retention or exodus of women’s careers. Phenomenological research seeks to capture the essence of the participant’s experience.

**Limitations**

The limitations of the study could include a small number of participants. Biases exist because the researcher is in an IT occupation. Chenail (2011) wrote that managing researcher bias for qualitative studies can be a major limitation. Also, the study may lack focus on contributing to generalizable knowledge (Patton, 2014). In addition, the study
did not focus on the specific experiences of males working in the IT workplace. Lastly, validity conflicts were imposed if interview questions were not answered honestly by participants.

**Summary**

This chapter presented an overview of the methodology for the study. The research purpose statement and questions framed the foundation for the study. The selected research design was described in detail, including the population and sample, the data-collection and the data-analysis procedures, including the limitations of the study. The next chapter presents the data collected during this research project along with a detailed report of the findings of the research study.
CHAPTER IV: RESEARCH, DATA COLLECTION, AND FINDINGS

The literature review uncovered many factors that contribute to the decisions women make to enter, remain, or leave an IT occupation (Freeman & Aspray, 1999; Marcus, 2015; Wentling, 2009). Since 1991, there has been a consistent decline in the number of women represented in computing and technology occupations (U. S. Department of Labor, 2015; NCWIT, 2015). This qualitative research study focused on exploring the experiences of women who worked in IT occupations through individual interviews. A purposive sample of 12 women, who had worked in an IT occupation for a minimum of four years from various organizations within the state of California, was used. The findings of the research are presented in this chapter. The chapter begins by stating the purpose and research questions followed by a description of the methodology, data collection procedure, population, sample and demographic data. The chapter concludes with the presentation and analysis of the data.

Purpose Statement

It was the purpose of this phenomenological study to understand how workplace culture impacts the career decision of women working in IT to enter, remain or leave work.

Research Questions

Central Question

What are the perceptions and experiences of workplace culture on the career decisions of women working in IT to enter, remain or leave IT work?

Sub-questions:

1. What is there about the culture of IT work that attracted you to this work?
2. How would you describe the culture of your organization?

3. How does this culture impact your decision to remain working in IT?

4. What is there about the IT workplace culture that might cause you to consider leaving your position in IT?

Research Methods and Data Collection Procedures

Research Methods

The research method for the study was a qualitative phenomenological methodology. Phenomenological research method was selected to examine the opinions, feeling and experiences of women who have IT careers and what factors in the workplace culture impacted, influenced or attributed to them entering, remaining or exiting the industry. Phenomenological research is a qualitative strategy wherein the researcher pinpoints the essence of human experiences about a phenomenon as described by participants in the study (Creswell, 2013).

The instrument utilized for this study was an in-depth semi structured, open-ended interview (Creswell, 2013; McMillan & Schumacher, 2010; Patten, 2012). Interviews were conducted through face to face or telephonic interview depending on the preference of the participant and their availability. The interview questions (see Appendix B) were broad and open-ended; this allowed the opportunity for the participant’s viewpoints to be expressed extensively (Giorgi, 1997). An interview protocol developed by the researcher and based on themes culled from the literature review was used for asking questions and recording answers during a qualitative interview. The research design and interview schedules were approved by the BUIRB prior to data collection (see Appendix E). The data-collection procedures were designed to protect the rights of the participants.
(Creswell, 2013; McMillan & Schumacher, 2010; Patton, 2002). The identities and the names of the participants were available only to the researcher and the chair of the dissertation committee. Demographic data was collected through a brief online survey that consisted of five demographic questions (see Appendix D).

**Data Collection**

The type of data gathering method that was used for this study was interview. The interview times and dates were agreed upon between the researcher and the participants. An in-depth semi structured interview was conducted through a format selected by the participants. Nine participants requested to conduct the interview through telephone and three participants requested face to face interviews. The face to face interviews were conducted at local public locations agreed above by the researcher and participants. All interviews were recorded and transcribed into an electronic format. All participants were given the opportunity to review the transcribed interviews. Only four participants requested to review the transcribed interview.

The length of the data collection period was a nearly a month. The interviews took place between September 28th and October 22nd. A total of 12 women participated in the interviews which lasted approximately 20 to 30 minutes each. The interviews begin with the participant reviewing the consent forms, and given the opportunity to ask any questions before the start of the official interview question portion (see Appendices G and H). It was also reiterated to the participant that their participation was completely voluntary and that they could withdraw at any time without penalty.

The interviews conducted were completed in two formats, 1) face-to-face (25%) and 2) telephone interview (75%). No participants requested the use of video conference through FaceTime or Skype. The face-to-face interviews took place at
public locations—two were at local restaurants and one at a local park. The overall representation is illustrated in Figure 5.

**Table 3- Semi-Structured Interview by Type**

<table>
<thead>
<tr>
<th>Semi-Structured Interview</th>
<th># Interviews</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face to Face</td>
<td>3</td>
<td>25%</td>
</tr>
<tr>
<td>Telephone</td>
<td>9</td>
<td>75%</td>
</tr>
</tbody>
</table>

**Figure 5- Percentage Types of Interviews**

During the face-to-face interviews, observations were recorded on the Note-Taking Form (see Appendix H). During the face-to-face interviews, some participants exhibited laughter, facial expressions, pauses, hesitations, hand gestures and adjustments to posture. During the telephone interviews, some participants exhibited a change in voice timbre, sighs, laughter and hesitations.

**Population**

The population for this study were women who worked in IT in the United States. US Labor and Statistics (2016) states that there were 3.9 million computing and IT jobs,
and women held 25 percent of these positions. This suggests that there are 957,000 women working in IT and computing nationwide. A manageable smaller population was identified for the study as the target population. The target population were women working in IT occupations in the state of California.

**Sample**

The sample was identified by purposeful sampling taken from the 80 members of the Orange County Regional Network of WITI LinkedIn networking group, and members of other LinkedIn technology focused groups. Participants were sent a letter of inquiry via direct email or LinkedIn messaging (see Appendix B) to solicit written interest in participation in the study. The letter of inquiry included the criteria for participant selection. A total of 18 participants responded to the letter of inquiry, 13 completed the demographic survey, and 12 completed the interview portion. There were 5 participants who were unable to complete the study due to scheduling conflicts, and 1 participant asked to be removed from the study.

The intent of the study was to interview 12 women who worked in IT occupations located in the state of California who met the criteria.

1. Gender was female.
2. Had worked in an IT department at any company or organization.
3. Had held an IT occupation for a minimum of four years.
4. Did not hold an entry level position.
5. Had worked in the state of California.
Demographic Data

Demographic characteristics provide relevant information regarding the study population and sample (McMillan & Schumacher, 2010; Patten, 2012). During the research, the following demographic information was collected from the participants: age, highest level of education, employment status, whether or not they had children, and the job role. Table 4 provides a full breakdown of the participant demographics by age.

Table 4 - Participants by Age

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-29</td>
<td>7.7%</td>
<td>1</td>
</tr>
<tr>
<td>30-39</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>40-49</td>
<td>15.4%</td>
<td>2</td>
</tr>
<tr>
<td>50-59</td>
<td>76.9%</td>
<td>10</td>
</tr>
<tr>
<td>60 or older</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

The participants were highly educated with all of them attending college, and the majority having obtained a bachelor’s degree. Table 5 provides a full breakdown of the participant demographics by education.

Table 5 - Participants by Education Level

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than high school degree</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>High school degree or equivalent (e.g., GED)</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Some college but no degree</td>
<td>7.7%</td>
<td>1</td>
</tr>
<tr>
<td>Associate degree</td>
<td>7.7%</td>
<td>1</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>46.2%</td>
<td>6</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>38.5%</td>
<td>5</td>
</tr>
</tbody>
</table>
All the participants were employed and worked 40 hours or more per week.

Table 6 provides a full breakdown of the participant demographics by education.

Table 6 - Participants by employment

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed, working 40 or more hours per week</td>
<td>100.0%</td>
<td>13</td>
</tr>
<tr>
<td>Employed, working 1-39 hours per week</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Not employed, looking for work</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Not employed, NOT looking for work</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Retired</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Disabled, not able to work</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

The majority of the participants had children. Table 7 provides a full breakdown of the participant demographics by having children.

Table 7 - Participants by having children

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>61.5%</td>
<td>8</td>
</tr>
<tr>
<td>No</td>
<td>38.5%</td>
<td>5</td>
</tr>
</tbody>
</table>

The majority of the participants held the role of team or project lead. Table 8 provides a full breakdown of the participant demographics by job role.

Table 8 - Participants by job role

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Contributor</td>
<td>15.4%</td>
<td>2</td>
</tr>
<tr>
<td>Team/Project Lead</td>
<td>46.2%</td>
<td>6</td>
</tr>
<tr>
<td>Mid-Level Manager</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Senior Manager</td>
<td>15.4%</td>
<td>2</td>
</tr>
<tr>
<td>Vice President</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Management/C-Level</td>
<td>23.1%</td>
<td>3</td>
</tr>
</tbody>
</table>
Presentation and Analysis of Data

This section presents the data and the findings of the study. The study findings are presented in relationship to the central research question and the four sub questions.

Data Analysis

The analysis involved content analysis using the NVivo© 11 software to generate clusters of meaningful data to create themes resulting in identifying key concepts related to the categories. All field notes, transcribed interview responses and pilot study documents were grouped into categories. Thematic analysis of the data clusters, using NVivo© 11 software was conducted to generate codes from participants’ responses associated with emerging categories, themes, and patterns. The NVivo© 11 software and content analysis was used to identify similar or identical phrases or words from the responses of the participants.

Coding and Identification of Significant Themes

**Origination of meaning.** Thematic analysis was conducted using NVivo© 11 software to produce codes from the participants’ responses associated with themes, and patterns. NVivo© 11 software was utilized to create queries and word trees (see Appendix N) to assist in identifying categories and themes. Thematic analysis involved thoroughly reading transcripts and reviewing field notes to analyze the interview narrative data from the group of women participants to synthesize the clustered patterns, meanings and themes to form the framework of the perceptions and experiences of the women interviewed. This is consistent with recognized qualitative research practices and principles (Yin, 2014). Content analysis was used to filter data
and begin formulating meanings resulting from the key words, phrases and significant statements. Key words and phrases were tracked and categorized under major headings. The data was further analyzed combining same or similar categories. Noteworthy statements uncovered the perceptions and experiences of the workplace culture on the career decisions of women working in IT to enter, remain or leave IT work.

Synthesis of meanings and themes. The content analysis technique is used in qualitative data analysis because of the content of the interviews and field notes being analyzed (Merriam, 2009). Content analysis was used to simultaneously code raw data and construct categories that capture the relevant characteristics of the content in the participants’ transcribed interviews and field notes (Merriam, 2009). Ambiguous, unclear or equivocal codes were removed or combined with other codes. This analysis provided the foundation for further clustering and selective coding.

Central Research Question

What are the perceptions and experiences of workplace culture on the career decisions of women working in IT to enter, remain or leave IT work?

Data analysis uncovered eight major themes (Table 9) in relationship to the central research question: 1) influences and factors to enter into an IT career, 2) perceptions of the IT workplace culture, 3) importance of a supportive work environment, 4) influences of continual learning and training to remain in IT, 5) necessity for advancement opportunities, 6) need for flexibility in work hours and schedules, 7) committed for staying in IT field, and 8) factors that may influence leaving. The following sections provide details of each of these themes.
Table 9 - Major Themes Identified

<table>
<thead>
<tr>
<th>Themes</th>
<th>Sources</th>
<th>References</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Influences and factors to enter into IT career</td>
<td>11</td>
<td>34</td>
<td>92%</td>
</tr>
<tr>
<td>2. Perceptions of the IT Workplace Culture</td>
<td>12</td>
<td>35</td>
<td>100%</td>
</tr>
<tr>
<td>3. Importance of a supportive work environment</td>
<td>4</td>
<td>16</td>
<td>33%</td>
</tr>
<tr>
<td>4. Influences of continual learning and training to remain in IT</td>
<td>12</td>
<td>41</td>
<td>100%</td>
</tr>
<tr>
<td>5. Necessity for advancement opportunities</td>
<td>12</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td>6. Flexibility in work hours and schedules</td>
<td>6</td>
<td>17</td>
<td>50%</td>
</tr>
<tr>
<td>7. Committed to stay in IT field</td>
<td>8</td>
<td>14</td>
<td>67%</td>
</tr>
<tr>
<td>8. Factors that may influence leaving</td>
<td>4</td>
<td>4</td>
<td>33%</td>
</tr>
</tbody>
</table>

Research Sub-Questions

The key themes were related to the sub questions. Details of these themes in relationship to the sub questions are explored and detailed in this section. Table 5 details each sub question and the corresponding key themes.

Table 10 - Key Themes related to Research Sub-Questions

<table>
<thead>
<tr>
<th>Research Sub-Question</th>
<th>Key Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.1. What is there about the culture of IT work that attracted you to this work?</td>
<td>1. Influences and factors to enter into IT career</td>
</tr>
<tr>
<td>Q.2. How would you describe the culture of your organization?</td>
<td>2. Perceptions of the IT Workplace Culture</td>
</tr>
<tr>
<td>Q.3. How does this culture impact your decision to remain working in IT?</td>
<td>3. Importance of a supportive work environment</td>
</tr>
<tr>
<td></td>
<td>4. Influences of continual learning and training to remain in IT</td>
</tr>
<tr>
<td></td>
<td>5. Necessity for advancement opportunities</td>
</tr>
<tr>
<td></td>
<td>6. Flexibility in work hours and schedules</td>
</tr>
<tr>
<td>Q.4. What is there about the IT workplace culture that might cause you to consider leaving your work in IT?</td>
<td>7. Committed to stay in the IT field</td>
</tr>
<tr>
<td></td>
<td>8. Factors that may influence leaving</td>
</tr>
</tbody>
</table>
Influences and factors to enter into an IT career. The data revealed several factors that influenced the women to enter into their IT careers. The most significant factor was a high level of interest in technology. As highlighted in Table 5, eleven which represents 92 percent of the women described this as a key factor. Their feelings of excitement about the technology were described with phrases such as “I was hooked” and “oh my gosh this is awesome”.

Table 11 - Theme 1 Detailed Breakdown

<table>
<thead>
<tr>
<th>Theme 1</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influences and factors to enter into a IT career</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A high level of interest in technology</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Education</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Family Member</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Flexible Schedule</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Independence</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Meaningful Work</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Positive Atmosphere</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Salary</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Self-Taught</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Team Environment</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Unsolicited Opportunity</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Quotation examples. Participant 10 described how she entered into the field, “When I was 18 years old, I got a job. I moved out on my own and got a job that was secretarial. In those days, you used type writers with correction tapes, and it was even a computer company, and I was watching what the engineers and the programmers were doing, and so I ordered a TIS80 computer, and it got shipped to my house. I started teaching myself programming, and I was completely captivated. Here I was teaching this machine how to think and react. I was hooked. I could never do anything else after that.” Participant 2 said “I happened to be very strong at mathematics, so I got a degree in math,
and my degree in math included … I actually thought I would be an actuary because that was what I learned that people who were good at math were also turn into actuaries, but I actually … During my degree, I took some computer programming courses that we had to take in support of numerical analysis, and it seemed like I had some flare for technology at that time, and I chose to go into that field.” Participant 17 tells how she began her career, “Yeah, I started as a shipping clerk at a trading company in Japan. The company bought us a computer company in Singapore and imported computers to Japan. At that time the trading company was using typewriters, and it was my first time to see and to touch computers. It was like oh my gosh this is awesome.” Participant 10 stated, “I would say it’s probably the best career in the world. There’s nothing else like it. It’s an amazing field.”

**Perceptions of the IT Workplace Culture.** One key theme emerged as a significant perception of the women in the IT workplace culture with the highest percentage than all other themes. This was a perception of male preference (Table 5) and dominance in the culture. There were many other themes such as biases, lack of support and lack of trust that were seen negatively. There were also positive aspects such as collaborative, relaxed culture and hard work.

**Perceptions of male preference.** Eleven (92%) of the participants felt there was a male dominance that existed in the workplace culture. Participants used phrases such as “male dominated” and “a good ole’ boy environment” to depict a workplace culture where males are given preferential treatment.
Table 12 - Theme 2 Breakdown

<table>
<thead>
<tr>
<th>Theme 2</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptions of the IT Workplace Culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Communication</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Competitive</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hard working</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Isolation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lack of Support</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Lack of Trust</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Management</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Opportunities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Perceptions of male preference</strong></td>
<td><strong>11</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>Positive</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Relaxed Culture</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Irresponsible</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Work Life Balance</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Quote Examples.** Participant 10 described the workplace culture as “a paramilitary structure” and stated that “I look upon them more as being a good ole’ boy environment.”

In regards to women entering into the IT field, Participant 1 stated, “I think that there are a lot of environments where it’s very heavily male-oriented, so it’s difficult for women to break in.” Participant 1 revealed a connection for a preference for males to advance quicker than females when she stated, “I noticed that my male colleagues who moved into the CIO role like me tended to do it earlier.” Participant 12 described the industry as “I think that it’s definitely a majority male industry.” Participant 3 stated, “I think that they are still pretty male dominated. It’s very difficult for people to think that a woman has that capability.” Participant 4 expressed the need for women in IT field because they complement the males when she stated, “I think women complement the male aspect in that, and I hope people continue, I hope women continue to come into the IT field.”

Participant 12 also said, “Yeah, I think definitely that gender is an issue, because men
always getting certain promotions when it comes to the IT field or just being accepted to
certain jobs. When you’re talking in certain meetings and things like that, people just
look at you like you don’t know what you’re talking about because you’re a girl. That’s
super frustrating.”

**Importance of a supportive work environment.** Four (33%) of the participants
indicated that a supportive workplace culture was influential in women entering,
remaining, and leaving their IT career, although this theme had the lowest percentage of
the six key themes identified. However, the importance placed on this factor when
discussed by the participants who affirmed the impact.

*Table 13 – Theme 3 Breakdown*

<table>
<thead>
<tr>
<th>Theme 3</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of a supportive work environment</td>
<td>4</td>
<td>16</td>
</tr>
</tbody>
</table>

**Quote Examples.** Participant 1 stated, “I feel I’ve been pretty lucky to work in an
environment where I felt supported, so I can’t imagine leaving the IT field.” Participant
8 talked in regard to helping women remain in the IT field that “There’s not a pipeline
lack of support for women who come in because if you have to have the same one or two
women reporting to everybody, well that over time doesn’t work. Just lack of the ability
to mentor.” Participant 1 also reflected on the need for a supportive work culture
environment when she stated, “it’s that maybe I didn’t help enough women along the way
or support women enough.” Participant 8 also talked about how a non-supportive work
culture impacts women leaving IT when she said, “the culture for me was crazy because
of the isolation of not having necessarily support but then having a really difficult
business partner.”
The quoted examples above illustrate how a supportive or non-supportive work culture can factor into a women’s choice to enter, remain or leave an IT career. When women were not supported, they found the work culture “crazy” as described by Participant 8, whereas a supportive culture created such an environment that Participant 1 “can’t imagine leaving the IT field”.

**Influences of continual learning and training to remain in IT.** This theme was tied for the second highest percentage, eleven (92%) of the participants were referenced about the importance of being provided initial and continual learning and training as a factor in entering and remaining in the IT field. The participants felt that without continual learning and being provided training it could be a negative factor in maintaining an IT career.

*Table 14 - Theme 4 Breakdown*

<table>
<thead>
<tr>
<th>Theme 4</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influences of continual learning and training to remain in IT</td>
<td>11</td>
<td>41</td>
</tr>
</tbody>
</table>

**Quote Examples.** Participant 10 describes how initial training was important when beginning her IT career. She stated, “Okay. In the beginning, I was very lucky because I was in a company that was willing to train me.” Participant 1 stated, “I think it’s really important to constantly be learning, and I think that’s true in any field, but it’s probably even more true in technology.” Participant 12 said, “I have fun when I’m learning things.” Participant 17 also stated, “I just love programming and the learning is really fun.” Participant 18 described the negative aspect of a workplace culture that does not support learning when she said, “I’ve worked in different types of cultures and there were those that I didn’t like at all, so I didn’t work there very long. It was more micromanaged
and no trust in my ability to do my own work. Also, there weren’t many learning opportunities and team work wasn’t really encouraged.”

**Necessity for advancement opportunities.** This theme was of the highest percentage. All of the participants (100%) discussed the importance of advancement opportunities as a major factor influencing women’s decision to remain in the IT field. There were negative references in the absence of advancement opportunities and how the availability of opportunities facilitated a positive perception in the workplace culture.

*Table 15 - Theme 5 Breakdown*

<table>
<thead>
<tr>
<th>Theme 5</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Necessity for advancement opportunities</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

*Quote Examples.* Participant 10 described the negative aspects when there exists a lack of advancement opportunity when she stated, “Most of the promotional opportunities go to friends and there is a known culture of a ladder, and the process for moving up the ladder is generally seniority and friendship. There is not a lot of opportunity based on merit, in my opinion.” On the other hand, Participant 1 described a positive experience when she stated, “I’ve been pretty lucky that women have had the opportunity to move ahead.” Participant 18 describes how the lack of opportunity can be negative, but when it exists, it is a very positive factor. She states “I have encountered cultures where women couldn’t move up the ladder. No matter how much work they did they were not promoted. I have one friend of mine; she stayed with the same company regardless, but she’s been passed over so many times in different teams, by different managers for promotion, and I think it’s really frustrating for her. If women are encouraged or get rewarded for their work, then actually they tend to like their work more.” Participant 2
describes opportunities for advancement as “Well I feel that there are good opportunities for advancement.” Participant 10 also stated, “In the present agency, I think the opportunities for advancement for women is virtually none. The males will definitely get the raises. In the IT world in general however, I think there are many corporations now that are very progressive. You see women in the top positions.”

The responses of the participants painted a workplace culture that was perceived negatively when women did not have the same opportunities for advancement for promotion as their male colleagues. In contrast, when women describe positive experiences with advancement opportunities, many of these same participants stayed committed to staying in the IT field.

**Flexibility in work hours and schedules.** Six (50%) of the participants discussed the value for flexibility in work hours and schedules. The participants perceived that this was not just a factor in women leaving but it could also be a factor in attracting women and influencing them to remain in the IT industry.

*Table 16 - Theme 6 Breakdown*

<table>
<thead>
<tr>
<th>Theme 6</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility in work hours and schedules</td>
<td>6</td>
<td>17</td>
</tr>
</tbody>
</table>

**Quote Examples.** Participant 1 described the benefits, negative aspects and flexibility in the work hours and schedule. She states, “I do think for many us, flexibility is important. Certainly, for me, when I was younger, flexibility mattered, and so the ability to stretch my day and to my home life which has a lot of negatives associated with it, but sometimes it’s the only way you can get things done as a working parent.” Participants 17 and 18 discussed the benefit of flexible work schedules for those that had
children, even though both stated that they did not have children. Participant 17 stated that I don’t have a kid but yeah, I think the flexible work hours. Just to pick up kids.” Participant 18 added, “Also, I think if jobs offered a little more flexibility on the hours, because a lot of women that I’ve known have children. I don’t have any, so it’s nice to have some flexibility as far as work hours.” Participant 2 described the work hours as a potential positive factor of the workplace culture for attracting women to IT careers. She states “As far as the culture kind of in a broad sense, the work hours are very flexible, because at the end as long as we have a computer we can be effective anywhere. So, people have flexible working hours, people can work remote.” Participant 5 also stated the benefit of flexibility of work schedule when she stated “For me it is flexibility. The days I work and the times I work. I can work for a couple of hours and I can go do something. I can take a day off and go see my grand-daughter’s dance recital. So, the flexibility for me has been a big plus.”

**Committed to stay in IT field.** Of the twelve participants, eight (67%) stated that they would not leave the IT field. These participants described a strong commitment to their careers in IT. They used words such as “never leave” and “I can’t imagine leaving” when responding to the question of factors that might influence them to leave their IT careers.

*Table 17 - Theme 7 Breakdown*

<table>
<thead>
<tr>
<th>Theme 7</th>
<th>Sources</th>
<th>References</th>
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<tbody>
<tr>
<td>Committed to stay in IT field</td>
<td>8</td>
<td>14</td>
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</tbody>
</table>

**Quote Examples.** Participant 10 stated, “I will never leave the field, never, whether I’m on my own or whether I am finding another position outside of the current agency.”
Participant 18 said, “I plan on staying in the field. I really like it. If I would not like a workplace, then I would just try to find a new employer. I really want to stay in the field.” Participant 9 conveyed that only a family emergency would warrant leaving the IT field when she said “I want to stay in this field as long as I can. Maybe if some family emergency comes and I have to leave the job, that’s different, but otherwise I don’t want to change career to any other field. I prefer to stay here.” Participant 3 stated that there would have to be extenuating circumstances to consider leaving her IT career. She says “I guess, at some point, if it got saturated, or there weren’t enough jobs, if I couldn’t make a living at it, then, I would have to, of course, leave. Other than that, I don’t see myself ever leaving it.”

The statements made by the participants depicted a strong commitment to staying in the IT field. Outside of extreme circumstances, the participants stated a dedication and willingness to stay in the IT field.

**Factors that may influence leaving.** The data analysis uncovered multiple factors associated with women leaving a career in IT. Though 50% of the women stated they would not leave, they gave many factors that may influence why women in general leave IT careers that were associated with the workplace culture. There were perceptions and depictions of barriers, sacrifices and issues with salary disparities.

*Table 18 - Theme 8 Breakdown*

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<thead>
<tr>
<th>Theme 8</th>
<th>Sources</th>
<th>References</th>
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<tr>
<td>Factors that may influence leaving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>New technology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Promotion</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Family time</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Had to relocate</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Long hours</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
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Quotation Examples. Participant 2 stated, “But when there is most men and only few females are present, you have to work a little bit harder and on your communication and adjustment because you are being the only one of you you are just not part of the club, so called club.” Participant 18 suggested that promotion and salary were influences when she stated, “I just think that the biggest problem is with the promotion and the pay, that sometimes we get passed by when it comes to that.” Participant 1 describes her sacrifices in relationship to her family when she stated, “I think it cost me time with my children. I’ve worked long hours and missed some things with my kids that perhaps I might … I look at some of my sisters, for instance, who chose to work shorter … more part-time positions when they had children, and I didn’t do that, but I think that I gave up a lot around my children. I think I personally gave up the ability to travel and have great vacations because when I took time off, I chose to spend it with my family instead of maybe seeing the world, that I might have done a little bit more in a different environment.” Participant 3 stated, “Yeah. Generally, across the board, I think what the barriers that really prevent us is still, is perceived as a very techy position, in some cases, meaning that unless you were a Computer Science major, a developer geek, or, you know, into more, the technical and hardware aspects of it, the toys. Those are, those, I think that are pretty still male dominated. It’s very difficult for people to think that a woman has that capability.”
Summary

The purpose of this phenomenological study was to understand how workplace culture impacts the career decision of women working in the IT to enter, remain or leave work. Chapter 4 presented the presentation of data and study findings which also included a summary of the demographics, data collection procedure and the methods used to analyze the data. In addition, Chapter 4 contained relevant quotes from women based on their experiences and perceptions of the IT workplace culture on the career decisions of women working in IT to enter, remain or leave IT work.

Data sources included demographic surveys and semi-structured interviews. The surveys consisted of five demographic questions. Semi-structured interviews included ten open-ended questions which resulted in transcripts of the perceptions and experiences of women working in the IT occupations. The interview transcripts were analyzed for themes and patterns using NVivo© 11 software in the data analysis process.

The analysis uncovered eight significant themes: (a) influences and factors to enter into the IT career, (b) perceptions of the IT workplace culture, (c) importance of a supportive work environment, (d) influences of continual learning and training to remain in IT, (e) necessity for advancement opportunities, (f) need for flexibility in work hours and schedules, (g) committed to stay in IT field, and (h) factors that may influence leaving.

Significant themes such as a strong interest in IT influenced women entering into the IT career, and, in addition, the theme remaining in IT displayed a solid commitment by many women to remain in the IT career regardless of the biases, barriers and lack of advancement opportunities. Other themes such as the necessity for advancement
opportunities described positive and negative factors that influence women to enter, remain and stay in IT work. The underlining theme to the significant theme of the perception of the women in the IT workplace culture was a perception of male preference and dominance in the culture. Women described this as still having an impact on women, entering and remaining in IT work.

Chapter V presents an analysis of these findings along with implications for action, recommendations for future research, and conclusions.
CHAPTER V: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Computers and IT are an integral aspect of modern life. The IT industry is the largest of any computer-related industry, employing more than 1.5 million people in 2011 (Csorny, 2013; Peck, 2015). Careers in IT have seen significant growth, and the opportunities for jobs continue to increase, but surprisingly, the number of women in these careers are dropping at a drastic rate (Corbett & Hill, 2015; Csorny, 2013). The percentage of computing occupations held by women has been on a continual decline since 1991, when it reached a high of 36 percent. In 2013 women made up just 26 percent of computing professionals, whereas in 1983 women made up 32 percent and about the same percentage as in 1960 (Corbett & Hill, 2015; NCWIT, 2016). Technology giants such as Microsoft, Google, Facebook and Twitter have become household names in the industry while the number of women working at these companies are surprisingly low. It is suggested that given the current labor shortage in the IT industry, it has become more important than ever to increase the representation of women in IT careers.

The workplace culture can be a major factor in how a woman feels about her career (Wentling & Thomas, 2009). When women perceive the culture as male-dominated, isolating and unsupportive, these perceptions can contribute to their decision to enter, remain or leave IT work (Croasdell, McLeod & Simkin, 2011).

This chapter presents and synthesizes the findings from this qualitative phenomenological study by exploring the feelings, experiences and perceptions of 12 women who have worked in IT careers for more than four years and examines any factors
that may influence women to enter, remain or leave IT work. The chapter starts by providing the purpose and research questions, followed by an overview of the research methods and data collection procedures; population; and sample. Proceeded by the major findings, and conclusions drawn from the major findings. Lastly, the chapter presents implementation for actions and recommendations for further research.

**Purpose Statement**

It was the purpose of this phenomenological study to understand how workplace culture impacts the career decision of women working in IT to enter, remain or leave work.

**Research Questions**

**Central Question**

What are the perceptions and experiences of workplace culture on the career decisions of women working in IT to enter, remain or leave IT work?

**Sub-questions:**

1. What is there about the culture of IT work that attracted you to this work?
2. How would you describe the culture of your organization?
3. How does this culture impact your decision to remain working in IT?
4. What is there about the IT workplace culture that might cause you to consider leaving your position in IT?

**Research Methods and Data Collection Procedures**

A qualitative phenomenological design method was used for this study. This design was appropriate because phenomenological research was used to explore the opinions, feelings and experiences of women who have IT careers and examine what
factors in the workplace culture impacted, influenced or attributed to them entering, remaining or exiting the industry. The data was collected through in-depth interviews conducted face-to-face or by the telephone with the participants. This was an appropriate means which allowed the researcher to capture the feelings, perceptions and experiences of the participants in relationship to the research questions.

**Population**

The population for this study were women who worked in IT in the United States. US Labor and Statistics (2016) states there were 3.9 million computing and IT jobs, and women held 25 percent of these positions. This suggests that there are 957,000 women working in IT and computing nationwide. The target population for this study were women working in IT occupations in the state of California.

**Sample**

Purposeful sampling was used to identify 12 participants taken from the 80 members of the Orange County Regional Network of WITI LinkedIn networking group and members of other LinkedIn technology focused groups. The participants selected met the following criteria:

1. Gender was female.
2. Had worked in an IT department at any company or organization.
3. Had held an IT occupation for a minimum of four years.
4. Did not hold an entry level position.
5. Had worked in the state of California.
Major Findings

This research study explored the feeling, perceptions and experiences of 12 women working in IT careers. It was the purpose of this study to examine the factors relating to the workplace culture that may influence a woman’s decision to enter, remain or leave IT work. This study identified eight themes in relationship to the workplace culture that attracted women to enter into an IT career, how they perceived the culture of their organization, what impact it had in influencing their decision to remain working in IT; and what it was about their workplace culture that might cause them to leave IT. The findings are presented in this section in relationship to the research questions.

Central Research Question

What are the perceptions and experiences of workplace culture on the career decisions of women working in IT to enter, remain or leave IT work?

Sub Research Questions

Sub-Question 1. What is there about the culture of IT work that attracted you to this work?

Theme 1. Influences and factors to enter into an IT career. The findings across all data sources revealed two significant factors attracting women to work in IT; 1) a high level of interest in technology and 2) preparation to enter into a technology career through education. A study by Croasdell et al. (2011) determined that there are three significant reasons why women chose to pursue a major in information systems. These are: (1) a sincere curiosity in the subject, (2) the belief that industry provided many employment opportunities and (3) a belief that it was a respectable career. These findings were also supported in the study by Gutierrez (2015) which found that women
had a true interest in IT influenced their pursuit of an IT career. Participants shared their high interest in the field with phrases that displayed their excitement about technology. They used phrases like “I was hooked” and “oh my gosh this is awesome” when talking when they entered into the career.

Sub-Question 2. How would you describe the culture of your organization?

Theme 2. Perceptions of the IT Workplace Culture. The findings across all data sources revealed several perceptions of the IT workplace culture. These included the workplace being termed collaborative, competitive, isolated and lacking in support, but one major description that stood out more than any was the perception that the IT workplace culture had a male preference and remains male dominated. This study found that eleven (92%) of the participants felt that there was a male dominance that existed in the workplace culture. Participants used phrases such as “male dominated” and “a good ole’ boy environment” to depict a workplace culture where males are given preferential treatment. Several researchers suggest that the IT workplace culture has been given a label as having certain unique characteristics in the industry that are defined as a white male culture. The IT culture is described as being predominately white, male-dominated, antisocial, individualistic, competitive, all-encompassing and non-physical (Glastonbury & Lamendola, 1993; Roldan, Soe, & Yakura, 2004; Trauth, Quesenberry, Yeo, 2008; von Hellens, Nielsen, Trauth, 2001; Wajcman, 2006).

This study supported many of the characteristics found in the study by Wentling and Thomas (2009) that explored the phenomenon of workplace cultural aspects that hinder and assist the career development of IT women, and found that some of the most
frequently described IT cultural characteristics were male-dominated, results-driven, teamwork-oriented, very competitive, challenging and problem-solving focused.

**Sub Question 3.** How does this culture impact your decision to remain working in IT?

The findings across all data sources brought out four significant themes that influence women remaining in IT work.

**Theme 3. Importance of a supportive work environment.** In this study, all twelve (100%) participants described aspects of a supportive work environment as an influential factor in women remaining in IT. Research has shown that a supportive, feminine organizational culture values and respects participation, collaboration, egalitarianism, and interpersonal relationships (Maier, 1999). Participant 1 supported this perspective. She states that “it’s that maybe I didn’t help enough women along the way or support women enough.” Participant 8 gave an account that also supported this view, she stated, “the culture for me was crazy because of the isolation of not having necessarily support but then having a really difficult business partner.”

**Theme 4. Influences of continual learning and training to remain in IT.** The findings across all data sources revealed that in order for women to remain in IT work, continual learning and training are essential. The workplace culture was described has “fast-paced” and “continuously changing”. Participants spoke of growth, creativity, being self-taught and needing to have a work culture that supported continual training and learning. Participant 10 states, “Okay. In the beginning, I was very lucky because I was in a company that was willing to train me.” In addition, Participant 1 stated “I think it’s really important to constantly be learning, and I think that’s true in any field, but it’s
probably even more true in technology.” Other participants (33%) felt prepared for their career in IT work based on their education and training. Research has shown that

**Theme 5. Necessity for advancement opportunities.** The findings across all data sources found that opportunities for advancement in the workplace culture was influential in women remaining in IT work. Twelve (100%) of the participants gave accounts and perceptions on the necessity for advancement opportunities. Participant 18 gave this account—she stated that “I have encountered cultures where women couldn’t move up the ladder. No matter how much work they did they were not promoted. I have one friend of mine, she stayed with the same company regardless, but she’s been passed over so many times in different teams, by different managers for promotion, and I think it’s really frustrating for her. If women are encouraged, or get rewarded for their work, then actually they tend to like their work more.” Lemons and Parzinger (2001) discovered that lack of advancement opportunities for women in IT were attributed to organizational culture issues and gender socialization. This study supported the research.

**Theme 6. Flexibility in work hours and schedules.** The findings in this study revealed that six (50%) of the sources perceived flexibility in work hours and schedules was an influential factor in women remaining in IT work. This was associated with family and work-life balance as underlining factors. In a study by Way (2015), the researcher suggests that even though there is available technology that could facilitate women having flexibility to work outside of the office, but the fast pace of change in technology coupled with the high expectations of the industry puts pressure of the IT employee to work extended hours and to have to continuously retrain. Participants view the lack of flexibility required sacrifices within family as a negative aspect of the
workplace culture, but others viewed it as being very beneficial and positive to IT work. Participant 1 stated, “I do think for many us, flexibility is important. Certainly, for me, when I was younger, flexibility mattered, and so the ability to stretch my day and to my home life which has a lot of negatives associated with it, but sometimes it’s the only way you can get things done as a working parent”. On the other hand, Participant 17 stated “I don’t have a kid but yeah, I think the flexible work hours [are necessary]. Just to [be able to] pick up kids.” Researchers found that organizations that provide flexible working conditions promote the retention of women in the workforce also encouraged women to aspire to build careers and continue an upward mobility in their career paths over a long period of time (Taneja, Pryor & Oyler, 2012)

**Sub Question 4.** What is there about the IT workplace culture that might cause you to consider leaving your position in IT?

The findings across all data sources revealed that eight (67%) of the sources had a strong desire to remain in the IT field while four (33%) of the sources described factors they perceived would influence women to leave the IT work.

**Theme 7. Committed to stay in IT field.** According to NCWIT 2016, workplace experiences emerge as one of the most significant variances between women who stay in computing and those who chose to leave. This study found many participants held a strong commitment to remain working in IT. This finding is contrary to studies showing an increased attrition rate among mid-level career women (Way, 2009). The women who expressed a stronger commitment to remain in the field in this study were in roles of senior management and C-level management (42%). The sources revealed statements that depict a desire to remain in the field. Participant 10 stated, “I will never leave the
field, never, whether I’m on my own or whether I am finding another position outside of the current agency.” In addition, Participant 18 said, “I plan on staying in the field. I really like it. If I would not like a workplace, then I would just try to find a new employer. I really want to stay in the field.” On the other hand, Participant 3 also supported this finding by conveying that

I guess, at some point, if it got saturated, or there weren’t enough jobs, if I couldn’t make a living at it, then, I would have to, of course, leave. Other than that, I don’t see myself ever leaving it.

Theme 8. Factors that may influence leaving. The findings across all sources uncovered multiple factors associated with women leaving a career in IT. Though eight (67%) of the women in this study stated they would not leave, they shared perceptions on what factors may influence women in general leave IT careers that were associated with the workplace culture. There were perceptions and depictions of barriers, sacrifices and salary disparities.

The research has shown that culture has the potential to be an exclusionary environment for women and minorities if they do not conform (Glastonbury & Lamendola, 1993; Roldan, Soe, & Yakura, 2004; Trauth, Quesenberry, Yeo, 2008; von Hellens, Nielsen, Trauth, 2001; Wajcman, 2006). Lemons and Parzinger (2001) discovered that lack of advancement opportunities for women in IT were attributed to organizational culture issues and gender socialization. In addition, according to a report by Igbaria and Greenhaus (1992), job satisfaction and organizational commitment are the most direct influences on turnover intentions among IT professionals. Participant 18 suggested promotion and salary as being influential factors when she stated, “I just think
that the biggest problem is with the promotion and the pay and sometimes we get passed by when it comes to that.” However, Participant 1 described her sacrifices in relationship to her family when she stated, “I think it cost me time with my children. I’ve worked long hours and missed some things with my kids that perhaps I might … I look at some of my sisters, for instance, who chose to work shorter … more part-time positions when they had children, and I didn’t do that, but I think that I gave up a lot around my children. I think I personally gave up the ability to travel and have great vacations because when I took time off, I chose to spend it with my family instead of maybe seeing the world, that I might have done a little bit more in a different environment.”

The findings from this study confirmed the work of Soe and Yakura (2008) who theorized that the male−dominated culture, work demands, and the expectation of work taking over non−work hours combined to create a chilly organizational climate for women in IT. In addition, the findings confirmed the work of a more recent study by Gutierrez (2015) who explored women’s perceptions of the organizational culture in IT and concluded that women in professional IT roles have various perceptions about the IT cultural aspects that influence women’s decisions to enter, remain or leave IT work.

**Unexpected Findings**

Several participants in this study expressed a desire to help address the problem with the declining number of women in IT work. They also shared a genuine concern about what could be done to facilitate in changing the landscape for women in IT. They also shared perceptions that the problem may relate to women’s communication styles and the availability of information on a wide-range of positions in the field, and that many
of these other IT positions did not have the persona of being “technie” or “geeky”. These factors were not indicated in the research included in the literature review.

Conclusions

Various conclusions resulted from the data collected related to the IT workplace culture that may influence women to enter, remain or leave the field. From exploring the feelings, perceptions and experiences of women working in the IT, conclusions were formulated that are associated with the major findings.

Conclusion 1. When women do not have a strong interest in technology they are less likely to be attracted to enter into IT.

Women who had a true and strong interest in technology were more likely to enter into an IT career which leads to the conclusion that women who do not have a strong interest in IT will be less likely to enter into a career in IT. A study by Gutierrez (2015) found that women perceived a true interest in IT, and this true interest was more influential in the pursuit of an IT career. Moreover, the obstructive societal norms and unclear expectations were not contributors to the lack of interest and pursuit of an IT career. This study supported these findings as 62% of the participants cited a true and strong interest that led them to a career in IT.

Conclusion 2. Women are committed to their IT careers but factors such as biases, stereotypes and lack of mentors in the workplace culture are influences that can deter women from entering and may possibility cause them to leave IT.

A supportive workplace culture along with advancement opportunities are essential and influential in a woman’s decision to remain in IT. Significant research has been conducted that provides evidence in the absence of these factors for which women leave
IT careers. When women cite unsupportive work environments as being one of the factors for their dissatisfaction along with a lack of role models and sacrifices in their personal lives that outweigh personal gain, they are more than likely to leave IT (Peck, 2015; Hewlett et al., 2008). This study’s findings emphasized the importance of advancement opportunities with 12 (100%) of the participants stating in response to whether it was a positive or a negative experience with regard to promotion and advancement that it was key to women remaining in the field.

**Conclusion 3. Long hours and rigid schedules is a deterrent to women entering and remaining in IT positions.**

Flexibility in work hours and schedules has been an overwhelming theme in many studies. Women have been cited as describing the workplace culture of IT having long hours and high demand of availability. This study supported those findings, and six (50%) of the participants referred to aspects of the benefit of and need for flexibility in the workplace culture. Many studies found that work-life balance is an important issue for workers, especially women, in engineering and computing. But some researchers argue that rather than work-life balance, the real issue was a “culture of overwork.” Organizational cultures of overwork result in the dissatisfaction among women and men (Padavic & Ely, 2013). This study supported these findings.

**Conclusion 4. IT workplace culture is male-dominated and males are given preferential treatment.**

The findings of this study and many recent studies depict a shift to women being more dedicated and committed to staying in IT careers. However, some factors still remain that are perceived as very influential in the decision of women to leave. The
significant theme for this study and many others is that the workplace culture is male-dominated and shows preferential treatment toward men. In this study, eleven (92%) of the participants felt there was a male dominance that existed in the workplace culture. This becomes a bigger issue when combined with other workplace culture perceptions such as feeling of isolation, bias and lack of support. Heilman (1995) stated that these forces can be at times be exaggerated in male dominant environments. In turn, this can be deterrents for women being attracted to IT, and in addition remaining in IT work.

**Implications for Action**

This phenomenological qualitative research study provides conclusions and implications for action based on the data collected on the workplace culture factors that may influence women’s decisions to enter, remain or leave IT work.

**Implication for Action 1: Interest in technology should be fostered and nurtured at an early age for girls**

When women have a true and strong interest in technology, they are more likely to pursue an IT career. Girls and boys can only develop interest when they have been exposed to technology. This should start at a very early age. Children are given toys that emulate careers such as doctors, policeman and fireman. If they are provided with toys that are emulating technology careers this can be the start of interest. But it has to continue in the early stages of education.

Organizations and educational institutions have to begin to establish partnerships so that the pipeline begins in the K-12 school systems. Technology has to be integrated into the learning process not only as a tool but also a means to develop interest. Girls should be provided with positive images of women in IT and have opportunities to
participate in clubs and activities at the elementary school level. These should be sponsored by organizations and local government agencies. Career days should include professionals in technology occupations. School districts should partner with technology companies to begin exposure at an early age. There are many companies that offer their technology products to school at a free or reduced cost. School districts have to start preparing children for the jobs of the future and the majority of these jobs will be in technology.

Implication for Action 2: Women have to be given equal opportunities for advancement and have work cultures that are supportive.

Organizations have to create programs such as mentoring for women, along with ensuring that they have equal opportunities for advancement and promotion as their male colleagues. Mid to senior-level women need to be able to share experiences and skills on how they navigated through their careers. This could be done through in-house mentoring programs. Leaders in organizations have to be agents for change in allowing equal opportunities for women. Human resources departments have to monitor how well woman are given opportunities for advancement and provide policies and procedures to ensure that women are not overlooked.

Implication for Action 3: Offer more flexible work hours and schedules.

Organizations need to have stronger policies for flexible work hours and schedules in reference to not just women but all workers in IT. Some organizations have implemented policies that allow for flexibility and these needs to continue to expand to more organizations and government agencies.
Implication for Action 4: Workplace cultures need active initiatives to encourage, support and foster women in technology.

We have already started to see some big-name technology organizations such as Google begin initiatives to increase the representation of women in IT. Programs such as Google’s Women Techmakers program is one such program. This program provides visibility, community, and resources for women in technology. More organizations need to follow suit and implement these types of programs.

**Recommendations for Further Research**

The study explored the feelings, perceptions and experiences of 12 women working in IT careers in the state of California. There were eight major themes that were discovered through semi-structured interviews. The following are the recommendations for further research.

**Recommendation 1**

The first recommendation for future research is to replicate this study in different states. Conducting this study in other states would allow the results to be generalized across an increased number of geographic areas.

**Recommendation 2**

The second recommendation for future research is to replicate this study and include male participants. This would allow for analysis of the feelings, perceptions and experiences across genders.

**Recommendation 3**

The third recommendation for future research is to examine the unexpected findings related to what mechanism exists or could be put in place for senior and C-level
management to change the perceptions of the IT workplace culture. If these mechanisms were identified, they could be shared with organizations and could result in an increase in women remaining in IT as they reach mid careers. As research has suggested, it is the highest among the attrition rates among women.

**Recommendation 4**

The fourth recommendation for a future study is to conduct a study that looks at the relationship between women working in IT in organizations with a female CEO or CIO versus a male CEC or CIO. Examining if the sex of the leadership has an impact on the workplace culture of women working in IT.

**Concluding Remarks and Reflections**

This study was concluded based on a sincere concern regarding the decline in women in the field of information technology. Since 1991, there has been a steady decline in women in computing and IT while the number of employment opportunities in IT continues to grow. Technology is now part of the fabric of our daily existence and the people who innovate, develop and create these new technologies have to include women. The IT industry is the largest of any computer-related industry, employing more than 1.5 million people in 2011 (Csorny, 2013; Peck, 2015). The IT industry is one of the most robust industries in the world. IT, more than any other industry or economic facet, has increased productivity and, as a result, has become a key driver of global economic growth (“IT Industry, Information Technology Industry,” 2010). According to Csorny (2013), employment in IT is expected to grow rapidly over the next decade, outpacing similar professional, scientific, and technical industries. In order for the U.S. to continue to be a leader in this field along with the ability to fulfil the influx of employment
opportunities in technology, organizations have to create workplace culture’s that foster
women to feel welcomed, included, and supported along with opportunities for
advancement so that they remain in IT careers.

It has to start by inspiring girls at an early age, educating their parents on the
opportunities for careers in technology, or it may even be getting the communities they
grow up in involved in technology events. The women who had a high interest in
technology showed commitment to their career in IT which provides opportunities for the
future. They were excited and found it an awesome field to work in. IT is a field that
continually growing and expanding. It provides opportunities for continual learning. But
more important technology is the fastest growth area for job opportunities.

If the pipeline of women is to increase it has to start long before college and even
high school. Girls have to have images of women in technology careers and be exposed
to the technologies so that interest may be inspired when they are young. Technology is
now and forever a fabric of our daily lives in the U.S. It is the future of our economic
growth. In order for the U.S. to continue to be a leader in technology there has to be a
pool of qualified people to fulfill those jobs and that pool must include women. There is
no way the U.S. can fulfill those positions without including qualified and talented
women.
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doi:http://dx.doi.org/10.1007/s10639-009-9120-y


Why Women Quit Technology Q&A: More than half of the women in science, engineering and other high-tech specialties leave the field at mid-career. Researcher Sylvia Ann Hewlett explains why - and what companies can do to stop the talent exodus. (2008). *Computerworld Newton then Framingham Massachusetts, 42*(25), 34-35.


## APPENDICES

### APPENDIX A

### Synthesis Matrix

<table>
<thead>
<tr>
<th>Article Description</th>
<th>Women in Information</th>
<th>Organizational Culture</th>
<th>Information Technology</th>
<th>Workplace Culture</th>
<th>Barriers</th>
<th>Diversity</th>
<th>Attrition</th>
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<td>By the Numbers. (2015). National Center for Women &amp; Information Technology (NCWIT)</td>
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<td>Working hard with gender Gendered labour for women in male dominated occupations of manual trades and information technology (IT). Equality, Diversity &amp; Inclusion, 32(6), 592603 (Smith, 2013)</td>
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<td>Why we must stop framing inclusivity as a women's issue; 'What is good for women in the workplace is good for everyone so we need a work culture that champions flexibility and fairness'. (2015)</td>
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<td>&quot;Age, Gender, and Work: Small Information Technology Firms in the New Economy,&quot; (2011)</td>
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APPENDIX B

Letter of Inquiry (Email)

Dear IT Professional,

My name is Andrea Hemphill and I am a doctoral student at Brandman University pursuing a degree in Organizational Leadership. I am seeking participants to take part in a research study exploring the experiences of women working in the field of IT and women’s perceptions of the workplace’s cultural influences that impact women’s career decisions to enter, remain or leave the IT profession. Women that respond to the research request should have been working within the IT profession for at least four years and currently hold a non-entry level IT position. As a participant of the research study, you will be required to complete the following:

1. Provide consent to participate in the study
2. Provide demographic data
3. Complete a brief online survey
4. Complete a one-on-one interview with me to discuss your experiences through one of the below media.
   a. Face-to-face interview to be held at an agreed upon location. If it is at your worksite, prior approval will be required from the organization.
   b. Video conference through FaceTime® or Skype®
   c. Telephonic interview

The online survey should take approximately 10 minutes to complete and the verbal interview will take about 45 to 60 minutes. The research study participant information is kept anonymous and confidential. The data collected will be anonymously recorded and will be presented to my dissertation committee. The dissertation will be published in the Brandman University library. If you are interested in participating in the research study, please respond to the email address provided below. Thank you for your consideration.

Andrea Hemphill (Merrills)

amerrill@mail.brandman.edu
APPENDIX C

Interview Questions

1. How would you describe your organization’s workplace culture?

2. What workplace culture factors do you feel have contributed to the increase in the attrition rate among women in the IT field?

3. What barriers, if any, do you feel are impacting women in IT?

4. Share a story of what influenced you most to enter into the IT field?

5. What factors do you perceive would have an influence in you leaving the field?

6. How would you describe the opportunities for advancement for women versus those of your male colleagues?

7. What do you feel is the most important aspect of the workplace culture?

8. Are there any insights you would like to share on the workplace culture in the IT industry?

9. How prepared were you for the role of an IT professional in terms of education and experience?

10. What sacrifices, if any, have you made to continue working in your position of an IT professional?
APPENDIX D

Demographic Survey

Research Study Demographics: An Exploration of the Workplace Culture of Women in Information Technology Careers

1. Which category below includes your age?
   - 21-29
   - 30-39
   - 40-49
   - 50-59
   - 60 or older

2. What is the highest level of school you have completed or the highest degree you have received?
   - Less than high school degree
   - High school degree or equivalent (e.g., GED)
   - Some college but no degree
   - Associate degree
   - Bachelor degree
   - Graduate degree

3. Which of the following categories best describes your employment status?
   - Employed, working 40 or more hours per week
   - Employed, working 1-39 hours per week
   - Not employed, looking for work
   - Not employed, NOT looking for work
   - Retired
   - Disabled, not able to work

4. Do you have children?
   - Yes
   - No

5. What is your job role?
   - Individual Contributor
   - Team/Project Lead
   - Mid-Level Manager
   - Senior Manager
   - Vice President
   - Management/C-Level
BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD
IRB Application Action – Approval

Date: 09/10/2016

Name of Investigator/Researcher: Andrea Hemphill (Merrills)

Faculty or Student ID Number: B00458142

Title of Research Project:
A Qualitative Exploration of the Workplace Culture of Women in Information Technology Careers

Project Type: ☑ New ☐ Continuation ☐ Resubmission

Category that applies to your research:
☑ Doctoral Dissertation EdD  ☐ DNP Clinical Project  ☐ Masters’ Thesis  ☐ Course Project  ☐ Faculty Professional/Academic Research  ☐ Other:

Funded: ☑ No ☐ Yes  

(Funding Agency: Type of Funding: Grant Number)

Project Duration (cannot exceed 1 year): August, 2016 – May, 2017

Principal Investigator’s Address: 22484 Ridgewater Way, Moreno Valley, CA 92557

Email Address: amerrill@mail.brandman.edu  Telephone Number: (951) 581-9348

Faculty Advisor/Sponsor/Chair Name: Dr. LaFaye Platter

Email Address: lplatter@brandman.edu  Telephone Number: (909) 556-7659

Category of Review:
☑ Exempt Review  ☐ Expedited Review  ☐ Standard Review

I have completed the NIH Certification and included a copy with this proposal

I have completed the NIH Certification and included a copy with this proposal

NIH Certificate currently on file in the office of the IRB Chair or Department Office

Signature of principal investigator: Andrea Merril

Date: 09/9/2016

Signature of Faculty Advisor/Sponsor/Dissertation Chair: Dr. LaFaye Platter

Date: 09/9/2016

Digitally signed by Dr. LaFaye Platter

Date: 09/9/2016

BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD
IRB APPLICATION ACTION – APPROVAL
COMPLETED BY BUIRB

IRB ACTION/APPROVAL

Name of Investigator/Researcher: Andrea Hemphill (Merrills)

- Returned without review. Insufficient detail to adequately assess risks, protections and benefits.
- Approved/Certified as Exempt form IRB Review.
- Approved as submitted.
- Approved, contingent on minor revisions (see attached)
- Requires significant modifications of the protocol before approval. Research must resubmit with modifications (see attached)
- Researcher must contact IRB member and discuss revisions to research proposal and protocol.

Level of Risk: □ No Risk  □ Minimal Risk  □ More than Minimal Risk

IRB Comments:

Dr. Timothy Perez

Telephone: Email: tperez@brandman.edu

BUIRB Chair: Date: 9/15/16

REVISED IRB Application □ Approved □ Returned

Name: 

Telephone: Email: Date: 

BUIRB Chair: 

APPENDIX F

BUIRB

PARTICIPANT INFORMED CONSENT FORM - INTERVIEW

RESEARCH STUDY TITLE: A Qualitative Exploration of the Workplace Culture of Women in Information Technology Careers

BRANDMAN UNIVERSITY
16355 LAGUNA CANYON ROAD
IRVINE, CA 92618

RESPONSIBLE INVESTIGATOR: Andrea Hemphill (Merrills), Doctoral Candidate

TITLE OF CONSENT FORM: Research Participant’s Informed Consent Form

PURPOSE OF THE STUDY: The purpose of this phenomenological study is to understand how workplace culture impacts the career decision of women working in information technology to enter, remain or leave work.

In participating in this research study, you agree to partake in this study, you will have a 45-60 minute interview that will take place at a agreed upon location or media at which time the investigator will record the interview and take notes.

I understand that:

1) My participation in this study is voluntary and that I may refuse to participate or withdraw at any time.

2) The study will be audio-recorded and the recordings will not be used beyond the scope of this research project.

3) All interviews will be recorded and transcribed and sent to me for review.

4) Data collected will remain anonymous. No names will be transcribed; rather numbers will be used instead of participants.

5) While there are no known major risks to your participation in this research study, minor potential risks may include inconvenience due to the timing of the interview and emotional discomfort with sharing personal experiences.
6) While there are no major benefits for your participation, potential benefits are important. The data collected because of your willingness to share your experiences will contribute to the knowledge base of the factors that may contribute to the understanding of why women enter, remain or leave Information Technology careers.

7) Any questions or concerns I have will be responded to by the primary investigator, Andrea Hemphill (Merrills) Brandman University, Doctoral Candidate who can be reached on her mobile number at (951) 951-9348 or through her email address: amerrill@mail.brandman.edu or Dr. LaFaye Platter, Dissertation chair - email address: lplatter@brandman.edu

8) If the study design or the use of the data is to be changed, I will be so informed and my consent re-obtained. I understand that if I have any questions or concerns about the study or the informed consent process, I may write or call the Office of the Executive Vice Chancellor of Academic Affairs, Brandman University at 16355 Laguna Canyon Road, Irvine, CA 92618, (949) 341-7641. I acknowledge that I have received a copy of this form and the Research Participant's Bill of Rights.

I have read the above and understand it and hereby voluntarily consent to the procedures(s) set forth.

----------------------------------------------------------
Signature of Participant or Responsible Party               Date

----------------------------------------------------------
Signature of Witness (if appropriate)                      Date

----------------------------------------------------------
Signature of Andrea Hemphill (Merrills) Primary Investigator
Brandman University IRB August, 2016                       Date
APPENDIX G

INTERVIEW PROTOCOL SCRIPT (FACE-TO-FACE)

“Hello. My name is Andrea Hemphill and I am the primary investigator of this research study. Thank you for offering to participate in this interview today. I appreciate it. I understand that you’ve had an opportunity to read, review, and sign the consent forms, and also ask questions, but I want to provide copies again in case you have any questions before we begin.” (Hand out and pause)

“Do you have any questions?” (Respond to questions and concerns as needed)

“The purpose of this qualitative, phenomenological study the purpose is to understand how workplace culture impacts the career decision of women working in information technology to enter, remain or leave work.”

“I want to make sure you are aware that this research was reviewed and approved by BIRB which stands for Brandman Institutional Review Board. This is a committee established to review and approve research involving human subjects. The purpose of the IRB is to ensure that all human subject research be conducted in accordance with all federal, institutional, and ethical guidelines.”

“As a reminder, we will be audio recording this interview to make sure I capture all of our questions and responses. You may also see me taking notes during the interview. To ensure accuracy, however, I will send transcriptions of the interview and ask that you review it and approve it. Please remember that any names will remain anonymous, so if any names are used, they will be removed from the transcription. Again, your participation is voluntary. Feel free to stop me at any time and let me know if you have any questions, concerns, or if you simply need a break. I will be using a
timer to make sure we don’t exceed our time commitment of one hour. Again, thank you so much. Do you have any questions before we begin?”

End:
APPENDIX H

INTERVIEW PROTOCOL SCRIPT (TELEPHONE)

“Hello. My name is Andrea Hemphill (Merrills), and I am the primary investigator of this research study. Thank you for offering to participate in this interview today. I appreciate it. I understand that you’ve had an opportunity to read, review, and sign the consent forms, and also ask questions but I want to give you an opportunity now to ask any questions you may still have before we begin.” (Pause)

“Do you have any questions?” (Respond to questions and concerns as needed)

“The purpose of this qualitative, phenomenological study is to understand how workplace culture impacts the career decision of women working in information technology to enter, remain or leave work.”

“I want to make sure you are aware that this research was reviewed and approved by BUIRB which stands for Brandman University Institutional Review Board (BUIRB). This is a committee established to review and approve research involving human subjects. The purpose of the BUIRB is to ensure that all human subject research be conducted in accordance with all federal, institutional, and ethical guidelines.”

“As a reminder, we will be audio recording this interview to make sure I capture all of our questions and responses. You may also see me taking notes during the interview. To ensure accuracy however, I will send transcriptions of the interview and ask that you review it and approve it. Please remember that any names will remain anonymous so if any names are used, they will be removed from the transcription. Again, your participation is voluntary. Feel free to stop me at any time and let me know if you have
any questions, concerns, or if you simply need a break. I will be using a timer to make
sure we don’t exceed our time commitment of one hour.

   Again, thank you so much. Do you have any questions before
we begin?” End:
APPENDIX I - Audio Release Form

BUIRB

Audio Release Form

RESEARCH STUDY TITLE: A Qualitative Exploration of the Workplace Culture
of Women in Information Technology Careers

BRANDMAN UNIVERSITY
16355 LAGUNA CANYON ROAD
IRVINE, CA 92618

RESPONSIBLE INVESTIGATOR: ANDREA HEMPHILL (MERRILLS)

I authorize Andrea Hemphill (Merrills), Brandman University Doctoral Candidate, to record my voice. I give Brandman University and all persons or entities associated with this research study permission or authority to use this recording for activities associated with this research study.

I understand that the recording will be used for transcription purposes and the identifier-redacted information obtained during the interview may be published in a journal or presented at meetings/presentations. I will be consulted about the use of the audio recordings for any purpose other than those listed above.

By signing this form, I acknowledge that I have completely read and fully understand the above release and agree to the outlined terms. I hereby release any and all claims against any person or organization utilizing this material.

__________________________________________  ______________________________
Participant Signature                        Date

__________________________________________  ______________________________
Research Signature                          Date
Andrea Hemphill (Merrills)

Participant #__________
APPENDIX J

Research Bill of Rights

BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD

Research Participant’s Bill of Rights

Any person who is requested to consent to participate as a subject in an experiment, or who is requested to consent on behalf of another, has the following rights:

1. To be told what the study is attempting to discover.

2. To be told what will happen in the study and whether any of the procedures, drugs or devices are different from what would be used in standard practice.

3. To be told about the risks, side effects or discomforts of the things that may happen to him/her.

4. To be told if he/she can expect any benefit from participating and, if so, what the benefits might be.

5. To be told what other choices he/she has and how they may be better or worse than being in the study.

6. To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study.

7. To be told what sort of medical treatment is available if any complications arise.

8. To refuse to participate at all before or after the study is started without any adverse effects.

9. To receive a copy of the signed and dated consent form.

10. To be free of pressures when considering whether he/she wishes to agree to be in the study.

If at any time you have questions regarding a research study, you should ask the researchers to answer them. You also may contact the Brandman University Institutional Review Board, which is concerned with the protection of volunteers in research projects. The Brandman University Institutional Review Board may be contacted either by telephoning the Office of Academic Affairs at (949) 341-9937 or by writing to the Vice Chancellor of Academic Affairs, Brandman University, 16355 Laguna Canyon Road, Irvine, CA, 92618.

Brandman University IRB

Adopted

November 2013

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APPENDIX K

NIH Certificate

7/18/2015

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that Andrea Merrills successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 07/18/2015
Certification Number: 1798864
APPENDIX L

Participant Informed Consent Form - Workplace

BUIRB

PARTICIPANT INFORMED CONSENT FORM – WORKPLACE

OBSERVATION RESEARCH STUDY TITLE: A Qualitative Exploration of the Workplace Culture of Women in Information Technology Careers

BRANDMAN UNIVERSITY
16355 LAGUNA CANYON ROAD
IRVINE, CA 92618

RESPONSIBLE INVESTIGATOR: Andrea Hemphill (Merrills), Doctoral Candidate

TITLE OF CONSENT FORM: Research Participant’s Informed Consent Form – Classroom Observation

PURPOSE OF THE STUDY: The purpose of this phenomenological study is to understand how workplace culture impacts the career decision of women working in information technology to enter, remain or leave work.

If you agree to participate in this study, you will be observed at your workplace by the primary investigator for a duration of 10-30 minutes at which time the investigator will silently observe while taking notes.

I understand that:

1) My participation in this study is voluntary and that I may refuse to participate or withdraw at any time.

2) Data collected will remain anonymous. Instead, numbers will be used to identify participants.

3) While there are no known major risks to your participation in this research study, minor potential risks may include inconvenience due to the timing of the workplace observation and emotional discomfort while being observed.

4) While there are no major benefits for your participation, potential benefits are important. The data collected because of your willingness to share your experiences will contribute to the knowledge base of the factors that may contribute to the understanding of why women enter, remain or leave Information Technology careers.
### Themes Detail Breakdown

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<th>Themes - Research Questions</th>
<th>Sources</th>
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<td><strong>Q.1. What is there about the culture of IT work that attracted you to this work?</strong></td>
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<td>1. <em>Influences and factors to enter into a IT career</em></td>
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<td><strong>Q.3. How does this culture impact your decision to remain working in IT?</strong></td>
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<td>3. <em>Importance of a supportive work environment</em></td>
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<td>4. <em>Influences of continual learning and training to remain in IT</em></td>
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<td><strong>5. Necessity for advancement opportunities</strong></td>
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<td><strong>6. Need for flexibility in work hours and schedules</strong></td>
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Q.4. What is there about the IT workplace culture that might cause you to consider leaving your work in IT?

7. **Committed to stay in IT field**
   - Staying                                              | 8       | 14         |

8. **Factors that may influence leaving**
   - Barriers                                             | 3       | 3          |
   - Bias                                                 | 2       | 4          |
   - Family                                               | 1       | 1          |
   - Leave career                                         | 6       | 8          |
   - New technology                                       | 2       | 2          |
   - Promotion                                            | 2       | 2          |
   - Sacrifices                                           | 4       | 7          |
   - Family time                                           | 1       | 1          |
   - Had to relocate                                      | 1       | 1          |
   - Long Hours                                           | 2       | 4          |
   - Physical                                             | 1       | 1          |
   - Salary                                               | 2       | 6          |
   - Saturation                                           | 1       | 1          |
   - Stereotypes                                          | 2       | 4          |
Appendix N

Word Trees