PERSISTENCE FACTORS OF WOMEN IN INFORMATION TECHNOLOGY –
A MULTIPLE CASE STUDY ANALYSIS

A DISSERTATION
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BY
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DEDICATION

This dissertation is dedicated to my wife, Lisa, and my children, Rosie, Sam, and Gabe. Without each of you, none of this would have been possible.
ABSTRACT

Women have historically been underrepresented in the field of information technology. The literature related to the underrepresentation of women in information technology has focused on developing strategies for attracting more females into the industry. Despite these efforts, the number of women in information technology has been declining. The factors that contribute to the career persistence of women in information technology were investigated. An exploratory multiple case study methodology was used with nine women who have been employed in the information technology field for a minimum of five years. The subjects underwent a series of two interviews that focused on the reasons why they thought they had been able to have sustained careers in information technology. A qualitative analysis of the interviews was conducted to determine the factors that the subjects identified as contributors to their career persistence. The interviews were also analyzed to discover whether women that have had sustained careers in information technology conceptualize their experiences from particular feminist perspectives.

The findings provided insights into the following factors that contribute to career persistence among women in information technology. These factors included how a woman transitioned into her first information technology position, personal traits, effective career strategies, and effective coping strategies. While there will be individual differences, each subject presented that a combination of the stated factors directly contributed to her sustained career in information technology.

Women in information technology were found to conceptualize their experiences through a variety of feminist perspectives. The existential feminist perspective was used
extensively as a rationale for how societal expectations shape peoples view of women in information technology. The Marxist/socialist feminist and radical feminist perspectives were utilized when describing the barriers against women in information technology. The liberal feminist and postmodern feminist perspectives served as a foundation for recommendations to increase the likelihood for women entering and staying in the field of information technology.
ACKNOWLEDGEMENTS

Breland (2006) once wrote about how the dissertation process is like coping with a dying loved one. When asked how I was doing on my dissertation, the response would come in a hushed tone, “Well, I’m hanging in there. It shouldn’t be too much longer.” Where Breland described how the end of the dissertation as a solemn event, I am here to shout from the rooftops that I am alive. I am happy to say that what may have been ailing me is in complete remission. It has been through the support of others that I have been able to complete this dissertation.

I would like to thank my wife, Lisa, for her support. Even when it seemed like the process would never end, you have been there with a foot in my back. You were there telling me that it will be done. You should be receiving an honorary doctorate for having gone through this with me.

To my children, Rosie, Sam, and Gabe, I thank each of you for being patient and understanding with the time it has taken to finish this dissertation and degree process. I hope that I have shown you by example the importance of education. No matter what direction your future holds, never stop learning.

Finally, I need to thank my doctoral committee members. In particular, a special thanks to Dr. Roger Wessel for agreeing to chair my committee after I had already completed all of the degree coursework. Your encouragement and advice helped to guide me through the dissertation process. To the rest of my committee, Dr. Michelle Glowicki-Dudka, Dr. Paul Biner, and Dr. Tom Harris, thank you for your support and feedback as I have worked my way through the doctoral process.
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Prove Yourself

Know What You Want and Get It

Effective Coping Strategies

Thick Skin

Use Humor

Embrace the Positive

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CHAPTER I
INTRODUCTION

The use of information technology is pervasive throughout society. This has spawned a high demand for professionals with the knowledge, skills, and abilities needed to design, implement, and maintain the complex technology that drives our economy. Despite this opportunity, there are very few female information technology (IT) professionals entering into and remaining in the field. The prevailing areas of research have focused on the circumstances that decrease the likelihood of girls and young women from entering the field of information technology.

Despite years of research and programs to correct the under-representation of women in IT, the number of females pursuing technology degrees and careers has continued to decrease. And yet, there have still been a number of women that have chosen to enter and maintained careers in the information technology industry. It was the goal of this study to approach the issue from a different perspective. Instead of focusing on the conditions that dissuade females from choosing to pursue IT careers, this study explored the factors that influenced those women that have maintained careers in information technology.

With a more thorough understanding of the influences that contributed to these women persisting in information technology careers, policy makers will be better
informed in their creation of programs and policies to increase the number females in the field of information technology.

Background of the Problem

Men have always accounted for the vast majority of workers in the field of information technology. Despite the scarcity of women in the IT field, there have always been those who have entered into and remained in the profession. Those women that have persevered in the IT industry have a story to tell. Embedded within their personal journeys are insights into their experiences, motivations, and coping strategies.

Previous research has focused on the reasons why females do not enter into the field of information technology. Studies have looked into the perceptions girls and young women have of information technology professionals and the field as a whole. Researchers have also tried to identify the barriers females face when working in a male-dominated industry. In spite of this research and the programs that have been developed in response to them, the demographics of the industry indicate that they have been largely unsuccessful.

As the coordinator of an information technology based academic program, the principal investigator had a personal interest in this issue. Every time the principal investigator would walk into the classroom he was struck by the lack of gender diversity. Most of the students have been young, White males from lower to middle class families. From 2000 – 2006, there would typically be one or two females student in a class of twenty. For the Fall semester of 2007, the program only had one female student as a registered major.
The significance of the underrepresentation of women in information technology extends beyond just the gender composition of university classrooms. The low number of women pursuing careers in information technology may have an impact on the long-term development of the U.S. economy. Four reasons have been presented (Barker & Aspray, 2006) why the underrepresentation of women in information technology needs to be addressed.

The first reason is the lack of qualified IT professionals to satisfy the needs of current and future growth of the U.S. economy (Barker & Aspray, 2006; Bartol & Aspray, 2006). It is expected that the demand for qualified IT professionals will experience 30% growth through 2014 (Hecker, 2005). However, with the number of women entering technology degree programs, such as Computer Science, Information & Computer Technology, and Information Systems, it is anticipated that there will not be enough professionals in the country to satisfy the growing need (Barker & Aspray, 2006). Since information technology is said to have been a primary contributor to improvements in the United States economy (Stiroh, 2002), not having enough IT workers could have a negative impact on the future growth.

While the first reason centered on the well-being of the national economy, the second reason was concerned with the welfare of individuals. In a report on the fifty fastest growing occupations, the Indiana Department of Workforce Development (2007) identified several IT professions in demand. In addition to being in high demand, these positions had average salaries ranging from $45,000 - $75,000. In a state where the average salary is $34,694 (Kostelac, 2005), these salaries represent opportunities for individual citizens to improve their financial well-being.
The third reason to increase the number of women in information technology concerns a diversified workforce (Barker & Aspray, 2006). Beyond the sociological reasons for diversifying, having a mixed workforce can have a beneficial effect on an organization's well-being. The shortage of qualified information technology professionals has caused organizations to rely on foreign IT workers (Barker & Aspray, 2006; Bartol & Aspray, 2006). Initially, this practice was initiated as a short-term solution to organizational needs. However, the practice of offshoring has persisted because of the five-to-one to ten-to-one wage differential between U.S. and foreign workers (Barker & Aspray). This practice has lead to criticism by various minority IT associations. These associations have argued that domestic firms should invest in the development of the local workforce.

Hiring a diverse local workforce would provide organizations with tangible benefits. A diversified workforce will be better able to develop solutions to meet the needs of a broader range of customers (Barker & Aspray, 2006). Each employee brings a different set of ideas, experiences, and cultural beliefs into an organization. This diversity can foster an environment of creativity and innovation that can aid IT organizations to develop products that provide solutions to a broader range of potential customers (Barkema, Baum, & Mannix, 2002). Even in organizations that do not develop IT products, the same benefits of diversity will allow IT departments in organizations from any sector of the economy to develop more creative and innovative solutions to organizational needs.

In the third reason, diversification of the IT workforce was identified as being important for the individual organization. Barker and Aspray’s (2006) fourth reason
extended that need for diversification in using technology to develop solutions for the well-being of the nation’s future. By diversifying the national IT workforce, the United States will be in a better position to address its economical needs. It has already been established that IT serves as a catalyst for economic development within the United States economy (Stiroh, 2002). The innovative use of information technology across all sectors of the national economy may be a key to the United States competitiveness in the global market.

Statement of the Problem

Women are under-represented in the field of information technology. Existing research has focused on barriers to females choosing to pursue education and careers in information technology. What this body of research lacks is the perspectives of those women who have successfully navigated the challenges of being a female in a male-dominated field. The absence of research on this topic has denied female IT professionals a voice in the development of programs and policies that would impact future generations of female technology professionals. This study seeks to begin to rectify this shortcoming.

Purpose of the Study

The purpose of this qualitative study was to investigate the influences that contributed to the career persistence of women employed in careers in information technology. The existing literature provides insight into the reasons why females have not chosen to enter the field. With the abundance of barriers impacting the entry of females into the industry, why do certain women persevere? This question is the crux of this study. Using a multiple case-study approach, this study sought to capture the lived experiences of women in IT in an effort to understand why these women chose careers in
IT and how they were able to successfully navigate the barriers identified in previous research literature.

Research Questions

1. What factors contribute to the career persistence in women in the field of information technology?

2. What are the prevailing feminist theoretical perspectives among the women that have sustained careers in information technology?

Significance of the Study

The outcome of this investigation will be the development of a framework that describes the factors that contribute to certain women entering into and persisting in the field of information technology. This study may be used to develop programs intended to reconcile the gender discrepancy in the field of information technology. By identifying those factors that positively influenced the retention of women in the field of information technology, a set of strategies to aid in the recruitment and retention of women in information technology that are based on their female predecessors could be developed.

Access and Identity Issues

One of the mainstays in academic life is the creation of knowledge. Inherent in this quest for knowledge is the issue of truth. Of course researchers are seeking out the truth concerning their academic interests. However, it cannot be assumed that the observation and collection of data is going to result in the discovery of absolute truth. This is not to say that the academician’s procedures or analyses are flawed. It is simply that the actions and interpretations of the individual researcher are influenced by his or
her unique life experiences. While the resulting analysis may have the appearance of truth from the researcher’s perspective, the analysis may not hold true for others.

In his essay on the sociology of knowledge, Merton (1972) described the historical impact of this subjective nature of knowledge.

Especially in times of great social change, precipitated by acute social conflict and attended by much cultural disorganization and reorganization, the perspectives provided by the various sociologies of knowledge bear directly upon problems agitating the society. It is then that differences in the values, commitments, and intellectual orientations of conflicting groups become deepened into basic cleavages, both social and cultural. As the society becomes polarized, so do the contending claims to truth. At the extreme, an active and reciprocal distrust between groups finds expression in intellectual perspectives that are no longer located within the same universe of discourse. The more deep-seated the mutual distrust, the more does the argument of the other appear so palpably implausible or absurd that one no longer inquires into its substance or logical structure to assess its truth claims. Instead, one confronts the other's argument with an entirely different sort of question: how does it happen to be advanced at all? Thought and its products thus become altogether functionalized, interpreted only in terms of their presumed social or economic or psychological sources and functions. (p. 9)

Merton’s (1972) assertions bring to question the nature of knowledge and the truth. He noted that throughout history, the creation of knowledge has been shaped by the perceptions of those in power. That is, the observations of the world filtered by the
thoughts and beliefs by those making the knowledge claims. Merton described how the Nazi’s search for knowledge was shaped by their belief that they were the master race and that all others were chattel. This set of perceptions provided the self justification for atrocious experimentation that supported their ambitions and beliefs.

It is this subjective interpretation of knowledge that served as the basis for Merton’s (1972) Insider and Outsider doctrines. In its most extreme form, the Insider doctrine dictated that “particular groups in each moment of history have monopolistic access to particular kinds of knowledge” (p. 11). The Insider doctrine can also take a lesser form when certain groups “have privileged access, with other groups also being able to acquire that knowledge for themselves but at greater risk and cost” (p. 11). The position of power over information access has typically been associated with membership of the dominant group in a particular society or culture (Banks, 1998; Damaris Rose, 2001; Merton, 1972; Miraftab, 2004). Unless you are a member of this dominant group, you may not have access to the resources required for the creation of knowledge. Additionally, the Insider doctrine implied that even if you are able to acquire those resources, you would not be able to fully comprehend the information that you discovered.

For example, there was a period of time in American culture when it was popular to state that, “It’s a guy thing. You wouldn’t understand.” The only way that a person could possible understand the “thing” was by being a guy. Of course, the term “guy” has been substituted by other groups and subgroups. By virtue of wearing the t-shirt, button, or owning a spare wheel cover (after all, it’s a Jeep thing), the implication was that it placed that person in a position of power. Everyone else, the “outsiders,” could not
possibly hope to understand the nuances of being an “insider,” even if they did have access to insider resources. The Insider doctrine contended that in order to conduct sociological research, one had to be an insider not only to gain access to the group under investigation, but to be able to accurately represent the perceptions and beliefs of the group members.

The Outsider doctrine presented the opposite perspective. That is, one must be an outsider in order to gain a more thorough understanding of a group or phenomenon (Merton, 1972). Merton noted instances throughout history of the “corrupting influence of group loyalties upon the human understanding” (p. 30). Subjects may not be willing to share information with a researcher that is considered an insider. There may be fear that the researcher will inform the group of what the individual shared, causing negative repercussions (Banks, 1998; Damaris Rose, 2001; Merton, 1972; Miraftab, 2004). By being an outsider, the investigator can be viewed as a neutral to whom the subjects have no need to self-censor (Damaris Rose, 2001). Also, being an insider may blind the investigator to critical questions that may be apparent to outsiders. An insider researcher may be blinded by the status quo, whereas an outsider investigator is more likely to ask “why” certain phenomenons are accepted as normal (Banks, 1998).

These seemingly dichotomous perspectives on the epistemology of knowledge can present quite a conundrum. Do you have to be a member of the group in order to gain access and understand the phenomenon under investigation? Or, do you have to be an outsider to be able to analyze the situation with a critical eye? In practice, the extremes are not the norm. Merton (1972) suggested that “we are all . . . both Insiders and Outsiders, members of some groups and . . . not of others” (p. 22). This transitory state of
Insider/Outsider status can be explained by the complex nature of positionality.

“Positionality refers to the shaping of perspective by identifiers such as class, occupation, gender, ‘race’, sexual orientation etc. (or several of these in interaction with each other) as well as location in time and space” (Damaris Rose, 2001, p. 23).

The interaction between these factors complicates the identification of whether an investigator is an insider or outsider in any given situation. A researcher expecting to have access to privileged “insider” information simply because he or she shares a single insider characteristic may find himself or herself ostracized from the group based on a different positionality trait (Banks, 1998; Miraftab, 2004).

Banks (1998) developed a “typology of crosscultural researchers” (p. 7) to help conceptualize the complexity of conducting research in multicultural societies. Banks includes four types of knowers or researchers: indigenous-insider, indigenous-outsider, external-insider, and external-outsider (See Table 1.1).

The indigenous-insider is one who “endorses the unique values, perspectives, behaviors, beliefs, and knowledge of his or her primordial community and culture” (p. 7). This is the researcher who is studying his or her own community. The benefit for the indigenous-insider has a presumed, pre-established rapport between the researcher and the subject(s).

The indigenous-outsider is also a researcher who has been “socialized within the cultural community but has experienced high levels of desocialization and cultural assimilation into an outside or oppositional culture or community” (Banks, 1998, p. 8). This is a researcher that was socialized within the culture or community, but has since left that indigenous community or culture. It could be that the person has moved away and
socialized into a new culture. Banks noted that it is common for the indigenous-outsider to be an individual that has been identified by a majority group to act as a representative of the indigenous community. In a research project with multiple investigators, this may be the “token” Asian researcher brought in to provide insight into the Asian culture.

Table 1.1

_A Typology of Crosscultural Researchers_

<table>
<thead>
<tr>
<th>Type of Researcher</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Indigenous-Insider</td>
<td>This individual endorses the unique values, perspectives, behaviors, beliefs, and knowledge of his or her indigenous community and culture and is perceived by people within the community as a legitimate community member who can speak with authority about it.</td>
</tr>
<tr>
<td>Indigenous-Outsider</td>
<td>This individual was socialized within his or her indigenous community but has experienced high levels of cultural assimilation into an outsider or oppositional culture. The values, beliefs, perspectives, and knowledge of this individual are identical to those of the outside community. The indigenous-outsider is perceived by indigenous people in the community as an outsider.</td>
</tr>
<tr>
<td>External-Insider</td>
<td>This individual was socialized within another culture and acquires its beliefs, values, behaviors, attitudes, and knowledge. However, because of his or her unique experiences, the individual rejects many of the values, beliefs, and knowledge claims within his or her indigenous community and endorses those of the studied community. The external-insider is viewed by the new community as an “adopted” insider.</td>
</tr>
<tr>
<td>External-Outsider</td>
<td>The external-outsider is socialized within a community different from the one in which he or she is doing research. The external-outsider has a partial understanding of and little appreciation for the values, perspectives, and knowledge of the community he or she is studying and consequently often misunderstands and misinterprets the behaviors within the studied community.</td>
</tr>
</tbody>
</table>

*Note:* Banks (1998)

The external-insider is one who “was socialized within another culture and acquires its beliefs, values, behaviors, attitudes, and knowledge” (Banks, 1998, p. 8) of another culture or community. A researcher conducting long-term, field research in
another culture may become an external-insider as he or she acculturates to the new community. The external-insider strives for the best interest of the community under investigation and may be viewed as an “adopted” member of that indigenous community.

The external-outsider was socialized within a community different from the one in which he or she is doing research. He or she has a partial understanding of and little appreciation for the values, perspectives, and knowledge of the community he or she is studying. (p. 8)

The external-outsider does not commit to understanding the perspectives, behaviors, or needs of the culture under investigation. This lack of understanding can result in findings that are detrimental to the indigenous community. Banks noted that this type of research is typically used by members of the dominant culture as a means to justify oppressive policies.

The issue of insider/outsider positionality is worthy of discussion for the present study due to its focus on gender issues within the information technology field. The primary investigator was a man studying the female experience within the male-dominated field of information technology. The positionality of the primary investigator could significantly impact the credibility of the study. If the primary investigator was perceived as an external-outsider, the findings of the study may be interpreted as an attempt by a member of the dominant culture to rationalize the reasons why there are not more females in the field of information technology.

It was the goal of the primary investigator to assume the position of an external-insider. As an information technology professional, the primary investigator hoped that he would already share many work experiences and interests as the female subjects of
this study. While the investigator cannot share in the female identity, by being sensitive to the experiences of the subjects and expressing a commitment to improving opportunities for future female information technology professionals, the primary investigator hoped that he would develop a rapport and trust relationship with the subjects.

Definition of Terms

**Barriers/Challenges.** Swanson and Woitke (1997) stated that career barriers and challenges are “events or conditions, either within the person or in his or her environment, that make career progress difficult” (p. 434). These can be real or perceived situations that impact an individual’s entry into a career path or situations that negatively impact career development after entry into the field. The perception or belief that a barrier or challenge exists can have just as powerful a negative effect as an actual event.

**Career Persistence.** For the purpose of this study, career persistence is defined as having worked in the field of information technology for a period of at least five years. The selection of five years is not based on predetermined averages. The literature does not provide any indication of attrition rates for women in information technology. Two assumptions of this study are that for a woman to remain in the IT field for five years: a) there are aspects of the job that encouraged her to stay in the position, and b) if she has experienced any issues related to being a female in a male-dominated industry, she has developed coping strategies.

**Case Study.** Case study is a research methodology “that investigates a contemporary phenomenon within its real-life context; when the boundaries between
phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (Yin, 1989, p 13).

Information Technology (IT). “Includes all matters concerned with the furtherance of computer science and technology and with the design, development, installation, and implementation of information systems and applications. . . . An information technology architecture is an integrated framework for acquiring and evolving IT to achieve strategic goals. It has both logical and technical components. Logical components include mission, functional and information requirements, system configurations, and information flows. Technical components include IT standards and rules that will be used to implement the logical architecture” (Interoperability Clearinghouse Glossary of Terms, 2003, ¶ 45).

Insider. With respect to qualitative studies, insiders are “researchers who belong to the same social or cultural group as the people they are studying” (Damaris Rose, 2001, p. 23).

Outsider. An outsider is a researcher that has not been socialized within the same culture or community as the subjects of a study (Damaris Rose, 2001).

Positionality. “Positionality describes the relative balance of perceived power between those involved in an interaction. Factors such as class, occupation, gender, ‘race,’ sexual orientation, and age can influence the perceived power of any of the individuals involved in the interaction” (Damaris Rose, 2001, p. 23).

Quintain. When conducting a multiple case study analysis, “a quintain (pronounced kwin’ ton) is an object or phenomenon or condition to be studied” (Stake, 2006). In Yin’s (1989) approach to multiple case study, the individual cases are evaluated
in terms of the degree to which they support or refute a predetermined theoretical construct about the topic of the study. With Stake’s (2006) approach, aspects of the individual cases are identified for their support of the overarching research question (i.e., the quintain).

Assumptions

When entering into any research study, the investigator brings a lifetime of thoughts, assumptions, beliefs, and biases. In quantitative studies, the controlled, experimental environment is perceived as providing a reasonable measure of objectivity. Qualitative studies are not afforded this confidence. With methodologies that are frequently based on social interactions between researcher and subject, the potential for researcher bias is considered a major weakness.

Despite this perceived weakness:

Objectivity must be an aim in the human sciences because there is no other reasonable way to construct public knowledge that will be considered legitimate and valid by researchers and policy-makers in diverse communities. However, we need to rethink and to reconceptualize objectivity so that it will have legitimacy for diverse groups of researchers and will incorporate their perspectives, experiences, and insights. (Banks, 1998, p. 6)

In essence, Banks believed that controlling variables in a controlled environment and following a rigid research protocol were not the only ways to achieve objectivity.

Banks (1998) argued that social research cannot be neutral. “The research is always and by logical necessity based on moral and political valuations, and the researcher should be obliged to account for them explicitly” (p. 6). Objectivity is
achieved through self-disclosure. It is not necessary to completely separate the researcher from the subjects under investigation, whether it is a quantitative or qualitative study (Banks, 1998; Damaris Rose, 2001). Regardless of the research design, the investigator still brings his or her own assumptions to bear in the choices that he or she makes. So instead of claiming objectivity by hiding behind a veil of controlled methodologies, it is incumbent upon the investigator to acknowledge the beliefs and assumptions that are brought into the study (Banks, 1998). In so doing, the researcher makes it apparent when his or her own thoughts are being brought into the analysis of the study. Acknowledging ones own assumptions should serve as a filter to assure that the perceptions of the subjects remain intact. As such, instances where the researcher’s personal beliefs are being presented will be noted.

Coming into this research project, the primary investigator was uncertain as to what he would find. Despite this uncertainty, the following belief was held. It was anticipated that women attracted to the IT field would be characterized by strong analytical skills. This belief was based on working relationships of the primary investigator with other women in IT and female students in IT-related disciplines. This differs from a generalization that women in IT must be gender atypical. That is, in order for women to be successful in IT, they must possess stereotypically masculine traits. For example, that they must be aggressive or good at math. The expectation that they will have strong analytical skills was derived from casual observations that women in IT appear to be better at breaking down the technologies into their various conceptual or theoretical components and then grasping the interrelationships between those components.
As for retention in the field of information technology, it would seem apparent that there must be a certain level of job satisfaction. However, it is not anticipated that this is the sole rationale for career persistence among women in information technology. Even if job satisfaction is the primary reason, determining the factors that contributed to career persistence is still relevant. It would not seem reasonable to assume that there are many individuals, male or female, who have encountered situations that have prompted them to leave careers that they would otherwise have enjoyed.

Summary

In this chapter, the rationale for this study was provided. It was explained how the under-representation of women in the information technology industry has prompted many studies to investigate why females are not entering the field. However, the literature failed to investigate the characteristics of those women that have chosen to work in the field of information technology. As such, the chapter described how the purpose of this qualitative study was to investigate the influences that contributed to the career persistence of women employed in careers in information technology.
CHAPTER II
REVIEW OF LITERATURE

Project Summary
Information technology has become pervasive throughout society. Despite the demand for professionals with the skills needed to design and maintain these technological systems, the number of women choosing to pursue careers in information technology has been disproportionately low. In the first chapter, the negative impact of the under-representation of women in information technology has on individual women, businesses, and society was described. This situation has prompted the current study investigating the persistence characteristics of women that have maintained careers in information technology.

Defining Information Technology
Information technology has been defined in several different ways. Some definitions are narrowly focused on the hardware and software components of the field. The essence of these definitions is that information technology relates to the hardware and software used to create, manipulate, store or transfer data or information (National Audit Office, n.d.; North Dakota State Government, 2006). Such a restrictive definition fails to acknowledge areas beyond the technological. Even the United States government
(Electronic and Information Technology Accessibility Standards, 2000) utilizes a narrowly focused definition of information technology.

Information technology. The definition of information technology is . . . any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. Information technology includes computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources. (p. 80505)

A second set of definitions extend beyond the technical by recognizing the organizational aspects of the field. These definitions recognize the importance of aligning the technology goals of an organization with that organization’s mission and strategy (Malone & Morton, 2003). While definitions that acknowledge the subordinate role of information technology to organization priorities is an improvement, it still does not encompass the depth and breadth of the field of information technology. The Interoperability Clearinghouse (ICH) Glossary of Terms (2003) defines information technology as follows:

Information technology (IT) - Includes all matters concerned with the furtherance of computer science and technology and with the design, development, installation, and implementation of information systems and applications. . . . An information technology architecture is an integrated framework for acquiring and evolving IT to achieve strategic goals. It has both logical and technical components. Logical components include mission, functional and information
requirements, system configurations, and information flows. Technical components include IT standards and rules that will be used to implement the logical architecture. (¶ 45)

This definition provides not only recognition of the role of information technology in an organization; it states that information technology incorporates a logical aspect. Where the technical aspects of information technology dwell on devices and applications; the logical aspect deals with the cognitive aspects of the field. An IT professional must have the ability to deal with group dynamics, psychology, and politics while trying to determine how to best support the mission of an organization through the use of technology. The ICH (2005) definition also cuts across multiple disciplines, including computer technology, computer science, information systems, and engineering.

It may seem that a great deal of emphasis is being placed on the selection of a definition for information technology. The lengthy discourse is necessary, however, because the choice of operational definition has a significant impact on the question at hand. The nature of the definition may preclude women from this study. A description of information technology that centers completely on the technical skills will exclude many women from consideration (Scott-Dixon, 2005). Their exclusion on this basis would not accurately represent the number of women that are involved with information technology. The ICH (2005) definition not only encompasses jobs beyond the front-line technician, but also recognizes the human skills necessary to function successfully in the field.

Feminist Theories and Information Technology

In reviewing the literature for the programs that have been highlighted, none of the authors or organizations has stated specific theories upon which their programs are
based. While each of the programs was well intended, the absence of specified theoretical foundations calls into question the basis for their procedures and recommendations. The literature that did investigate theoretical perspectives were qualitative theory building studies and not outreach programs. The current research project sought to investigate whether women that have persisted in information technology careers possess particular feminist ideologies.

In trying to understand the under-representation of women in traditionally male-dominated jobs, it would be simple to assume that these are just “male” jobs. That is, men are fundamentally or genetically predisposed to perform specific job titles, such as fire fighter or surgeon. Women, on the other hand, are born to perform more nurturing tasks such as childcare, nursing, or other human services. This explanation for gender representation falls into the essentialist perspective. Trauth, Quesenberry, and Morgan (2004) stated that “the essentialist perspective dichotomizes gender based upon the presumption of significant inherent differences between women and men. This view finds the causes of gender under representation in biology” (p. 114).

Many would argue that such a binary approach is a disservice to society and to women in particular. Feminism is a philosophy that investigates why women are oppressed, subjugated, or treated unequally individually, within groups, or in society (Baehr, 2007; Huang, 2008; Lorber, 2001; Rosser, 1998, 2005) As with any topic of theoretical discussion, there are many perspectives that have been developed. The issue of information technology and feminism is no exception. The purpose of this discussion on feminism is not to provide a comprehensive dialogue of all feminist perspectives. This would be beyond the scope of this literature review. Instead, the alternative feminist
ideologies and how they relate to the under-representation of women in information technology will be presented. By describing these theories, the primary investigator had a basis for determining the theoretical perspective of the subjects during the analysis the transcripts.

Feminist philosopher Alison Jaggar (1983) provided a taxonomy which separated feminist theories into four major categories: liberal feminism, Marxist feminism, socialist feminism, and radical feminism. Since Jaggar’s taxonomy, many feminist theorists have combined the Marxist and socialist philosophies together due to their similarities. In addition to those categories identified by Jaggar, existential and postmodern feminist philosophies have been used to describe the circumstances surrounding women in information technology. While not a comprehensive list of all the variations of feminist perspective, the identified ideologies have been identified in previous literature.

Liberal Feminism

Liberal feminism is based on the premise that everyone, male and female, has the intrinsic right to “freedom from coercive interference” (Baehr, 2007, ¶ 2). From a liberal feminist perspective men and women are essentially the same. As such, men and women should have equal protection under the law and be afforded equal opportunity and access to resources (Lorber, 2001). However, liberal feminism holds the belief that women are oppressed in society because of unjust discrimination (Jaggar, 1983). Despite this belief, Rosser (1998) noted that “liberal feminists seek no special privileges for women and demand simply that everyone receive equal consideration without discrimination on the basis of sex” (p. 174-175).
The liberal feminist framework would argue that overt and covert barriers (Rosser, 1998) impede women from entering and succeeding within the male-dominated field of information technology (Lorber, 2001; Rosser, 2005). Programs that follow a liberal feminist philosophy have a goal of women reaching employment and salary parity in numbers with their male counterparts.

While liberal feminism is credited for raising the awareness of discrimination against women (Lorber, 2001), it is criticized for not bringing around any fundamental changes in society (Rosser, 2005). Liberal feminism’s perceived shortcoming has been the belief that making the dominant male workforce aware of the discrimination and informing them that women are just as capable would cause a change in the male belief systems that caused the discrimination.

*Marxist/Socialist Feminism*

Marxist philosophy dictated that control over production resources was the key to control and power in a capitalist system (Lorber, 2001; MacKinnon, 1982). In turn, an individual’s class in society was the key determinant of whether the individual would have control over such resources. This belief was based on Marx’s observations of American capitalism and society. Marxist feminism took Marx’s philosophy and took the perspective that class was a higher priority than gender in the oppression of women (Rosser, 1998). MacKinnon (1982) noted that within Marxist feminism, the notion of women being equal to each other across classes is impossible. Even amongst women, there will be the bourgeois and proletarian classes (Rosser, 1998). Though both classes may be considered subservient to males within the feminist perspective, the Marxist
aspect would note that bourgeois women would be provided with resources while the proletariat have to toil for those same resources.

Within the socialist feminist framework, “class and gender [are given] equal weight in determining the position and perspective of an individual in society” (Rosser, 1998, p. 178). Lorber (2001) noted that socialist feminists have argued that women are treated as a resource in the production of society’s needs. In times of economic prosperity, women are discouraged from gaining access to employment. This has been accomplished through restrictive policies, such as lower funding for education or childcare support for women. Then again, economic downturns would result in the active recruitment of women into low skilled, low paying jobs.

Evidence supporting the Marxist/socialist feminist perspectives has been identified in the field of information technology. Rosser (2005) noted that “class and gender analyses document women’s occupation of the worst-paid, most tedious and health-destroying segment of the labor market in electronic assembly” (p. 3). Outside of the manufacturing environment, the ITAA (2001) found that women comprised 82% of the low skilled data entry keyer and computer operator positions. However, women only represented about 27% of the higher skilled, higher paying system analyst positions (Meares & Sargent, 1999). Some would argue that the very nature of technology development has intimately related to class and gender. Rosser (2005) observed that technology has been developed by men for the purpose of supporting their own needs. This system is supported by men having easier access to the venture capital, geographic mobility, and opportunity to work the long hours typically needed for technology start-ups and development (Matthews, 2003). Marxist/socialist feminists would argue that by
making it difficult for women to take advantage of these resources, men are able to keep women under their control. From the Marxist/socialist feminist perspective, reform programs should seek to provide for a more balance distribution of resources (Rosser, 2005).

**Radical Feminism**

Lorber (2001) described radical feminism as a “theory of gender inequality that went beyond discrimination, to oppression, and a gender politics of resistance to the dominant gender order” (p. 16). Within the radical feminist perspective, patriarchy, which is described as male oppression and exploitation of women (Lorber, 2001), has fostered a culture that views women as inferior and subservient. With liberal feminism and Marxist/socialist feminism, developing a system of equality amongst and between males and females was a goal. Radical feminism views the replacement of male-dominated systems as the only solution to the abuse suffered by women (Lorber, 2001). The rationale for such an approach is rooted in the philosophy that what is considered scientific knowledge on which American society is based on the male perspective and control of scientific discovery (Rosser, 1998, 2005). Providing a female only environment allows women to engage in consciousness-raising groups (MacKinnon, 1987). Rosser (1987) suggested that these groups offer “a strategy for obtaining reliable knowledge and correcting the distortions of patriarchal ideology” (p. 191).

A radical feminist approach to resolving the gender issues within information technology takes a more antagonistic approach than the cooperative approaches of liberal and Marxist/socialist feminist ideologies. Rosser (2005) presented that “radical feminism suggests that because men, masculinity, and patriarchy have become completely
intertwined with technology and computer systems in our society, no truly feminist alternative to technology exists” (p. 11). Radical feminism would recommend that technology programs be for girls only so that they can learn without the threat of violence or oppression from male participants. The premise would be that a female only environment would allow them to think freely about the possibilities and uses of technology.

Existential Feminism

Existential feminism would argue that differences between males and females are not strictly due to biological differences, which would be an essentialist perspective, but the value that society places on the perceived differences between males and females (Rosser, 2005). These perceived differences are the basis for why women are treated as the Other (Tong, 1989). By viewing women as an Other, male society is seen as having permission to dominate and exploit them (Beauvoir, 1953).

Within the area of information technology, this perceived difference in capabilities is the primary reason why boys are socialized to embrace technology at an early age (Rosser, 1998). Meanwhile, girls are not expected or encouraged to participate in technology. While essentialists would state that programs designed to increase computer literacy in girls is due to their biological inferiority, existential feminists would argue that they are needed to make up for the lack of opportunity girls have had because of the preferential treatment boys receive in the area of technology.

Postmodern Feminism

One of the common themes among each of the feminist perspectives presented thus far is the notion that women as a group are all treated the same, poorly. Lorber
(2001) presented that postmodern feminism challenges the notion of “gender categories as dual, oppositional, and fixed, arguing instead that sexuality and gender are shifting, fluid, multiple categories” (p. 32). Instead of having universal truths for all women, Rosser (1998) noted that “her particular race, class, and sexual identifications, along with her gender as constructed by her society and era, differentiate her from [other women]” (p. 192). There is no simple description or solution to the differential treatment of women since the circumstances of their individual situations are unique.

The existence of individual circumstances does not suggest that there are no solutions to the under-representation of women in information technology. Instead, it suggests that multiple strategies targeting different barriers be utilized in an effort to address as many of the barriers as possible (Rosser, 1998). Rosser (2005) recommended that organization try to develop flexible policies. One such example is the option of telecommuting. Telecommuting can provide the option of working from home to avoid the cost and concerns of finding safe and affordable daycare.

Information Technology Demographics and Trends

Information technology has proven to be a catalyst for economic growth (Stiroh, 2002). Oliner and Sichel (2000) estimated that information technology accounted for two-thirds of the increase in labor productivity since 1995. It has been argued that the impact of information technology on the United State economy has not been fully appreciated since the leading economic indicators fail to account for the impact of information technology in non-IT industries (Tech-economy.org, 2003). Bynum (2002) of the Information Technology Association of America (ITAA, 2003) found that over 90% of IT professionals worked for non-IT companies.
Information technology is pervasive throughout society. There are few, if any, industries that are not impacted by technology. In a report by Atkinson and Correa (2007), it was observed that:

The information technology revolution continues to transform the economy, as organizations in all industries use IT to find new ways to boost productivity, develop new products and services, and create new business models. IT workers, even in “traditional” industries, are bringing IT to an ever-growing list of applications, from standard website design, to tracking supply and product shipments in real time, to streamlining internal office operations. (p. 21)

For the period from 2000-2010, Moncarz and Reaser (2002) anticipated that the demand for IT professionals will increase dramatically (see Table 2.1). Even when the economy has experienced downturns, there has been a demand for those with information technology skills (Lopez, 2002). Hecker (2005) anticipated that information technology jobs would grow over 30% through the year 2014, among the highest growth rates of all sectors in the United States economy.

With this phenomenal expected growth in demand for IT professionals, one would expect that the number of women entering into the field would be increasing as well. However, only a small percentage of information technology professionals are women (Lopez, 2002; Margolis & Fisher, 2002; Smith, Morgan, & White, 2005). Instead of increasing, the number of women in the information technology field has been decreasing (American Association of University Women [AAUW], 2000; ITAA, 2003; Klawe & Leveson, 1995; Lopez, 2002). The ITAA (2003) found that in 1996, women comprised 31% of the programmers in the United States. By 2002, the percentage of female
programmers dropped to 25%. The only areas in which women were represented in
greater proportions were in the area of data entry keyers. Unfortunately, the 82% that
females dominate were in jobs that required minimal skills and provides low pay. Meares
and Sargent (1999) agreed that women primarily filled data entry keyer and computer
operator positions, but also stated that women on comprised only about 27% of computer
system analysts and scientists.

Table 2.1

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Employment, 2000</th>
<th>Employment change projected 2000-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer and information systems managers</td>
<td>313,000</td>
<td>48%</td>
</tr>
<tr>
<td>Computer software engineers</td>
<td>697,000</td>
<td>95%</td>
</tr>
<tr>
<td>Computer support specialists and systems administrators</td>
<td>734,000</td>
<td>92%</td>
</tr>
<tr>
<td>Systems analysts, computer scientists, and database administrators</td>
<td>887,000</td>
<td>62%</td>
</tr>
</tbody>
</table>

Note: Moncarz and Reaser (2002)

The number of females pursuing information technology degrees has also been in
decline. Snyder and Hoffman (2001) reported that in 1985, the number of women
pursuing degrees in computer science reached a high of 37%. By 1998, only 27% of
computer science students were female. In 2000, women represented only 22% of the
recipients of undergraduate degrees in computer science and engineering (ITAA, 2003).

Barriers to Women in Information Technology

The lack of female representation in information technology has been attributed to
a number of real and perceived barriers or challenges. Swanson and Woitke (1997)
described career barriers and challenges as “events or conditions, either within the person
or in his or her environment, that make career progress difficult” (p. 434). These can be
real or perceived situations that impact an individual’s entry into a career path or situations that negatively impact career development after entry into the field. The perception or belief that a barrier or challenge exists can have just as powerful a negative effect as an actual event.

*Lack of Role Models and Mentors*

The lack of female role models and mentors has been identified as a deterrent to females choosing to pursue careers in information technology (ITAA, 2003). Without the presence of other female IT staff, women may feel that the lack of opportunity to collaborate and socialize with other female professionals would result in a lonely work environment. A report by the Bush, Henle, Cohen, Jenkins, and Kossy (2002) presented that minority women were not inclined to consider careers in information technology since they were not seeing any other women of color in the IT field. If it is true that people are inclined to prefer the presence of others that share similar characteristics, then the lack of females in IT may discourage other women entering the field. Without a visible opportunity to socialize with other women in IT, females may not feel that there will be opportunities to learn from women that have come before them.

*Lack of Career Guidance and Academic Preparation*

Kekelis et al. (2005) found that many females were not aware of information technology career options. Without an awareness of the opportunities available in information technology, there was no incentive for these females to even consider pursuing careers in information technology. In addition to this lack of information about careers, these females were unaware of the academic requirements needed to prepare for information technology careers.
The ITAA (2003) found that a lack of academic preparation has prevented many women from pursuing degrees in information technology disciplines. The highly logic driven and analytical disciplines in information technology require advanced math and science courses. Computer science and information technology programs typically require that students successfully complete calculus and physics courses to earn their degrees. The problem is that “teachers and career counselors, particularly in middle and high school settings, may not understand or appreciate the requisites to prepare students for careers in IT” (p. 5). Without a clear understanding of the requirements for earning a degree in information technology, teachers and career counselors may not encourage high school students to take the advanced math and science classes that go beyond the high school graduation requirements.

For those female students that may have been interested in an IT career, the prospect of taking prerequisite courses before they can take the required science and math courses may seem insurmountable. Instead of taking the extra courses, students may opt for other less technical degree programs. While this barrier is also true for male students, females are less likely to receive encouragement to investigate educational programs that lead to careers in information technology (Bush, et al., 2002; ITAA, 2003). The converse would indicate that males are more likely to receive encouragement to investigate and apply to information technology educational programs. This would reduce the probability of academically unpreparedness being a barrier for males.

Negative Perceptions of IT

The field of information technology suffers from a public relations problem. The negative stereotypes of the people that work in information technology and work
environment are ingrained in popular culture (ITAA, 2003). The image of the “computer nerd” or “computer geek” may turn females away from pursuing degrees and careers in information technology (Bush, et al., 2002; Kekelis, Ancheta, & Heber, 2005; Lopez, 2002). This negative perception is fueled by characters in movies, sitcoms and children’s programming. Newmarch, Talyor-Steele, and Cumpston (2000) characterized the stereotypical IT professional as “a nerdy male dressed in a short sleeved shirt and tie who completely lacks social skills” (p. 7) or that they were “lonely and dull will little human interaction” (p. 8). Analyses of television and magazine advertisements have been shown to support these stereotypes (Barker & Aspray, 2006). Barker and Aspray noted that media frequently portrays females as the helpless users of technology, while the males are presented as technological intellectuals rescuing the damsels in distress.

In addition to the negative stereotypes attributed to IT professionals, the perceptions of IT work is not generally favorable. In a study by Kekelis et al. (2005), it was found that females anticipated that IT work would be boring since it would entail looking at a computer screen all day in a little cubicle. Females were also put off by the perception that IT work requires long hours at the office (Bush, et al., 2002). The negative attitudes towards careers in information technology has been exacerbated by the perception that the industry promotes a philosophy that it is necessary to sacrifice your personal and family life in order to succeed (von Hellens, Nielsen, & Trauth, 2001).

In a report by the American Association of University Women (2000), it was claimed that:

The cultural emphasis on technical capacity, speed, and efficiency when discussing computers estranges a broad array of learners, many girls included,
who do not identify with the wizardry of computer aficionados and have little interest in the purely technical aspects of the machines. As commission co-chair Sherry Turkle writes, the computer culture has become linked to a characteristically masculine worldview, such that women too often feel they need to choose between the cultural associations of “femininity” and those of “computers.” (p. 7)

While not stating it outright, the AAUW (2000) implied that if forced to face a perceived choice between femininity and masculinity, women will choose to retain their feminine identity. The common perception of technology as a masculine discipline would then turn females away. The AAUW report stated that females would rather pursue careers that offered “human interaction, variety, communication, working with colleagues and job satisfaction, all qualities which stereotypically IT careers lack” (p. 10).

_Lack of Career Guidance from Parents_

Parents can have a significant impact on the career choices of their children. While the influence of parents may be most significant during their early years, that parental influence still persists during the independence-seeking teen years (Barker & Aspray, 2006). Unfortunately, Kekelis et al. (2005) discovered that most of the parents of the females in their study provided little to no career guidance. Instead of providing suggestions of or exposing their daughters to potential careers, most of the parents chose to maintain a laissez-faire attitude. Parents that provided little career guidance would instruct their daughter to simply graduate. The discipline did not matter. Most of the females in their study stated that their parents would support whatever career they decided to pursue. Kekelis et al. concluded that:
By not providing early support for specific career interests, parents may unintentionally exclude some professions that require considerable advanced planning and training. Parents’ reluctance to support specific career choices may unknowingly hinder their daughters’ ability to stay on a technical or scientific educational and career path. (p. 104)

*Sex-Role Stereotyping*

To some extent, the claim that information technology is a male-dominated field may be as much of a self-fulfilling prophecy as it is a descriptor of the field. Technology has typically been viewed as a masculine topic (Newmarch et al., 2000). Boys tend to be socialized towards an affinity for technology, whereas girls have been directed towards the use of technology (Bush, et al., 2002). Newmarch et al. (2000) stated that “parents were more likely to buy computers for boys than girls because they are more likely to believe that male children will have a future career in [information technology]” (p. 6). Additionally, fathers were more likely to engage their sons in activities that involved experimenting with computers than they were with daughters (Barker & Aspray, 2006).

Gaming has also been identified as a factor that deters females from involvement in information technology (Barker & Aspray, 2006). Traditionally, computer games have been designed and marketed for males. Competitiveness and violence have continued to be a mainstay in computer games since their inception. The stereotypical or socialized affinity boys have towards such characteristics has drawn males into gaming; while turning away females. This alone does not serve as a barrier to entering educational programs and careers in information technology. However, being actively involved in computer gaming increases the likelihood that the person will learn about the technology
on which game is being played (Tillberg & Cohoon, 2005). Active computer gamers are likely to engage in research into the computer components that will enhance their gaming experience. With a low proportion of females engaged in computer gaming, their experiences and comfort with technology are likely to lag behind those of males.

Eccles (1987) noted that “student, teacher, and parental attitudes discourage girls from pursuing science and math despite the fact that females, in general, get better grades in math and science than males” (p. 30). Gender stereotyping increased the likelihood of parents underestimating the potential of girls’ capabilities in the areas of math and science. Li (1999) noted that the math capabilities of male students were frequently overrated and girls’ abilities were underrated by their teachers. This lack of encouragement discourages females from considering careers in information technology. Goode, Estrella, and Margolis (2006) observed that in an Advanced Placement computer science course, the instructor would engage the “tech-savvy” males in the class at the expense of other students.

In the classroom, the sex-role stereotyping that information technology is not appropriate for females can shape how teachers incorporate technology into their curriculum. Whereas female students may be encouraged to explore creative interests through the use of technology, males were encouraged to take risks and discover how technology works (Newmarch et al., 2000). From a very early age, females have been socialized to be passive users of technology, not creators and controllers of technology. These expectations have been slow to change in the primary grades since the vast majority of elementary school teachers that have not been adequately trained in not only
the instructional use of technology, but also in addressing the differences in how male 
and female students learn technology (Barker & Aspray, 2006).

Also associated with sex role stereotyping is the burden of child care that is 
placed on women. It was anticipated by females that the long hours required to work in 
information technology would interfere with family aspirations or obligations (Bush et 
al., 2002). For some female IT professionals, there was the fear that if they leave work 
early, or even on time, that they would be branded the “mommy” of the IT group (Nobel, 
2007). This perception is not without basis. Nobel observed that in order to be successful 
in the field of information technology, one has to prove his or her “professional fortitude” 
(p. 35). In order to command respect from peers and management, IT professionals would 
need to successfully complete a major project. In addition to the difficulty of the task, the 
women interviewed by Nobel noted that these projects typically occurred during the 
times of their lives that they were starting or had young families.

Recommendations for Increased Female Involvement

With the all of the real and perceived barriers confronting women considering 
careers in information technology, what has been done to rectify the situation? Since 
information technology suffers from a significant amount of negative stereotyping and 
misunderstanding, many recommendations revolve around changing people’s perceptions 
and awareness of the reality of the information technology field.

Early Outreach

Changing the negative perceptions of information technology has been identified 
as one of the primary recommendations to increase the number of females in the industry. 
While there are many different entry points into the field of information technology
(Bush, et al., 2002), completing a degree program in a relevant field has been found to be the most successful strategy for entering information technology careers (United States Department of Labor, 2006). However, if attempts to change female perceptions of IT are delayed until they reach college; it is likely to be too late. It is recommended that strategies focusing on late primary and lower secondary schools would be more effective (Lopez, 2002; Newmarch et al., 2000). Barker, Snow, Garvin-Doxas, and Weston (2006) recommended designing middle-school programs that not only made technology more appealing to females, but should also include the following: show them how technology can impact the lives of others; expose them to IT careers; make them aware of high school courses that would be needed to pursue the educational requirements for a career in technology.

Efforts in schools should not focus solely on the students. Strategies to improve interest in technology should include teachers as well (Ramnanan, 2001). Many teachers assigned to teach IT courses do not have formal training in this area, which can result in poorly developed and implemented curriculum (Newmarch et al., 2000). As a result, course design may not account for the different ways that males and females learn.

Courses should be designed to increase interest and enjoyment of technology among females. Emphasis should be placed on hands-on projects that build confidence in interacting with technology (Kekelis et al., 2005; Klawe & Schneiderman, 2005). Newmarch et al. (2000) found that females lost interest when technology courses were too theoretical. This should not be construed as a recommendation to avoid theoretical content. Instead, it should be a priority for curriculum designers to utilize a theory-to-practice model of course development. By having the hands-on projects after being
exposed to the underlying theoretical constructs, students can see how theory can “come to life.” This approach is intended to change the outlook of technology by improving their feelings of self-efficacy.

**Image Reconstruction**

In conjunction with early outreach efforts, it is recommended that attempts should be made to change the stereotypical images of IT professionals and their work (Kekelis et al., 2005). The scope of such an endeavor would be rather broad when the “nerd” image of IT professionals is reinforced in television, movies, and print. Instead, images and profiles of women engaged in IT should be promoted (Bush et al., 2002). Newmarch et al. (2000) recommended comprehensive campaigns that included mentoring, female IT support networks, female role models, field trips, job shadowing, and internships.

With the perception that IT professionals spend all of their time staring at computer screens and doing “nerdy” things, it is important that women be made aware of the true purposes of technology. Technology is a tool, nothing more. The role of the IT professional is to help organizations meet their goals and objectives through the use of technology. This holds true regardless of whether the organization is a for-profit business or a community outreach organization. With the pervasiveness of technology, technology has the potential to have a positive impact throughout society. An awareness of this aspect of the information technology may make the field more attractive to women (Klawe & Schneiderman, 2005).

Efforts to change the perception of IT should not be restricted to young females. The misconceptions and lack of information that is conveyed to young women by others that influence their career and education choices need to be addressed (Newmarch et al.,
2000). Parents, teachers, and guidance counselors need to have a better understanding of information technology careers (Kekelis et al., 2005; Ramnanan, 2001) and that women play an important role in the industry’s continued development. Additionally, these individuals need to know what academic courses are needed in high school to prepare the student for pursuing a college degree in information technology. Meares and Sargent (1999) reported that females were less likely to take computer application courses in high school than males.

Role Models/Mentors

A highly recommended strategy has been to provide young women with female role models and mentors who are already working in information technology (Bush et al., 2002; Newmarch et al., 2000; Ramnanan, 2001; von Hellens et al., 2001). Having women who are successful IT professionals with whom they can identify with is thought to have a positive impact on the perception of IT careers by young women. These mentors and role models give females a tangible example of the fact that women can be successful in IT careers. They also give the young females an opportunity to discover how and why these women chose to enter the field of information technology.

The importance of mentors, in particular, extends into the work environment. While it is beneficial for both men and women, it is seen as an especially important contributor to the success of females in the IT workforce (Catalyst, 2003). Nobel (2007) noted that women who had female mentors increased their likely of being promoted within an organization. These mentors help the new employees to learn the “rules of the game.” Since the actions and expectations required for success are not usually documented, the insights of those that have traversed that trail are seen as an
immeasurable asset. Women are more likely to realize these benefits from female mentors (Newmarch et al., 2000).

*Corporate Commitment*

In order to decrease the under-representation of women in information technology, a conscious effort must be made by the corporations hiring IT professionals. In addition to connecting new female IT professionals with mentors within an organization, it is recommended that they interact with their peers from other organizations. To that end, companies should encourage their female IT professionals to participate in professional associations for women (ITAA, 2003). This can be accomplished through time-off for attending conferences, meetings, and activities sponsored by associations such as Women in Technology. The Information Technology Association of America (ITAA) also recommended that businesses consider paying the dues for their female employees to become members of these associations.

It is also recommended that IT companies increase their commitment to colleges and universities (ITAA, 2003). It is not uncommon for companies to come to college campuses for recruiting new employees and student interns. While this is good, it does not represent a strong commitment with the college or university. Ultimately, they are serving their own needs for human resources. What the ITAA recommended was an alliance with the college or university in which the IT company actively supports the institution’s mission of educating students.

Businesses can assist by providing students with the resources they need to learn through financial support, curriculum development, and non-monetary donations. Non-monetary donations could include hardware that has reached the end of their life-cycle in
a production environment. In a corporate data center, computers, servers, and network
devices may not support the increasing demands of their system after being in operation
for a few years. While this hardware may no longer support corporate needs, donating the
hardware to an academic IT program would provide students with an opportunity to
apply the concepts and theories they are learning. Providing females students with hands-
on learning experiences in which they can explore and experiment has been
recommended for increasing retention of female IT students (Newmarch et al., 2000).

Programs to Increase Female Involvement

A number of programs have been implemented attempting to address the issue of
the underrepresentation of women in information technology. A comprehensive
description of the programs that have been developed is beyond the scope of this research
study. However, a few of the programs will be presented here.

Females in Technology

In her research to determine the impact of skills development and mentoring on
enhancing female interest and involvement in technology, Ramnanan (2001) developed
and implemented an after school program for young women (ages 14 to 18) in Miami-
Dade county in Florida. The program was divided into three major clusters.

The first cluster was designed to increase the computer literacy skills in both
computer hardware and software. To increase their hardware knowledge, participants
disassembled and reassembled a desktop computer. During this procedure, students
learned about the components, their purpose, and how they are installed into a desktop
computer. In addition to learning about the computer hardware, participants were taught
how to use a digital camera and video recorder. They were then taught how to import
captured images and video into the computer. With respect to software, participants learned about various aspects of the Windows 95 operating system; such as control panel items, Windows Explorer, and other computer literacy skills. They also learned how to use the HyperStudio multimedia authoring software.

The second cluster of the program focused on teaching participants how to utilize information technology to accomplish assigned tasks. The initial tasks focused on learning how to conduct research on the Internet. This was accomplished through a series of lessons that provided the participants with an opportunity to use the technology to explore topics of their own interest. Once they were comfortable with using the tools for general investigation, the participants were directed to explore various career opportunities in technology.

The third and final cluster introduced participants to women currently working in IT professions. These professionals introduced the young women to their respective careers and job responsibilities. Mentors also exchanged e-mail addresses with participants and encouraged open communications with them.

**Girls Creating Games**

Denner, Werner, Bean, and Campe (2005) developed an after-school and summer program for girls (grades 6-8) to break down the barriers of entry into technology. The underlying concept of the program was to have girls develop their own computer games using Flash technology. The first assertion was that teaching the girls to develop their own computer games would foster a more active interest in technology. A second assertion was that the program would put the girls into the roles of creators and leaders of technology, rather than passive users of technology.
The first of four strategies used in the program was to have the young females design and build their own interactive story games. The participants are guided through five stages of application development: requirements specification, user interface design, prototyping, prototype testing, and implementation. Activities provided instruction on how to use Macromedia Flash to take their games from storyboard to working game. With this approach, the young females were empowered to use technology to be creators, and not passive users of technology.

Paired programming was used as a second strategy in the program’s design. With this approach, pairs of girls shared responsibilities as driver and navigator. The driver was responsible for describing to the navigator how she was using keyboard and mouse to make entries into the computer. The navigator used supporting documentation to help the driver and verified the accuracy of the driver’s entries. Paired programming encouraged peer support and collaborative learning.

The third strategy attempted to challenge the negative stereotypes associated with women and technology. This was accomplished by having female technology students and IT professionals interacting with and helping the girls at various stages of their projects. These role models not only provided the girls with technical support, they also shared their own personal experiences with the girls. The girls were able to see that there are women involved in technology that are still able to maintain families and friendships.

The fourth and final strategy was an effort to increase the likelihood of persistence with the study of technology. Specifically, the strategy targeted the recommendation to enhance girls’ confidence in the use of technology. In one activity, participants were asked to write affirmations about the skills of other participants. The
second activity provided girls with lapel buttons with the statement, “Ask me for help with . . .” Each girl was then asked to write down the technical skills with which they would be able to help others (Denner, Werner, Bean, and Campe, 2005).

*Girl Scouts of the U.S.A.*

Some organizations have implemented broader initiatives to combat the underrepresentation of women in technology. The Girl Scouts of the U.S.A. (2007) has been involved with the movement to promote an interest in science, technology, engineering and mathematics (STEM) among its members. They have developed STEM awareness programs that local chapters can present to their members. Currently available on the Girl Scouts of the U.S.A. website is a resource guide that was developed in conjunction with the Optical Society of America Foundation. In it, young women discover the science of light and career opportunities in the field of optics. The Girls Scouts of the U.S.A. has also established partnerships with outside agencies to support their initiatives. Lockheed Martin has provided funding to help local and national initiatives within the Girl Scouts to explore STEM education and careers. Individuals or groups within the Girls Scouts are encouraged to apply for the grant to fund activities such as field trips, job shadowing, or STEM related projects that will enhance an interest and participation in science, technology, engineering and mathematics. NASA has also extended opportunities for the Girl Scouts through outreach programs, camps, and mentoring. Through the efforts of the Girl Scouts of the U.S.A., many of the aforementioned barriers are being addressed at an early age.
Summary

This chapter provided an overview of the existing literature on women and information technology. The field of information technology was described in detail with respect to its definition, the demographics of the industry, and the trends in information technology employment. The barriers to women in the field of information technology were outlined. Much of the literature looked into the reasons why females choose not to enter into information technology. Despite the many recommendations and programs that have been attempted, the number of females entering information technology related degree programs has not improved. For this reason, Trauth et al. (2004) recommended that future research should investigate issues surrounding retention of women in information technology. Various forms of feminist theory and their relationship with information technology were also described.
CHAPTER III
RESEARCH DESIGN AND METHODOLOGY

Project Summary

In the information technology profession in the United States, women are significantly under-represented. As technology becomes increasingly pervasive throughout all aspects of society, it is anticipated that the demand for technology professionals will continue to increase. This demand may in part be addressed by efforts to increase the number of women choosing to enter the information technology profession. However, research has shown the factors that contribute to the disproportionately low number of women in information technology professions. The research has described various barriers that can discourage young women from considering careers in information. However, the lack of research in persistence factors of those women who have chosen information technology as a career is a rationale for the present study. In an effort to determine whether feminist ideology has an impact of career persistence, a number of feminist theories and their relationship to information technology were investigated. It is anticipated that through this analysis of feminist ideologies, a better understanding of how women that have persevered in the male-dominated industry of information technology conceptualize their experiences and
beliefs. This chapter will describe the research design, research subjects, data collection methods, and strategies for analyzing the data.

Purpose of the Study

The purpose of this qualitative study was to investigate the influences that contributed to the career persistence of women employed in careers in information technology. The existing literature provides insight into the reasons why some females have not chosen to enter the field of information technology. With the abundance of barriers impacting the entry of females into the industry, why do certain women persevere? This question is the crux of this study. Using a multiple case-study approach, this study sought to capture the lived experiences of women in IT in an effort to understand why these women chose careers in IT and how they were able to successfully navigate the barriers identified in previous research literature.

Research Questions

1. What factors contribute to career persistence in women in the field of information technology?

2. What are the prevailing feminist theoretical perspectives among the women that have sustained careers in information technology?

Quantitative vs. Qualitative

In the broadest sense, research falls into the major categories of quantitative and qualitative methodologies. Quantitative methods are the most common research paradigm. When conducting quantitative research, the initial step would be determining a hypothesis based on an extensive literature review and professional experience. A methodology for data collection would be developed that would ensure the reliability and
validity of the results. The study would be conducted with concerns of researcher bias, random sampling, sample size, and any other factors to avoid corruption of the data. The collected data is then submitted to statistical analysis to determine if the results were statistically significant. Assuming that the results are statistically significant, the hypothesis would be supported and generalized beyond the sample group to the broader population. If the research was experimental in nature, then the results may indicate a causal relationship between variables (Golafshani, 2003). In describing quantitative methods, Labuschagne (2003) stated:

As a rule, quantitative research is mainly concerned with the degree in which phenomena possess certain properties, states and characters, and the similarities, differences and causal relations that exist within and between these. It is usually based on theoretical or empirical considerations and quantifying phenomena. (p. 100)

Qualitative analysis is quite different from the quantitative approach. The goal is not to develop an experimental model for data collection. Instead, the intent is to gather a rich, detailed understanding of a subject’s experiences or of a phenomenon. Qualitative methods were developed to study social and cultural phenomena (Myers, 1997). While quantitative analysis may find consistency across the subject population, Labuschagne (2003) expressed the benefits of qualitative methods.

Qualitative methods typically produce a wealth of detailed data about a much smaller number of people and cases. Qualitative data provide depth and detail through direct quotation and careful description of situations, events, interactions, and observed behaviours. (p. 100)
The actual methods of qualitative research are markedly different than quantitative research. In qualitative research, the hypothesis is not necessarily stated at the onset of the study. With qualitative methodologies, the researcher starts with a general notion about a phenomenon. From the onset of data collection, the analysis of the data starts to shape a theoretical construct about the phenomenon being studied. This, in turn, can prompt changes in both methodology and subjects (Strauss & Corbin, 1990).

Jacelon and O’Dell (2005) described the dynamic nature of qualitative research when they stated that “substantive theory is derived through an ongoing process of continually reviewing the data, refining questions, and re-evaluating these changes. The resulting substantive theory is a theory that is applicable to a specific situation” (p. 49).

In quantitative analysis, one of the cardinal sins is tampering with sample selection in any way that does not provide a random sample. Qualitative analysis does not have the same reservations. To the contrary, researchers using qualitative analysis might argue that it is unrealistic for the subject pool to be untainted by the researcher, whether conducting qualitative or quantitative research. The best that can be hoped for is to acknowledge and mitigate the impact of the researcher on the subject. However, there are times when the researcher affects subject behavior. Qualitative methodologies, such as the interview and observation, can place the researcher in close contact with the subject for long periods of time. In such cases, it is expected that the personal biases and behaviors of the researcher may have an impact on subject behavior. This is not to say that the researcher has permission to unduly influence a subject to elicit certain responses. It is incumbent upon the researcher to accurately capture the responses and experiences...
of the subjects while acknowledging the researcher’s own feelings and the perceived impact the researcher may have had on the subjects.

Another key difference between quantitative and qualitative studies is the purpose of the literature review. The deductive nature of quantitative studies warrants that the literature review be conducted at the beginning of the study. The purpose of the literature review in quantitative research is to gather information that will shape the research questions and corresponding procedures. With the intent on determining whether a narrowly focused research question is statistically significant, the literature review is an attempt to identify and control all possible variables that may impact the item of study. In order to do this, the literature review must be done at the onset of the study.

In a qualitative study, a literature review is still conducted at the beginning of the study. However, the focus may be different. The initial literature review is intended to sensitize the investigator to the issues surrounding the research question (McCann & Clark, 2003). The concern is that by becoming immersed in prior research, the investigator would develop preconceived expectations of a subject’s responses. In effect, too much initial literature review could lead to shaping the investigator’s perceptions of subject statements, instead of trying to capture the perspectives of the subject’s own perceptions.

The literature review also manifests itself during the analysis of the collected data. During the analysis phase, the existing literature is incorporated as a means of explaining and validating subject observations and interpretations.
Qualitative Methods and Information Technology

There are many sociological and cultural issues related to information technology that cannot be explained readily through the use of quantitative methodologies. Trauth, Quesenberry, and Morgan (2004) conducted a grounded theory study to address the issue of under-representation of women in information technology. They presented that the prevailing theories to explain the discrepancy were essentialist and social constructivist. The essentialist perspective held the viewpoint that there are biological differences between men and women that account for the low number of women in the field. The social construction perspective was presented as a belief that information technology is more in line with the social construct of the male identity than female within a given culture. Trauth et al. utilized a grounded theory approach through a series of interviews to develop a theory of individual differences to explain why women are under-represented in information technology. A quantitative approach to a study focusing on individual differences would seem inappropriate since quantitative analysis would try to generalize to the whole rather than recognize the individual.

von Hellens, Nielsen, and Trauth (2001) utilized open-ended interviews to study women’s perception of the masculinity of information technology. It would have been possible for the authors to develop a survey of masculine and feminine traits that could be associated with information technology, but this would not give them the individual perceptions that they wanted. The strength of qualitative analysis in this study was its focus on capturing the richness of the perceptions of the subjects. What made it rich was the opportunity to explore beyond the predetermined options presented in a quantitative
survey. The reasons behind those perceptions can be pursued during a semi-structured or unstructured interview.

The field of information technology is ripe with opportunities for qualitative research. In an effort to understand why women are underrepresented in the information technology field it would be beneficial to develop a thorough understanding of their backgrounds, experiences, and perceptions. A qualitative study can capture that and provide females, academics, policy makers, and organizations with the insight needed to take actions that will provide an accurate representation of the information technology field.

Consistency and Trustworthiness Measures

In quantitative analysis, the constructs of reliability and validity are paramount. If the data collection tool is not reliable, there is no certainty that the tool will provide consistent results. Without validity, the data collection tool is not measuring the intended topic of the study. Ensuring that reliability and validity are established is a key aspect of designing a quantitative study.

For a qualitative study, these constructs are approached from a slightly different perspective. Reliability is still an issue in that there should still be some consistency in how the investigator interacts with subjects. For the current study, the interview guide was intended to provide some consistency among the interviews. Even with this, it has already been stated that the interview guide in a semi-structured interview is more of a framework for the conversation. So while the notion of reliability is shared between quantitative and qualitative methodologies, there is still some difference.
In qualitative analysis, the issue of validity is not as concerned with the accuracy of the data collection tool. Instead, the priority is the accurate representation of the subject’s experiences and perceptions. Lincoln and Guba (1985) referred to this as a study’s trustworthiness. For a qualitative research project to be considered trustworthy, the researcher needs to separate out his or her own thoughts and opinions from those of the subjects. It could be that the insider/outsider issue has caused problems for the trustworthiness of a qualitative study. To improve the trustworthiness of the current study, two strategies were utilized.

The first attempt to increase the trustworthiness of the current study was to have a qualified indigenous-insider (Banks, 1998) review the various aspects of the study. To fill this role, a female academician in the field of information technology volunteered to be the insider for the study. This person entered into the information technology field in the 1970’s and has completed her Ed.D. Throughout the study, the insider was asked to review the design and analysis for any oversights or biases that may have resulted from the primary investigator being male. The insider reviewed the interview guide for the first interview for its appropriateness based on the research questions and for language that would introduce a male bias. After data collection was complete, the insider reviewed one of the transcripts in which the personally identifying references had been removed. Her purpose was not to conduct any of the analysis, but to ensure that the primary investigator did not impose a male perspective on the findings.

The second trustworthiness measure was member-checking (Bromley et al., 2003). With member-checking, the subjects were asked to review their individual case analysis for accuracy. During this review, there was also the possibility that the subject
would recall experiences that were not expressed in the earlier interviews. This, then, would be incorporated into the data for the analysis. The concern with member-checking, however, is that subjects may choose to change their story if they see that the analysis does not present them in a positive light.

Research Design

The research design for this study was an exploratory, multiple case study analysis of women who have been working in the field of information technology for a minimum of five years. The use of case study has been said to “identify how a complex set of circumstances come together to produce a particular manifestation” (Hancock, 1998). When little research exists on a particular topic of interest, exploratory case study can be used for hypothesis generation (Galloway, 1997).

In a single case study, the researcher seeks to develop an in depth understanding of the lived experiences of the subject. Through research methods such as interview and observations, the researcher learns in rich detail the unique experiences of the subject. Multiple case studies take this approach a step farther by looking for themes that are present among a series of individual case studies.

This research strategy was selected due to the lack of studies that focus on such women. An attempt to engage in a research design that would try to establish causality or develop theory would be premature. At this point it seems more appropriate to begin preliminary research by developing a better appreciation for the lived experiences and perceptions of women that have persisted in this male-dominated field.

The research design was based on Stake’s (2006) model of studying the quintain through multiple case study analysis. Stake defined the quintain as the overarching...
research question for which the individual cases are trying to enlighten. Stake’s model of multiple case study analysis contained two distinct phases: individual case analysis and cross-case analysis.

In the initial phase of the research design, each individual was treated as a separate case study. The design and data collection of the individual cases was based on the quintain. However, evidence analysis was conducted separately for each case. The intent was to respect the individuality of the subjects and capture the essence of their experiences and perspectives (Stake, 2006).

Once all of the individual case studies have been analyzed, the cross-case phase of the design began. At that point, the researcher was looking for evidence that supports or refutes the quintain from across all of the case studies. The analysis looked for recurring themes from the individual case study that provided insight into the research question.

Sample Selection

The first characteristic of the subject population was that they must be female. The age, ethnicity, or other demographic characteristics of the subjects, while possible contributing factors in the analysis stage, was not a consideration for sample selection. In addition to the subjects being female, they must have worked in an IT position for a minimum of five years. Other characteristics such as age, race and educational background could have been taken into consideration as a filter in the sample selection. However, since there was a potential that these characteristics could have an impact on the research questions, they were not considered in the selection process. Existing literature on the attrition rate of women in IT does not indicate how long women may
stay in the job before leaving the industry. Further research will have to be done to determine this threshold.

For the purpose of this study, information technology was defined by the Interoperability Clearinghouse Glossary of Terms (2003) as follows:

Includes all matters concerned with the furtherance of computer science and technology and with the design, development, installation, and implementation of information systems and applications. . . . An information technology architecture is an integrated framework for acquiring and evolving IT to achieve strategic goals. It has both logical and technical components. Logical components include mission, functional and information requirements, system configurations, and information flows. Technical components include IT standards and rules that will be used to implement the logical architecture. (¶ 45)

The definition for information technology was chosen due to its recognition that IT extends beyond the technologies involved. It implies that IT professionals are able to address the issues of group dynamics, management, politics, and psychology in determining how to deal with the logical components of organizational missions, systems requirements, and information flows.

Based on this definition, an IT position is one involved in the design, development, installation, implementation, or support of information systems and applications. The use of information technology inundates every sector of the US economy. As such, IT positions are not restricted to what would normally be considered “high tech” companies. Not only can IT positions be found in technology-laden industries...
such as banking and health care, but also in other economic sectors such as law, manufacturing, and education.

As stated, subjects must have worked in an IT position for a minimum of five years. An overarching purpose of this study is not only to understand why certain women have chosen to enter into the field, but why or how they have been able to persist. An intended outcome of this research is to develop better strategies for encouraging young women to consider careers in IT. If this is the case, then the characteristics and perceptions of women entering information technology professions may be different from those with sustained employment. Those just entering have not shown their ability to handle, adjust, cope, or prevail over the challenges of working in a male-dominated industry.

The goal for the current research project was to interview seven to twelve subjects. Several potential subjects who match the criteria for the subject population of this study have been identified. All are female who have been working in IT positions for at least five years. The subjects also came from a range of industries, such as education, banking, and software development. If additional subjects are required, a snowballing technique will be implemented. Snowballing is a non-probability sampling method used when there are a small number of subjects that have narrowly defined characteristics (Galloway, 1997). Snowballing asks subjects for references of other potential subjects that share the characteristics required for inclusion in the study. This sampling approach is commonly used “when working with hard-to-reach groups and/or generating inductive, theory-building analyses” (Bromley et al., 2003).
This selection process followed a “replication” logic instead of a “sampling” logic. Yin (1989) explained that sampling logic found in quantitative studies is not appropriate for case study analysis. With such an approach, the researcher would be required to locate and conduct case studies on subjects that represent all possible variables that impact a given research question. Instead, the recommendation was that the selection of subjects be based on a replication logic. With this approach, no attempt is made to select subjects to represent all possible variables. Instead, the cases of individuals that meet the subject criteria are analyzed for the degree to which they support or refute the research question.

Evidence Collection

Two interviews were needed to thoroughly investigate the research questions. An interview can take one of three forms: structured, semi-structured, or unstructured. A structured interview is characterized by a “rigidly defined set of questions” (Bromley et al., 2003). In the structured interview, a rigid interview protocol is applied to each subject in the research study. This form of interview typically employs closed questions in which the respondents choose from a predetermined set of responses (Mathers, Fox, & Hunn, 1998). A structured interview is appropriate when investigating a narrowly defined set of research questions.

Unlike structured interviews that require a strictly regimented script, a semi-structured interview seeks to draw out detailed responses from the subjects (Mathers et al., 1998). An assumption was that a high level of detail provides a more thorough insight into the perceptions of the subject. This is accomplished through the use of open-ended questions (Bromley et al., 2003). The semi-structured interview also gives the
investigator the latitude to explore unanticipated topics through follow-up, re-directs, and probing questions.

A third form of interview is the unstructured or in-depth interview (Bromley et al., 2003). As the name implies, there is very little structure in this form of interview. The researcher goes into the interview with one or two general questions about the research topic. The flow of the interview is governed by the responses of the interviewee, there is “no structure or preconceived plan or expectation as to how the interview will proceed” (Mathers et al., 1998). Unstructured interviews can be useful in situations where little is known about the topic of study.

For the purpose of this study, the semi-structured interview was utilized for the first interview. The choice was based on the exploratory nature of the study. The semi-structured interview methodology provided the primary investigator with the latitude to explore areas that may not have been considered prior to the interview. The structured interview would have restricted the interview to a narrow set of responses based only on questions that had been established in the interview guide. While the unstructured interview would have given even greater freedom to explore in the interview, it was determined to be inappropriate for the first interview. It was, however, appropriate for the second round of interviews. The purpose of the second interview was to clarify and expand on what was discussed in the first interview. An unstructured interview was employed to respond to the unique responses of each individual subject. In a multiple case study research design, there needed to be a level of consistency across subjects in order to ensure that the interviews stayed focused on the research questions.
Before any interviews began, the entire research protocol was submitted to Ball State University’s Institutional Review Board (IRB). The purpose of the IRB was to ensure that the research design conformed to state and national laws regarding the ethical treatment of human subjects. One of the requirements of this process was the development of an Informed Consent (see Appendix A) release. In the Informed Consent, the general purpose and procedures of the study were presented. It also included a statement indicating that individuals were free to refuse or withdraw from the study at any time without any penalties. Subjects were asked if they would be willing to sign the Informed Consent release so that the interview process could begin. Subjects were informed that they could choose not to sign for release and terminate the session without any penalties. Once the release was signed, the digital audio recorder was turned on to capture the interview.

The research design incorporated two rounds of interviews. Having two rounds of interviews provided an opportunity for follow-up questioning and member checking. All subjects participated in the first round of interviews prior to the principal investigator beginning the second round of interviews. To ensure a degree of consistency across subjects, an interview guide was utilized during the first round of interviews. The interview guide served as a framework for how the interview might flow. It consisted of the questions that were identified prior to data collection. However, the number of questions asked varied between subjects based on the flow of the interview. Some subjects may independently disclose information related to an unasked question in the guide. The questions for the semi-structured interview can be found in Appendix B.
The interview guide was reviewed by a panel of experts to ensure its potential for uncovering the evidence sought to address the research questions. An expert in quantitative analysis was the first panel member. This panel member was chosen to ensure that the research design conformed to accepted qualitative research practices. The second panel member had conducted a similar research study into the under-representation of women in technology education in secondary education. The final panel member was a female information technology professional.

A major concern of the first interview was the establishment of rapport with the subject. Since the primary investigator of this study was male, there was the potential that a subject may feel uncomfortable sharing negative experiences about male coworkers or managers. Establishing a rapport was essential. Without a feeling of trust with the investigator, the subject may have chosen not to disclose her experiences, feelings, and outlooks on being a woman in the field of information technology. It was the intention of the investigator to convey to the subject that the purpose of the study was to improve the working and learning conditions for those young women who would consider careers in information technology.

Once the first round of interviews was completed and analyzed, copies of the transcripts were sent to the subject for review. While the first round was designed to make sure that a core set of inquiries were made of each subject, the second round was intended to clarify or follow-up on responses given in the first interview and to delve deeper into areas that may not have been considered during the first round. Consistent with the concept of constant comparative analysis, the researcher is encouraged to explore topics or questions relevant to the research questions that may not have been
considered during the initial research design. With this approach, the researcher had the opportunity to explore themes that arose from subjects in the latter part of the first round with all of the subjects. The second interview employed an unstructured format.

**Analysis of Evidence**

Analysis of the cases was conducted across two phases. The first phase consisted of independent analyses of each individual case. The individual cases were then subjected to a cross-case analysis to find the “binding concepts” (Stake, 2006, p. 8) that provide insight into the research questions.

**Individual Case Analysis**

Analysis of the interviews followed the recommendations of Strauss and Corbin (1998). During the first level, coding of the interviews was done at multiple levels. After reviewing the transcripts, open coding was used to identify concepts and patterns. Initial attempts were to identify the broad concepts and patterns within the dialogue of the transcripts. Transcripts were then analyzed at paragraph and sentence levels. The purpose of this coding was to capture the individual concepts and patterns conveyed in the raw transcripts (McCann & Clark, 2003). At this stage, the analyses of the concepts and patterns were done independently of each other. Simply identifying the concepts and patterns expressed in the transcripts was the goal.

Axial coding (Strauss & Corbin, 1998) permitted the primary investigator to identify links between the independent concepts captured during open coding. Similar concept and pattern codes were organized into categories. Links were then created between categories and subcategories (McCann & Clark, 2003). These initial coding
levels were focused on accurately documenting the observations gathered through the
data collection process.

Selective coding (Strauss & Corbin, 1998) guided the interpretation of the
outcomes of the first two levels of coding. At this stage, relationships between categories
were analyzed to determine themes that illuminate the research question (McCann &
Clark, 2003). During this phase, the overarching categories or themes were compared
with previous literature. The purposes of literature at this stage included: a secondary data
source; prompt unexplored questions relating to the data; and provide a means of
validation (Strauss & Corbin, 1998).

Each of the individual case studies followed this method of coding and thematic
analysis. In this process, additional attention was given to determining the presence of
feminist theoretical frameworks among the subjects. Once the individual analysis of the
first round of interviews was completed, the process moved into the cross-case analysis
phase.

Cross-Case Analysis

The purpose of the cross-case analysis is to identify the recurring themes across
the individual case studies that provide insight into the phenomenon being studied. Stake
(2006) provided a systematic approach to organizing and analyzing the individual case
study observations that worked towards the central research question. The methods
described were based on Stake’s model of cross-case analysis. Stake provided a series of
seven worksheets that cover the entire multiple case study process. For the purpose of
this study only worksheets four and five were used as they are the most pertinent to cross-
case analysis. Stake acknowledged that his model was a series of recommendations and
that the researcher must determine which components are appropriate for use in his or her unique study.

Expected Utility

The first step in the cross-case analysis was determining the utility of each case. In the Case Utility Worksheet (Appendix C), each of the original themes (research questions) was listed. Any new themes that were identified during the individual case studies were also added to the list. Each case was then evaluated for the extent to which they would be useful in explaining the themes. For each theme, a case was given a ranking of high, middle, or low depending on its usefulness for developing that theme.

The purpose of this worksheet was to provide an initial tool for identifying how each case can be used during the cross-case analysis. It was not expected that each case would be equally useful in addressing the research questions. The unique experiences of each subject were anticipated to provide varying degrees of information for specific themes. The Case Utility Worksheet provided a framework for how each case was expected to be used for the remaining steps in the analysis. During data collection of the individual cases, the researcher would indicate the utility expectations. In the cross case analysis phase, it identified the specific cases to focus on particular cases when analyzing a specific theme.

Theme-Based Assertions Matrix

The Theme-based Assertions Matrix (Appendix D) worksheet was used for the development of cross case assertions. In this worksheet, the findings from individual cases were placed in a matrix to determine which themes were supported across the cases. Each finding was assigned a utility rating for each of the themes identified in the
quintain. In doing this, the researcher was not trying to determine whether the finding was similar to the theme. Instead, the question was, “How important is this Finding (derived from its Case) for understanding the Quintain (with regard to this Theme)” (Stake, 2006, p. 52)? For example, Finding I of Case A may have little importance for explaining Themes I, II, and III, resulting in a Low ranking in the matrix. However, it received a High ranking for Theme IV because it appeared to significantly explain this theme.

When analyzing the findings from a given case, Stake (2006) warned about being aware of the atypicality of the findings. That is, the more typical the findings are with respect to the theme, the more likely that finding is going to be generalizable. When filling in the Theme-based Assertions Matrix worksheet, it also needs to be noted when findings were atypical. The findings that are considered atypical “should be treated with extra thought when the Analyst is generating Assertions. The atypicality may extend or limit the generalizations being expressed in the Assertions” (Stake, 2006, p. 55).

These rankings were then placed in the matrix for this finding. This continued for all of the findings in each of the individual cases. Stake (2006) asserted that the completed matrix gave an indication of the level of insight that has been gathered for each of the themes in the quintain.

Further analysis of themes based on the identified findings then served as the basis for the assertions of the study. For Stake (2006), the assertions of a study were what normally would be considered the “results” of the study. Assertions would be the answers supported by the findings to the research questions that have been supported by the findings across the cases.
Summary

In this chapter, the methodologies for this study were presented. It was explained how multiple cast study analysis was to be used. The selection process of women who have been employed in information technology careers for a minimum of five years was described. It was explained how interviews and document analysis were used as the data collection methods. The method for coding and constant comparative analysis of the individual cases was established. Stake’s (2006) methods for cross-case analysis of the quintain were explained. Included were two of the worksheets Stake developed for organizing the findings of the individual case studies for the cross-case analysis.
CHAPTER IV

RESULTS

Project Summary

The demand for individuals skilled in information technology is expected to grow
(Hecker, 2005; Moncarz & Reaser, 2002) despite the current downturn in the economy
(Lopez, 2002). Despite this high demand, women continue to be underrepresented in the
field of information technology (Lopez, 2002; Margolis & Fisher, 2002; Smith, Morgan,
& White, 2005). However, there are still those women who choose to enter the field and
maintain prolonged careers in information technology. It is the intent of this study to
identify those factors that contribute to women persisting in the field of information
technology.

The study utilized Stake’s (2006) methodology for multiple case study
investigation. A total of nine women (n=9) who have been employed in the information
technology field for a minimum of five years were interviewed on two occasions. The
first interview used a semi-structured approach with questions that focused on
determining persistence factors of the subjects. Once all of the first interviews were
completed and transcribed, the principal investigator engaged in preliminary analysis.
The preliminary analysis was to become familiar with the data and develop questions for
the second interviews.
The second interview served two purposes: member-checking and follow-up questioning. Member-checking allowed the subjects to review the transcripts from their first interviews for accuracy. This provided them with an opportunity to clarify or expand on topics from the first interviews. The second interview also provided the principal investigator an opportunity to expand on the first interview. The second interview was an unstructured interview based on the responses from that subject’s first interview and potential themes that emerged across all of the subjects.

Once all of the second interviews were conducted and transcribed, the data were analyzed. The first phase of analysis involved coding, categorizing, and searching for themes for the individual subjects. The purpose of the first phase of the analysis was to provide the data needed for the cross-case analysis. The cross-case analysis occurred during the second phase of the analysis. The individual case analyses were used to determine the recurring themes that provided insight into the quintain (Stake, 2007), or overarching research questions.

In the final analysis, the individual cases were assessed on the degree to which they provided insight into the quintain. The results of the study were not a retelling of the individual case analyses, but a presentation of the findings associated with the overarching research question and how the individual cases support those findings.

This chapter will present the findings from the analysis process. A brief introduction of each subject will be presented. The introductions give a context or reference that serves as an aid for understanding the basis of individual subject observations. All personally identifying information has been removed and names have
been substituted with pseudonyms. The introductions will be followed by the findings of the study.

Subject Biographies

Subject 1: Anastasia

Anastasia is an associate director of support services at a university in the Midwest. The university is state funded and serves 17,000 - 20,000 students. A recent re-organization at the university will be dividing the services provided by University Computing Services into two divisions. Anastasia will be the associate director of the new division of support services.

Anastasia started working for the university as a student employee while completing her undergraduate degree in education. She started at the university working desktop support for the library in 1992. Since that time, Anastasia has been promoted through positions of increased technical and managerial responsibility. She has been with the university for her entire professional career.

Subject 2: Betty

Betty is a support manager for teacher education students at a Midwestern university. One of her responsibilities is to help students develop electronic portfolios required for their state teaching licenses. Additionally, Betty manages a computer support center for the laptops required by all teacher education students at the university. She also assists students to integrate technology into the teaching methods of K-12 grade education.
Betty entered the information technology field as a career change after she returned to the university to pursue her master’s degree. Prior to this, she was a history and English teacher at the junior/senior high school level.

Subject 3: Carla

Carla is the Executive Director of Quality for a software development company based in a large Midwestern city. Carla’s responsibilities include, but are not limited to, managing ten quality assurance teams, technical writing, federal technology regulation compliance, and technical course development. Though based in the Midwest, the company has sales throughout the world.

Carla first entered into the information technology field in 1979 as a systems engineer. During her career, Carla has worked her way up through computer and software manufacturers in California and Texas. Having spent most of her career in the higher levels of management, Carla has experienced the male-dominated culture of information technology field for three decades.

Subject 4: Diana

Diana is the manager of information services for a software development company headquartered in the Midwest. She is responsible for technical editing of product documentation and training. She is also responsible for researching, implementing, and maintaining all systems related to information storage. The company is a privately held, midsized business.

Diana has been with the same company for her entire professional career. She started with the company as an intern. She then moved into a technical writing after
completing her undergraduate degree in management information systems. Since that time, she has also earned her master degree in information and communication sciences.

Subject 5: Ellen

Ellen is senior vice president and chief information officer for a small, Midwestern bank. She is responsible for chairing the bank's steering committee to determine what new technologies will support the bank's business strategies. She is also responsible for technology budgets and contracts.

Prior to her career in information technology, Ellen worked on the financial side of the bank. She started in information technology at the bank as the sole technical support staff in 1985.

Subject 6: Faith

Faith is the information systems/medical records manager for a mental health center in the Midwest. She oversees the development and implementation of information systems strategies and manages the technical support staff for the institution. Faith is also responsible for developing the electronic medical records system and ensuring that the system is in compliance with HIPAA regulations.

The mental health center is a member of a statewide mental health organization. Each location acts independently of each other with respect to the information systems. After working in non-technical positions, Faith entered the information technology field at the center after completing an associate degree in computer science.

Subject 7: Gail

Gail began her career in information technology in help desk support for a microfiche company in 1981. She was also responsible for developing and conducting
computer training within that organization. Gail moved on to other technical positions until the company she was working for closed in 2003. After that, she held a position in technical sales. Gail recently took a systems engineer/consultant position with a technology firm specializing in colocation and managed services in the Midwest. The obligations associated with this new position prevented Gail from being able to participate in the second interview described in the research methodology. Since the second interview was for follow-up and expansion, it was determined that her first interview would remain in the data analysis.

Subject 8: Helen

Helen started her career in information technology as a technical specialist at a Midwestern hospital in 1998. At the time, her responsibility was desktop support. Helen took the position after completing her associate degree in networking. She is currently responsible for systems administration and management of the hospital’s help desk management software.

Subject 9: Iris

Iris is a business analyst for a global, agricultural manufacturing company in the Midwest. She is responsible for developing businesses and technical requirements for application development, data management, project management, process management, new technology deployment, and budget and resource management. She has been with this company since 2000.

Research Question One: Persistence factors

The first research question sought to determine the factors that contribute towards the career persistence of women in the field of information technology. These factors
included both internal and external motivators. Also included in the findings were career
and coping strategies that helped the women persevere in their careers in information
technology.

Transition into IT

For the women in this study, the conditions under which they transitioned into the
field of information technology appear to have played a factor in their career persistence.
The field of information technology is relatively young compared to other industries.
Historically, the education and training available to prepare for careers in information
technology have been limited to computer science. The problem is that computer science
is focused on training programmers. While the field of information technology does
include programmers, it also includes many other career opportunities for which
computer science does not prepare. Education and training opportunities for these other
technology fields has become more prevalent in recent years. For many of the women in
this study, those educational opportunities were not available to prepare them for their
careers in information technology.

Only one of the nine women interviewed for this study indicated that after high
school, she attended college with the intent to earn a degree that would lead towards a
career in information technology. For the remainder, entering the field of information
technology was either a second or delayed career choice.

For Anastasia, the decision to pursue a career in information technology was
made as she was completing her undergraduate degree in elementary education. While
Anastasia worked towards a degree in education, she held a part-time job in desktop
support at her university’s library. As she was getting ready to graduate, the library
offered to transition her job into a full-time position. Anastasia found that her interest in working with technology was greater than her desire to enter the teaching field for which she had been educated. Anastasia has spent her entire working career in information technology at the same university that granted her degree in education.

Betty used the same strategy in her transition into information technology. Betty earned an undergraduate degree in education. But unlike Anastasia, she held a career as a teacher for many years. It was not until Betty returned to college for a master’s degree that made her decide to change career paths. Taking an education technology class fostered an interest that made her enroll in all of the technology classes available in her master’s degree program. This caught the attention of a faculty member who offered her a full-time job that started her career in information technology. Like Anastasia, Betty has spent her entire career in information technology at the same university.

The process of transitioning into information technology for Ellen was similar, but the environment was different. Unlike the previous examples, Ellen was not in an educational institution for her transition. She had worked her way through a number of positions in the bank at which she was employed. While working those positions, she was always interested in finding out how the technology could help her do her job. When the bank decided to create an internal technology support position, Ellen was offered the job. Ellen benefited from having already proven herself as a valuable employee to the bank prior to entering into a technology position.

For Faith, the transition occurred later in her career. Until the age of thirty, Faith was a stay-at-home mother raising two children. It was not until she was getting a divorce that she chose to go to school to learn a trade. She studied computer science based on the
promise of gaining a financially rewarding career. During this time she remarried and returned to the role of being the wife and mother. Although she had worked other jobs, it was not until her second husband retired that she decided to take advantage of her training in computer science. She had been working as a receptionist at a mental health center when a software position opened in their information systems department. Having been employed at the center and knowledgeable of their procedures, Faith was offered the job. Since then, she has spent her entire career in information technology at the same mental health center.

Diana was the only subject who intended to go into information technology as her first career choice. While working towards her degree in information systems, Diana worked as an intern at the organization in which she is currently employed. After graduation, she was hired in as a technical writer. From there, Diana moved to technical training and then into the information technology department. She has since been promoted into one of three technology management positions within the company. Diana was able to parlay her internship into a career in information technology.

*Personal Traits*

Over the course of the interviews, it became apparent that there were certain personal traits that were common amongst the women in this study. The inclusion of personal traits should not be interpreted as a conclusion that the forthcoming traits are required for women to have a sustained career in information technology. They are observations of the nine women included in this study and should be considered as one of several factors that have contributed to their perseverance.
Aptitude

All of the women in the study expressed an aptitude in the area of information technology. With all but one of the women having been initially educated in information technology, the women had to have an ability and capacity for learning technology. Without this aptitude, it would seem unlikely that they would have chosen to pursue careers in information technology. Gail supported this belief when she said, “I’m sure none of us would be given the opportunity we had had we not proved that we were go-getters and, you know, we would pick up the bulk and teach ourselves what we needed to know.”

Anastasia talked about the fact that she had no training in technology. Despite her lack of preparation for entering this field, she always thought that she “had a knack for it.” As a result, Anastasia developed her technology skills while on the job. She felt that this ability to learn technology easily has been a key factor in continued professional growth and perseverance in the field of information technology. The same can be said for Ellen. She credited her aptitude for technology as the primary reason why the bank offered their very first internal technology position to Ellen.

This willingness to learn technology appears to be born out of an inherent inquisitiveness among the women. Even before the technology position was created at her bank, Ellen said, “if I was not busy with a customer, I was busy researching what the system could do for me.” For Ellen, it was this inquisitiveness that contributed to her transition into information technology. Faith also felt that “I think it’s that natural inquisitiveness that first attracted me to IT.”
Once they were in their technology positions, the women frequently commented on their continued inquisitiveness. Ellen mentioned how she loves researching technology. While Faith stated how “I’ve always been very inquisitive when I’m in my jobs,” she always had to “know how it works” and “why we are doing it this way.” Gail talked about how she had “to know the ‘how’s’ and ‘why’s.’” Not that it just works like this” when it came to technology. In order for these women to persevere in their careers, they had an aptitude based on their inherent desire to learn more about information technology.

*Ambitious*

Another major trait that has contributed to these women’s career persistence has been an ambitious personality. Iris talked about how “In the beginning of my career I was very passionate and very disciplined and very enthused” about her career in information technology. Both Iris and Gail talked how being “go-getters” has provided internal motivation to push themselves to move forward in their careers. Even before transitioning into information technology, Helen ran her own cleaning business. When the cleaning chemicals began to have a negative impact on her health, she redirected that ambition to pursuing a career in information technology.

One of the personality traits that appears to have contributed towards the ambitiousness of these women is determination. Anastasia attributed her career persistence to her determination or her drive to keep moving forward. Betty talked about her determination when she described how she was “the kind that will stick with it until I get it” and that she is “bull headed. I tend to be more stubborn if somebody tells me I can’t, I will.”
This persistence was exemplified by Diana when she said, “I’ve just always been a person that if I have something to do, I just put my head down and get it done. There isn’t an option to not get it done. If there’s a deadline, do it.” Both Ellen and Iris agreed that a woman entering this field must have persistence to survive. Gail added that “I’m just not one to quit.” It is this attitude that they are going to finish what they start that has aided these women to persevere in the information technology industry.

However, this was not as simple as a declaration that the work will get done. Anastasia warned that a woman is “going to have to be a strong willed individual who can adapt to change and not let things bother them.” A woman needs to be aware of the likelihood that she is going to be faced with barriers as a result of being a woman in a male-dominated field. In order to have that determination to persevere, they will have to be strong willed in the face of these barriers. Carla displayed this fortitude when she talked about how she has been able to maintain a career in this field despite being faced with acts of discrimination. Carla attributed this to her “outspokenness” and trying to be “courageous” in these situations. Looking back at her career, Carla observed that her persistence and strong will are evident by “the very fact that I didn’t back down. I didn’t run away.”

Iris captured this idea when she said,

It’s a scary field and it’s, you know, it’s a, it’s a, it’s a field that is highly competitive, especially in between the male-dominated race and honestly, it takes a special kind of woman personality, if you think about it as drive and stamina that keeps people in this field.
Anastasia, Betty, and Carla all described the pervasiveness of male managers holding male subordinates to lower expectations than female subordinates.

It is ambition and its supporting traits that will allow women to carry forward in the face of adversity. Each of these women has expressed support for this belief either in their recommendations for the next generation of women in technology or in their descriptions of how they have overcome barriers during their careers in information technology.

**Self-Confidence**

Closely related to ambition is self-confidence. It may be true that those who display high levels of ambition are also highly self-confident. However, it cannot be assumed that all people who are self-confident are ambitious. This warrants a separate discussion of self-confidence as a factor that contributes to the career persistence of women in information technology.

Each of the women was asked to describe their level of self-confidence when they first entered the information technology. Most of the women expressed a high level of confidence in their ability to fulfill the responsibilities of an information technology professional. Iris, Gail, Ellen, and Anastasia all expressed that they were very sure of themselves and their abilities. Even though Anastasia earned a degree in elementary education, her experiences during her part-time technology support job during college was enough for her to state that “I was very confident with myself because I could do it.”

However, not all of the women shared this confidence as they transitioned into the information technology industry. Carla spoke of having a feeling of “impostership” when
she entered the field. This was attributed to her lack of formal education or training in technology.

I think that I probably spent my 20’s with a sense of impostership. Like, well, if I didn’t have a computer science degree like the guys then I’m really not as good as them. And that really wasn’t the case.

Faith also referred to a lack of confidence as a result of not being as educated in technology as the technology directors at other locations within the mental health organization for which she works. Even though she did have some education in computer science, she felt that a lack of confidence because:

So much I know is self-taught, I didn’t want to appear stupid. I mean, I knew what I was doing. I thought I knew what was what, but, and I was running my center okay, but I did not feel comfortable around maybe some of the others. Maybe they knew something I didn’t know. I’m going to say something that makes my center look bad and makes me look bad.

Even if they did not have a high level of self-confidence at the beginning of their careers, it is something that can be developed with experience. Ellen stated that if you are going to be a woman in information technology, “you have to develop confidence.” Ellen felt that as a woman’s career develops, she has to have faith in her own abilities and decisions. She described that for herself:

Maybe I am a bit more aggressive. But after I realized that I was important to these people here and they were willing to do some different things for me. But yet, in the back of my mind, I always knew that I did have some special knowledge and I think that’s pretty good skill sets.
For Ellen, in order to be successful in information technology, a woman must find that confidence in herself if she does not have it when entering the field.

**Character**

For the purpose of this study, character refers to the moral and ethical traits that define an individual (Merriam-Webster, 2002). There are a few recurring character related traits that the women of this study have identified as factors that contribute to career persistence.

*True to yourself.* Most of the subjects made statements indicating the need for women to stay true to themselves. Women need to maintain their integrity when they encounter ethical dilemmas in their careers. Carla described a situation at a previous employer where the business was running behind in their software development. To buy them some extra time, a vice-president ordered Carla to distribute a set of faulty disks to customers. He figured that it would take at least a week or two for the customers to contact them about the problem. He would then issue an apology claiming that there was a manufacturing problem that has been rectified and working disks would be reissued. He was hoping that this would give him an extra month to finalize the application development. Realizing that this was an unethical act, Carla refused to sign off on the order and quit that organization. Carla explained that “I’ve never done anything for someone that I knew was dishonest. And I wouldn’t. And I think that a lot of people get compromised in a workplace, even in an IT shop.”

Anastasia echoed Carla’s feelings when she stated, “I can’t do some of the things that are dishonest that some people do to get ahead.” In the end, Anastasia pointed out that “it’s more comfortable for me to be comfortable with who I am, because I have to
While it may be easier to engage in questionable activities to get ahead, women in information technology need to resist this temptation. The women of this study pointed out that these acts are especially risky for women. Both Carla and Anastasia noted that women are under greater scrutiny than men in the workplace. While the dominant male culture in information technology is likely to overlook or forgive the actions of men, they would use the opportunity to drive a woman out of the job.

The notion of being true to yourself does not have to be restricted to these major incidents. It also refers to maintaining your identity. Ellen talked about how some women coming into the field of information technology will try to emulate the personality characteristics that are stereotypically associated with men, such as ambition and forcefulness. While it may be that the women in this study do possess certain traits typically associated with men, it should not be a conscious decision to alter one’s actions to gain acceptance by the dominant culture. Ellen declared that “you have to admit to who you are and what you are” and that “I don’t think if you are a woman you need to hide the fact that you’re a woman. I think you need to be yourself.”

Role Model. All of the women in the study expressed the importance of having female role models in information technology. While it is easy to state these needs, it takes a special character to choose to be the role model for future generations of women in information technology. Almost all of the women mentioned the hope that they are leading by example to show other females that women can be successful in information technology.

For young women, Anastasia expressed the hope that “by showing them my work, as almost an example, that maybe they would find it an appealing career to go into.” She
went on to say, “I hope that I’ve impacted them enough for them to realize that women are competent, are very capable in this field. I hope that because I can do my job well that that makes an impact on them.” Being in contact with college students, Anastasia is trying to directly influence the number of women who enter the field of information technology by serving as a role model. The same can be said for Betty in her role as a supervisor of college students in at a computer helpdesk. She mentioned trying to be a role model by being “an example. And by that example, I think students will begin to change, maybe, what they think and how they view the world around them.” By being a role model for future women in information technology, she was also trying to change how society views women in information technology.

Like Betty, many of the subjects expressed the hope that by serving as a role model for how a woman can have a sustained career in information technology, they will have made it easier for future generations of women to enter the field. Diana stated, “Hopefully some of the things that I’ve done at my current employer and some of the things I’m going to do will be models for how it can be done. How you can do it all and be successful.” These women hoped to provide others with a plan on how to attain a successful career in technology. Helen shared this idea when she stated the desire to “show them that it can be done and it’s not that difficult.”

Activism. Along with offering up themselves as role models, several of these women would take actions to actively impact the well-being of other women in information technology. One strategy used by the subjects was to engage in hiring practices that favored women. Betty mentioned that she tries to hire female college students whenever possible and that she has more girls than guys on her staff. Carla also
tries to hire women whenever possible. She mentioned, “I hire women whenever I get the opportunity to hire a capable woman. I certainly do.” The problem is that she is the only manager in her organization that hires women. Both Ellen and Faith have also hired female technicians in their respective organizations. Betty observed that in areas where there are more women in technology, “they’re pushing their tech coordinators, who are generally men, to make changes, to let loose some of the tights reins there holding onto.”

Another form of activism presented by the subjects is the need to actively address acts of discrimination against women. Carla mentioned that in her experience, many women in management will not reach out to help other women. The belief is that they had already paid their dues and that other women should do the same. The women of this study rejected that belief and shared experiences in which they have taken a stand.

Anastasia talked about her experiences with her male coworkers. She observed that on hiring committees, her male coworkers were discriminating against female job applicants. They were making assumptions that the female applicant did not know enough about technology. Anastasia’s activism came through when she confronted the men about their actions. She stated, “First you got to get them to recognize that they are doing this. That they are actually doing it.” In order to bring about change, her male coworkers needed to be aware of their actions. By being self-aware, Anastasia hoped that this would change those men’s behavior.

For other subjects, their activism came through in their defense of other women in the workplace. Carla stated that “in the culture I work in, even a very capable woman on my staff I have to defend.” She has found that the male administration has actively tried to remove females from technology positions in her company. “I’ve often been pressured
to reprimand women to push them out. And, I don’t!” Carla described how during a recent employee reduction exercise, her male supervisor would automatically target the unattractive and overweight women in her department for layoffs, regardless of their productivity. In order to protect these female employees, Carla convinced the president of her company to allow her to develop a productivity rubric to determine which employees were candidates for the reduction exercise. Based upon this rubric, she was able to show how her supervisor was targeting women who were actually highly productive employees.

It should be noted that these actions were not always welcome. Carla described how she “had initiated a group called Women in Technology at my company for purpose of having a dialogue group for the women that were working in technology positions in my company.” In response to this group, her male supervisor ordered her to disband the group. His argument was that was inappropriate to have such a group for women within the organization. Out of fear that continued participation in the group would result in the women being victimized, she disbanded the group.

**Effective Career Strategies**

To successfully navigate through the male-dominated culture of information technology, women have to develop effective career strategies. The women of this study provided several examples and recommendations of actions that can be taken for a woman to improve her likelihood of having a sustained career in information technology. **Prove Yourself**

One of the recurring problems that the subjects shared is the lack of credibility or respect they receive as a result of being a woman in information technology. This was
especially the case when they first entered into the field. Betty commented that people “don’t expect a woman to have any kind of [technical] knowledge.” Since these women are defying societal expectations, they do not start their careers with the same level of credibility as their male coworkers. They also do not get the initial respect or credibility among both the other male or female users in their organizations.

Overwhelmingly, the women in this study reinforced the belief that a woman is going to have to prove herself when she starts into an information technology position before she will earn the respect and credibility from others. Ellen described how for most people,

It’s just something that you’re not expecting to see that kind of face there. And when you do, I think it throws you off until you get to know the individual. So I think that’s why, for us in this job, until people get to know us and we get to work in groups and do things together, it’s going to be tough. There will be a few more questions.

Ellen’s statement highlights society’s expectation that only men are supposed to be in information technology. As a result, these women have indicated that, unlike their male counterparts, their actions, decisions, and very presence were questioned by others in their places of employment when they started their careers.

In order to overcome this barrier, the women expressed the need to prove themselves. As Anastasia put it, “They need to talk the talk and understand IT and prove themselves a little bit more than the men.” They all spoke of stepping into their first technology jobs and feeling the need to demonstrate that they knew what they were doing. For those women that transitioned into a technology position after being in a non-
technical position within the same organization, it was especially difficult to overcome
the biases of others. Faith discussed how she had hired a young woman who had been a
transcriptionist within her organization. Now that the young woman was working at the
helpdesk, “It took quite awhile that they thought, ‘she’s just a transcriptionist.’ But when
they have a question about the computer, then it was like, ‘Well, we better call one of the
guys.’” The people in her organization had a hard time accepting her as anything other
than a transcriptionist. It was difficult for them to accept her in a role that was not in line
with their perception of a woman’s work. It was not until Ellen implemented a helpdesk
policy requiring users to work with whoever answered the call did people in her
organization start to recognize this woman’s abilities. By forcing the users in her
organization to work with the female technician, she was able to show them that she was
knowledgeable and had the ability to help them with their computer needs.

To build that credibility, the subjects all spoke of being prepared. They pointed
out that since a man will be given the benefit of the doubt, his actions or
recommendations are not as likely to be scrutinized. A woman’s, however, are going to
be questioned or rejected unless she can provide enough supporting evidence that her
actions or recommendations are appropriate. As a result, Anastasia stated, “I needed to
research it and I needed to understand it and I needed to be right. I don’t know that a male
employee would feel that they had to do that as much.” Iris agreed when she said that:

There are strategies of always keeping yourself one leg up, always keeping
yourself just as educated or, if not more educated, showing that you’re solid and
sound and being more factual. It’s knowing your stuff before you ever try because
you, unfortunately, as a woman, you have a harder time getting the credibility
than you are in this field as a man would.

So in order to be able to sustain a career in information technology, a woman has
to do the research necessary to present a strong business case for their recommendations.
As Diana moved into an administrative position within information technology, she said
that as a woman, you have “to keep proving your point and saying why this is a good
direction to go in and doing your homework.” By doing the research, these women
believe that they are heading off any arguments the men would have about their
recommendations.

By continuously proving to the organization that they are prepared, the women
are making themselves invaluable to the organization. As Carla described,

I have had to be well rounded, I have had to be better than them, I’ve had to be
more productive, I have had to be very reliable. I’ve not given anyone an opening
to say, ‘Maybe we don’t need her.’ What I sell they need. Because of that, and
because they know that they may have to hire two or three people to do it, they
will pay me a price premium to do the job and put up with me. And I put up with
them.

To maintain a long career in information technology, a woman needs to position
herself so that the organization recognizes that they need to retain her for her
productivity.

In order to be recognized as a valuable employee worth retaining, it is especially
important for a woman to have an understanding of business. The purpose of technology
is to help an organization reach its goals or satisfy their needs. To implement technology
effectively, women entering the field of information technology need to be aware of how organizations operate. Ellen attributed her continued success in information technology to her knowledge of the banking business. Having worked in various positions at the bank, from teller to loan officer, Ellen had a strong understanding of the banking industry. When she transitioned into technology, she was able to envision how technology could be implemented in support of that banking process. In so doing, she was able to create value for the bank, as well as increase her value as an employee to the bank. In particular, Ellen stated that “being able to measure those risks well helps you be a lot more successful and that’s what we’re talking about the project from beginning to end, to be able to visualize where you’re going, how you’re going to get there, dangers along the way.”

In order to gain credibility from not only her male peers within technology, but the other men and women of her organization, a woman has to be knowledgeable of current technology and future trends. Information technology is a field that is constantly changing. There are always new software applications, software updates, and new hardware that need to be considered for inclusion in an organization’s network. To stay on top of these changes, it is imperative that women engage in lifelong learning. They have to be independently motivated to continue the learning process throughout their career. Anastasia stressed the importance of “continued learning. Having that ability to continue to learn. To change as the field changes. What you learn today is completely different five years later.” A lack of dedication to lifelong learning will result in becoming obsolete. Betty commented that “technology changes and if you don’t change with it, you’re outdated.” A woman cannot afford to provide the dominant male culture with a weakness that they can use against the woman. Carla explained that “challenging
myself to learn new things has created more value” for the organization and for herself. By knowing the business and knowing more about the technology than her male coworkers, she is able to provide a valuable service that is recognized by her employer.

*Know What You Want and Get It*

All of the women interviewed agreed that they feel the need to be more prepared than their male coworkers in order to gain a measure of credibility within their organization. The women that have been in the industry the longest would also add that a woman should not do this without getting something in return. Ellen said that when a woman is working hard for her organization, she needs to remind herself to make sure that she tells herself, “I’m getting my satisfaction. And when she sees those raises coming in every year, I’m getting my satisfaction.”

However, money is not the only thing a woman needs to consider when she is looking at compensation for her work. Many of the women mentioned the toll that working in information technology can have on a woman and her relationship with her family. After a woman has done the hard work to earn respect among her peers, management may congratulate her and reward her with raises, but at what cost to the other aspects of her life. As these women have indicated, society still has the expectation that even if a woman is working full-time, she is still expected to fulfill the responsibilities of caring for children and the household. Anastasia talked about the expectation of being a “superwoman. You can go and do this job and manage your family.” The women with families expressed the need to fulfill both of these obligations.

Carla and Diana pointed out that management is not likely to approach them and ask them, “What can I do for you? How can I help you manage your work and family
life?” These two women took matters into their own hands. They identified what they wanted in order to reach balance between work and family. They recognized a need to dedicate more time to their families. Both women approached their supervisors and asked to make arrangements so that they would not have to come into the office five days a week.

Having proven herself, Carla was able to successfully make an arrangement for a four day work week. During an annual review with her supervisor, she decided to negotiate an arrangement where she would not work on Wednesdays in lieu of receiving a raise that year. Since then, she has also made arrangements where she telecommutes on Fridays. Unless there are meetings in which she needs to be present, she works from home on Fridays. By making these arrangements, Carla has been able to find a balance between her work and family responsibilities. She has maintained a high level of productivity while still being able to attend her children’s school functions. In doing so, she has had a more satisfying professional career and avoided the need to drop out of the technology field.

However, these arrangements do not just happen. And even if arrangements can be made for the individual, it is no indication that it will be offered to other employees. Diana explained that at her organization, there was no precedent allowing staff members to telecommute from home. But Diana felt that she could perform some of her responsibilities just as well from home as she could at the office. She mentioned that,

I was one of the first persons to really push that. And when I came back from all three of my kids, I just said, ‘You know, there’s no reason why I have to be here
from 8 to 5. I can work from 9 to 11 at night when my kids are asleep.’ And they’ve let me do that and it’s been really beneficial to try that out.

Like Carla, Diana had already proven her productivity to her supervisor who agreed to let her telecommute one day a week. However, this was done so with a warning not to advertise the arrangement to other employees. For that reason, Diana recommended that:

> You can’t be afraid to ask for what you want because they’re not just going to hand it to you. You have to be willing to say, you know, ‘This is what I want.’ And give them alternate ways you can get to it. Don’t just say, ‘I need to be at home with my kids.’ That’s not going to fly. This is what I need to do and this is how I think we can get there and be open to lots of different arrangements.

Diana warned against women approaching the situation as if they were entitled to concessions that would make their lives easier. The woman has to be able to present management with a sound rationale for how the arrangement will not hurt productivity.

These two women have shown how women can reduce the stress of work that is associated with also trying to care for a family. While these arrangements can be made, Carla and Diana warned that the individual must be self-motivated. If management is willing to offer telecommuting, the woman will be under even more pressure to maintain a high level of productivity. Their hope was that they would serve as examples of how these arrangements can be successful, which in turn would enable future women to have the same opportunities to balance work and family obligations.
Effective Coping Strategies

It is anticipated that women will encounter various barriers as they try to enter and progress in their careers in information technology. Of vital importance is an awareness of the coping strategies utilized by these women to help them get past those barriers and continue with their careers. It was anticipated that those subjects who experienced significant barriers in their careers would be the most vocal about coping strategies. While this was true, even those that expressed an absence of barriers presented coping strategies.

Thick Skinned

The most frequently expressed coping strategy was the need to develop what was referred to as a “thick skin.” Having a thick skin was described as the ability to accept that others may act inappropriately and not take it personally. That is, when a male coworker or supervisor is behaving in an inappropriate manner, the women in this study all talked about having to endure a certain amount of this behavior. Helen and Anastasia talked about working with a thick skin and not letting things get to them. Betty agreed when she stated that you have to “have thick skin to start with. Because there are going to be guys who make comments about you.” Betty expressed that there is an inevitability that a woman is going to be the target of some form of discrimination or harassment during her career and she cannot always take it personally.

Faith expanded on this further in her recommendation to young women considering a career in information technology.

I think the first thing I ought to tell them is there are going to be times when you’re going to have problems and it may be because you’re female. Don’t take it
personally. Just understand that that’s just the way the world is sometimes.

Nobody promised that it was always going to be fair every day.

Faith agrees with the other women that one cannot take everything to heart. She takes it further by indicating that world is not a fair place. Based on this statement, she is indicating that a woman should not cry foul and file discrimination lawsuits every time a coworker says or does something that she finds offensive.

This is not something that is an inherent personality or character trait. It is a survival skill that is typically developed over time. As Carla described,

You have to build it. I was always a very sensitive person actually. It’s not . . . I think you have to build a shell and a persona. And it isn’t necessarily your innate persona. It is adaptive to the environment and to the issues.

Carla’s recommendation suggests that women need to build a barrier through which the words and actions of others cannot penetrate.

Ellen warned that a woman cannot,

Get her feelings hurt because she knows that people pursue her, or they perceive women in general that way, she’s not going to be successful. She just has to say, I don’t care. If I know and I can be productive and I can be a big part of what’s happening and make a difference, I’m getting my satisfaction. And when she sees those raises coming in every year, I’m getting my satisfaction.

For Ellen, a woman needs to concentrate on doing better at her job than anybody else and not pay attention to the word or actions of others. When she states, “I’m getting my satisfaction,” she is expressing the belief that hard work will be rewarded in the end.
At first, the notion of having a thick skin can have a negative appearance. It could be interpreted that having a thick skin means that you have to turn a blind eye to the harassment and abuse of women in the workplace. This is not what the women of this study are trying to convey. It is true that some of the women in the study have been the subject of harassment and abuse. However, they are the ones that are most adamant about a woman standing up for herself. Instead, it is a recommendation not to overreact every time a man makes a comment. These women are strong willed. Having a thick skin is not giving the men the satisfaction of getting a reaction out of the woman. It is having the strength of character to stand up to these men and make them feel foolish for their behavior without having to say a word.

**Avoidance**

A few of the women interviewed for this study indicated that they felt that they had experienced little or no barriers as a result of being a woman in the male-dominated field of information technology. For these women, they attributed a supportive work environment for the lack of barriers that they faced. However, there appears to be some discrepancies in their stories. Despite claims to the contrary, these women would occasionally make statements indicating that they had, in fact, experienced the barriers that other women face in this field.

One woman qualified her experiences by saying that the only time she noticed any discriminatory behavior was when she interacted with those outside of her department. She was also the same person who described how her male coworkers engaged in discriminatory practices while serving on hiring committees. These discrepancies should not be considered lies or attempts to mitigate the actions. Instead,
there appears to be a need to displace the blame for these actions. There may be a feeling of guilt at being associated the department that engaged in such behaviors. Not guilt for having conducted those behaviors, but for having received continued promotions from the same technology department that is discriminating against other women.

Examples of avoidance behaviors included statements that they did not “perceive” that there was discrimination occurring at the workplace. There were also statements that subjects felt “sheltered” in their work environment or that their workplace was not part of the “real world industry.” One of the women did acknowledge this avoidance behavior when she indicated that “it could just be me choosing not to see it.”

One woman went so far as to say that “I don’t know that I’d actually use the term that I was discriminated against. I think I was just challenged more to prove myself.” It is true that all employees, regardless of sex, need to prove their worth to their employer, however, the discriminatory acts that have been described present an unrealistic expectation on women. So by having been successful in her organization, those discriminatory expectations must not have been insurmountable. As a result, this woman did not see their actions as discriminatory.

*Embrace the Positive*

One of the simplest coping mechanisms described by the women was embracing the positive characteristics of working in the field of information technology. By holding onto the things that they like about the job, the weight of the barriers that they may experience seemed to be diminished to an extent. They were willing to endure some level of discrimination as long as they were able to receive satisfaction from the parts of the job that they liked.
Many of the women expressed that they really enjoyed the challenge of solving technology problems. Helen described how she “liked it. I understood how it worked and so that’s what I drew on.” Anastasia agreed when she stated that the reason “I’ve stayed in IT is because it is challenging. The field does change over time and I like that challenge.” This challenge to solve problems or to keep up on the constant changes that develop in the technology field is what drives these women to persevere in the field.

Change was a recurring characteristic that the women enjoyed about technology. Betty described how she enjoyed technology because “it’s always growing and changing.” Helen talked about how she enjoyed her job because “it’s not all sitting at the desk. You learn something new every time. I mean, you learn new things all the time, and it’s not repetitive.” Ellen embraced technology for more personal reasons. She said, “I’m easily bored, so I like to change anything that is happening different all the time to keep me going. I don’t want my mind to have three things and then those be the same three things forever and ever.” Ellen also stated, “I guess I thrive in chaos and IT is chaos, always a new system out there. They’re always implementing something. There is always a bug or a fix or many bugs or fix-it’s.” Almost all of the women embraced the changing nature of the field of information technology.

Another characteristic that was frequently cited was financial reward. Several of the women saw technology as an opportunity to enter into a field that paid higher than average salaries. Carla described how “some people close to me were surprised that I could make such a good living financially in this profession. Clearly it far exceeds what I could have made as a technical writer or in the automotive industry by far.” As a result, she “recognized that the opportunity to make a good income offsets the downside.”
in technology has provided these women with enough income to provide for their families.

While the promise of financial gain may be a factor contributing to the perseverance of women in information technology, it is not always a positive thing. Carla talked about how the salary she receives are also “golden handcuffs.” That is, she would have a difficult time finding an equivalent salary in a non-technology field. “Where am I going to get that kind of salary from another company in Indiana, huh? Not too many. I would have to move.” The organization is offering her a large financial incentive to stay with the company. Having established her family in a local community, it would be extremely difficult for her to relocate to an area where she could find a job that paid the same.

For each of these job characteristics, the subjects have used them as a coping strategy to endure certain levels of discrimination or harassment. Only a few job characteristics have been identified in this study. However, the specific characteristic is not as important as having something about the job that they can look forward to each day. Finding something about the job that they could embrace was a major contributor to the career persistence of the subjects.

**Humor**

The ability to maintain a sense of humor was identified as a coping strategy for sustaining a prolonged career in information technology. The women found that humor was an effective method of relieving the pressures of being a woman in a male-dominated industry. While most of the women expressed some form of humor during the interviews, the three most senior participants specifically identified humor as a prominent contributor
to their longevity in the field. These women were both the eldest of the subjects and the most senior administratively within their respective organizational charts.

Carla used humor as a way of dealing with the harassment she has experienced in the workplace. She anticipated that for females in information technology, it is not a question of whether a woman will experience discrimination or harassment. It is a question of when it will happen. With this expectation, Carla stated that:

You have to both steel yourself against and use humor about. You have to respond with humor. You cannot be offended. You cannot take the, ‘Stop! I am offended!’ approach. You have to turn it into a joke. Because it is really sophomoric behavior. It’s very immature, and yet it’s such a part of their culture.

The use of humor allows Carla to laugh at the behaviors of these men. It also contributes to her ability to have the thick skin that was previously described. Carla would use humor to turn harassing behavior back on those behaving inappropriately.

Ellen was the most vocal about the use of humor by women in information technology. Her use of humor differed from Carla’s. Instead of using it to defend herself against the attacks of others, Ellen used humor as a way to deal with the normal stresses of working in information technology. That is, instead of getting frustrated when a piece of technology is not working properly, she will use humor as a stress reliever. She also used humor as a way of building rapport with the users in her organization. Instead of waiting for an inappropriate behavior to occur and then react to it, she chose to be proactive and tried to ingratiate herself with those in her workplace through the use of humor. The use of humor alone would not be recommended. It has to be supported by evidence that the woman has a thorough understanding of the technical aspects as well.
Support Systems

It was anticipated that women with sustained careers in information technology would have a strong support system to help them cope with the barriers they are likely to experience. This was found to be the case with almost all of the subjects.

Family. For almost all of the women in this study, the most important contributor to a sustained career in information technology was the support of family. Several of the women expressed concern over the time requirements of working in the technology field. For those involved in maintaining servers and networks, it is not uncommon that they are on-call all hours of the day and night. If one of those systems does go down, the system or network administrator will have to stay on sight until the problem is fixed, regardless of how long it takes. When there is a system in need of an upgrade, these activities typically occur in the evening or on weekends. The job can be very demanding of one’s time.

When these things occur, it is imperative to have a supportive family. Several of the women described how their spouses have been very encouraging. Ellen talked about how her husband has always been in favor of her pursuing her career. When there were times when she had to stay at work after hours or go out of town for training, he was always prepared to care for the children. Ellen felt that “having a good supportive family means a very, very lot.”

The problem is that even when the spouse is supportive, children are less likely to be understanding of why “mommy” is spending so much time at work. Unfortunately, women are placed into a situation where they are forced to choose between family and work. Anastasia pointed out that “the reality of the situation is that little girl on the phone
crying because you’re not home.” For certain jobs within information technology there are time commitments that are unsympathetic to the needs of family. Iris explained that a woman choosing that career path needs to work with her children to develop an understanding. Without it, there can be resentment and other negative repercussions. Iris spoke of her children having school problems which she attributed to her not being available at home as much.

*Colleagues/Friends.* In addition to family, colleagues and friends were found to be an important source of support. These could be either at work or outside of work. Betty spoke of her colleagues at the university. “If you have problems, you can call them and they’ll do whatever they can to help you.” By having this network of support, she felt that she had support resources nearby in case she needed assistance. If she had a problem, she knew she had someone that she could turn to for help. So for Betty, these individuals were more professional colleagues than friends. This may not seem a coping strategy for the barriers experienced by women, but it is. The women provided different examples of when their male coworkers would prevent them from having access to the resources they needed to do their jobs. So having a network of professional colleagues is a strategy for overcoming this barrier.

Ellen also mentioned the importance of colleagues. She would go to a colleague’s office that did not have a background in computers to discuss technical problems she was having. While this may seem counterproductive, it was really a cognitive exercise. By explaining herself in basic terms, she was forced to think through variables impacting the problem she was explaining. In so doing, Ellen was usually able to develop a solution by the end of the conversation. Knowing how she operated, Ellen needed colleagues who
were supportive enough listen to her work through the technical issues she was facing. Having a group of supportive colleagues can then be a contributing factor to a woman’s career persistence.

For Diana and Ellen, their colleagues were also friends and served a slightly different purpose. These women were not looking for a resource to find a solution to a technical problem. Instead, they were there for personal support. Diana talked about being in a small group of women at work who would occasionally get together to vent their frustrations. She stated that “when it gets really bad, we tend to go in a room together and [mock scream] ‘What are they doing?! What’s going on?!” I guess I’ve had support systems all around.” It is important for these women to have someone that they can turn to when the pressures of being a woman in technology gets to a boiling point. The venting process was seen to have a cathartic effect that enabled them to cope with whatever stressors they were experiencing.

*Mentors.* Many of the women pointed out the importance of having a mentor. This was especially true as a woman is entering into the field of information technology. Iris identified the need for mentors when she encouraged women to find a sponsor within their organizations. They need to find someone with whom they can build a “good faith” relationship. Iris described a mentor as someone you can go to:

> After you’ve been knocked down on a few times. It really, giving you the confidence boost. Giving you constructive criticism and constructive feedback. You know? Especially if you’re running, if you want to propose a new idea, propose, you know, a new technology, a new, a new way to do, redo a process,
you know, it’s really helped being able to bounce ideas off and be able to run your idea through, I guess, a dry run.

So the mentors provide multiple forms of support for the women in this study.

While a mentor is frequently a senior staff member within the organization where an individual works, this does not always have to be the case. For Carla, it was her father that was her mentor. As an executive for a major auto manufacturer, Carla’s dad had a lifetime of experience in the corporate environment. He was able to provide Carla with advice and feedback when needed. Carla recalled a time early in her career when she was in a situation where the men were harassing her for being promoted to a management position. These men would tell her that the position should have gone to a man who was supporting a family, not to a young, single woman. Her father told her,

Carla, if you want to just stay the same the rest of your life, you’ll never catch any flack. But if you want to go ahead and improve your career, you’re going to get a lot of sour grapes from other people and you’re going to need to be able to accept that and let it roll off your back. That’s the price you pay for moving ahead.

To this day, Carla has repeated her father’s advice to young employees and students that she now mentors.

Carla mentioned that there is a “lack of mentoring of how we can be successful women.” She felt that the lack of female role models and mentors serves as a barrier preventing young women from entering the field of information technology. She stated that, “I really think . . . that one of the key challenges is to get appropriate role models in front of girls.” The scarcity of women in technology leadership position serves as a disincentive for young women choosing a career in technology. Those that do enter, they
do not have female mentors whose careers they can emulate. For this reason, Carla has always tried to make herself available to be a mentor.

Ellen has also identified mentoring as a priority in her career. “I think that mentoring everyone who works for me, to the best of my ability, is really great.” Ellen’s commitment to mentoring is not limited to the females under her supervision. She has been equally generous with both the men and women that have worked for her. Ellen described how she had mentored a boy who had started with the bank as a high school intern. After working with the Ellen, he was able to find a new job that would offer him greater opportunities. She described her final conversation with the young man at the bank,

He literally almost cried when he left because he said, you took a kid straight out of school who really didn’t know anything. You taught me how to behave every day. I don’t even know all the lessons that I’ve learned from you, but I know that I’ve just landed this wonderful job with so many opportunities and I could not have done it if it hadn’t been for you.

As the vice-president of technology, Ellen has probably progressed as high as she can at her bank. She has already proven her worth to her peers and her supervisor. Other than the president of the bank, there is nobody higher on the organizational chart. She is at the point in her career that she has overcome most of the barriers experienced by most women in information technology. So how do these acts of mentoring on her part constitute a coping strategy? Even though she may not experience much in the way of barriers herself, she has still seen other women in her organization be the subject of discrimination. Ellen displays her empathy for those still experiencing these barriers by
serving as a mentor. Through her actions, she appears to be trying to help others avoid situations in which they may experience barriers.

Women in Technology Support Groups. All of the subjects were asked for their opinion concerning women in technology support groups. During the first round of interviews, Carla spent a great deal of time talking about how she had organized a women in technology support group at her organization. She initiated the group “for purpose of having a dialogue group for the women that were working in technology positions.” Having endured the discrimination and harassment of men in technology throughout her career, she wanted to provide the younger generation with a support system. Based on her emphatic support for such groups, the other subjects were asked for their opinion during the second interviews.

Betty and Gail were the only women who expressed an interest in actively participating in a women in technology support group. They saw it as an opportunity to engage in mutual support and professional networking. Betty and Gail were in the minority among the subjects.

Most of the subjects were not interested in being associated with an all female support group for women in technology. Some of the women expressed a concern that it would only call unwanted attention to them. They felt that they were already being targeted by the dominant male culture by virtue of their sex. Being associated with such a support group would only give the men additional reason to treat them poorly.

Others felt that these meetings would degrade into a “bitch session” in which participants would be complaining about how unfairly they are being treated. One subject warned that a strong facilitator would be needed to keep the group focused on mutual
support and development. These subjects were more interested in participating in organizations that focused on professional development opportunities. For Anastasia, “It implies to me that because we’re women we don’t get enough opportunities so we need to support each other.” She viewed participation in any all-women’s group as a sign of weakness.

The last group of women did not consider participation worth their time. It was not that they felt strongly against women in technology support groups. They simply did not see that there was enough value in these groups. There time was already dedicated to family and other activities. Diana mentioned that “with everything else I have. With three kids, a husband, and the business, there’s just not time for those kinds of things.” Faith shared Diana’s concern about other time commitments taking a higher priority than participating in a women’s group.

Research Question Two: Feminist Perspectives

The transcripts were analyzed to determine the extent to which feminist perspectives were prevalent among women that have had sustained careers in information technology. The primary investigator looked at how wording and descriptions were used in response to interview questions related to the second research question. It should be noted that it is not the presence or absence of a particular barrier or experience that indicated a particular feminist perspective. Different subjects may interpret identical experiences with different perspectives. The feminist perspective held by the subject becomes evident in how she described her experiences and how they have impacted her.

The feminist perspectives included in this study were liberal feminism, Marxist/socialist feminism, radical feminism, existential feminism, and postmodern
feminism. The results of the analysis on feminist perspectives will be presented from the most prevalent to the least prevalent feminist perspective. This ordering of the feminist perspectives should not be considered an interpretation of the importance of a particular ideology’s impact on the career persistence of women in information technology. At this point, it can only be considered an interpretation of a particular subject’s experiences.

Each of the feminist perspectives will be described with respect to both its ideology and how it might manifest in the subjects. Observations from the transcripts will be interlaced to show how the feminist perspectives are presented by the subjects.

Existential Feminism

The existential feminist perspective is rooted in the belief that gender differentials are not the result of biology itself (Rosser, 1998). Instead, it is the value or perception given by society that is associated with the biological differences between men and women (Rosser, 2005). The existential feminist perspective would hold that there are no biological reasons for the under-representation of women in the field of information technology. It is the influence of society that creates the expectation that men are more appropriate for working with information technology.

Of the feminist philosophies included in this study, the existential perspective was the most prevalent. This was especially true when discussing the causes for the under-representation of women in information technology. In effect, the existential feminist philosophy blames the values and expectations created by society for the relatively low number of women in information technology. The observations of existential feminism centered on the major themes of information technology stereotypes and societal expectations.
Information Technology Stereotypes

One of the common themes that supported the existential feminist philosophy was the idea of stereotypes. From this feminist perspective, stereotypes are social constructs created by the value society places on a particular item. Many of the women in this study cited the negative stereotypes of what it means to be an information technology professional or the work involved as a significant barrier to girls and young women entering the technology field.

The subjects in this study were asked about what they considered to be barriers to women choosing to pursue careers in information technology. Five of the nine women indicated that society’s perception of the type of person who works with computers and technology as a significant barrier. Faith expressed her belief in this existential feminist belief when she stated,

I don’t know that it’s really marketed to women because, let’s face it, when you see the commercials with IT people, you see commercials with white males generally, or there might be the stereotype that there might be an Asian person that does better at this.

Anastasia mentioned that when envisioning who works with information technology, the common stereotypes are males who are the “geeky, gamers, [and] nerdly programmers.” It is not what would be considered a positive stereotype that encourages young people to pursue a career in this field. Instead, Betty noted that:

Most girls are going to see it as the geek with the glasses taped together and that pen pocket-liner thing off in his own little world playing with machines. That is still the stereotypical thing that most girls see.
The subjects expressed that it is this image that society has created that discourages girls and young women from considering a career in information technology. Anastasia pointed out that “it may just simply be the perception of the geeky programmer guy is not appealing to the young girls.” The belief that this social construct created in our society is a contributor to the under-representation of women information technology supports an existential feminist philosophy. The stereotype conveys an image that information technologists are supposed to be male. The existential feminist would say that because of this image that society has fostered, it is sending a message to girls and young women that they are not appropriate for the field of information technology. In addition to being male, the stereotype portrays the information technology professional as being “geeky” or “nerdy.” Society has associated several unappealing characteristics to which girls and young women would not want to identify. Betty supported these notions when she stated, “I think about the stereotype that women can’t be ‘geeks’, women can’t do technology.”

Helen noted that she has seen more advertising that portrays women in the role of information technology professional. However, these images still possess negative characteristics. Helen expressed her concern “that they always promote the geek guy; the geek girl as being not very pretty, frumpy, doesn’t dress very well.” Her observation supported the notion that even if a woman is portrayed in that role, society will associate it with negative characteristics with the intention of dissuading women from considering careers in information technology.

In addition to the individuals involved in information technology, there are also stereotypes related to the technology work environment. Anastasia pointed out how
society has created the image that if you work in the information technology field, “You either write programs or you fix computers.” These social constructs imply that an individual is staring at a computer screen, writing code all day in a little cubicle or playing with computer components. The connotation is that information technology professionals spend most of their time in isolation and engage in very little social interaction. Anastasia expressed concern that people do not realize that there is more to the field than these two jobs.

Societal Expectations

Closely associated with stereotypes is the area of societal expectations. One of the most pervasive societal expectations expressed by the women in this study was the belief that women are less capable than men at being information technology professionals. By creating this image, the existential feminist would argue that society has reinforced the perception that women are unable to work with technology. Betty claimed that with this belief that “women can’t do technology,” very few women will consider information technology as a potential career path. The women found this societal expectation to be reinforced in educational systems, the home, and at work.

Education. Betty found this social construct to be prevalent in elementary schools. She presented the belief that society has told little girls that they are less capable and should let the boys handle the technology. She observed that in a mixed class of boys and girls, the boys always seemed to be immediately drawn to the computers. At the same time, the girls were willing to wait until the boys were done before showing interest in the computers. Betty mentioned that it is hard for girls in elementary school to go against those societal expectations. Specifically, she stated, “Because of that social nature there, I
don’t think they’re told they can’t, I think they just assume they can’t because the boys always appear to take over from them.” This statement supports the existential feminist perspective in its belief that a social construct created by society is serving as a barrier to prevent girls from developing or expressing an interest in computers. Betty postulated that even if girls are interested in computers, “they will never show that to the boys because the boys tend to make fun of them.” This, in turn, only reinforces the social construct.

Even in high school and college, these perceptions have a negative impact on women in information technology. Betty mentioned that in high school, the boys are more inclined to take the technology classes. The girls are encouraged to take classes in family and consumer sciences like sewing and cooking. Faith talked about how societal expectations when she was in high school prompted her to drop “out of that whole math college preparatory field and [go] into more of a business, something that I can do right away. I’m going to type and I’m going to, you know, I’m going to work in an office.”

In college, Betty pointed out the societal expectation that “girls are teachers and nurses and that’s about it. It’s still that way, even today, in a lot of schools because of the atmosphere within the school.” The concern was that guidance counselors in high schools have been steering girls into the direction of these stereotypically female career paths. In addition to teaching and nursing, this included human services and business support positions. In high school, Carla was restricted from taking the higher level math and science classes. With that path blocked, she was directed towards the business classes. Carla was in high school prior to the passage of Title IX which prohibited schools from restricting access to classes based on sex.
Unfortunately, Faith observed that this societal expectation can still be found. She described how the guidance counselor for her granddaughter tried to place her on the business track in high school even though she had no interest in that area. While this does show that there are still areas in which these expectations manifest, Diana was of the opinion that there have been changes. She stated that, “I don’t feel like girls feel like they have to go to college just to be a teacher or just to be a nurse or just to be a guidance counselor, or whatever.” In her experience, the traditional expectations are lifting and that society has become more accepting of women pursuing careers traditionally associated with men.

*Home.* Societal expectations concerning women and technology also appears in the home. The existential feminist perspective would hold that the perception of women being less capable will impact how parents interact with their children. Faith talked about how she does not:

See a lot of people going - Wow, I can’t wait until my daughter grows up to be an IT person. You know, you might hear it from a father to a son, but I don’t know that you would hear him say, ‘I can’t wait until my daughter does IT.’

The older subjects in the study spoke of how they were part of a generation in which there were clear societal expectations of what a girl should do after high school. Faith mentioned that “my mom and dad really never put a big expectation on me, but I was raised in a generation where you got married and you had children and you stayed at home. My mom was a stay-at-home mother.” For Faith, the influence of these expectations appears to have been subtle in that she attributes it to a societal pressure and not pressure from her parents. This was not the case for Carla. Carla stated,
My mom’s view was that college was a waste of money for girls. My father felt very differently. She felt like, 18 and out. You’re never going to be able to support yourself. You’re going to need to find a good man to support you. So you need to set your sights on that, not on college.

Her mother actively tried to discourage her daughters from going to college after high school graduation. Carla has described her sisters as being very intelligent and independent. And yet, “All of my sisters thought it was rather appalling that I would enter the field of computers as a career. Just very strange, foreign.”

*Work.* The most common theme that fell within the existential feminist perspective was that the subjects were less capable than their male coworkers. This opinion from others manifested itself in different forms and to varying degrees, but it was present in each of these women’s story. The first hurdle encountered by most women trying to build a career in information technology was the job interview. Betty commented on how the male interviewers “don’t expect a woman to have any kind of knowledge” in the area of information technology. Carla followed up on this idea when she mentioned, “I don’t think that it’s easy for a woman to get in the door unless they have really strong credentials.” So from the beginning, women have to battle that expectation just trying to get the job in the first place.

One of Anastasia’s responsibilities has been hiring students to work in her technology department at the university in which she works. She has observed that:

When female students apply, I see the other males in the department not giving them, before they even have a chance to meet them, an equal opportunity in their mind. They already have a pre-judgment opinion about that student coming in.
This issue is compounded if the female applicant is physically attractive. Anastasia noted that “the pretty girl has that perception maybe they are not as bright anyhow. Maybe they don’t have the technical skills.” The outcome is that she does not feel that these female applicants are given the opportunity to prove that they can do the job. From an existential feminist perspective, Anastasia has brought to light the impact of combining two of the negative values that society has attributed to women. For the male applicants, however, Anastasia commented on how the male interviewers at her university will give the male applicants the benefit of the doubt. “They’re a guy, they’ll figure it out. But the girl, she’s just trying to get the buzz words.” This description appears to reflect an existential feminist belief that since males are supposed to know more about technology than females, interviewers are more likely to expect that the male applicant knows what he is talking about and accept what he is saying. But Anastasia observed that for female applicants, “they’re going to grill a girl a little bit harder.”

Even if the female applicant be granted an interview and represents herself well in the process, the problems do not end there. In a perfect world, hiring decisions would be based on an applicant’s qualifications and potential within the organization, regardless of gender or other demographic factors. The existential feminist would consider this a naïve assumption. They would argue that the predominantly male culture is likely to maintain the societal expectation which they represent by hiring a man over a woman. Faith commented that “I think that’s where I see the discrimination is when they have two equal candidates and one’s a male and one’s a female. They’re more likely to take the male.” In an effort to maintain that cultural norm, Carla stated that for male managers, “they prefer to hire in their own image.”
If the woman is able to make it through the interview process, she will still encounter the societal expectation that women do not know as much as men about technology. Once she is on the job, the woman will have to deal with respect and credibility issues. Gail had been fortunate to have been hired by a male peer. However, he “told me up front, you’re going to have problems here because you’re a woman.” This warning was based on the cultural norm that women are not supposed to work in technology.

Iris exhibited an existential feminist philosophy when she described her reception upon entering the information technology field. “It was constant credibility issue with peers.” Regardless of her knowledge or training, the people within the organization doubted her capabilities with technology. As Betty put it, “they don’t expect a woman to have any kind of knowledge.” Betty spoke of her frustration when dealing with a male system administrator at her university. Even though this man knew what position she held, he refused to acknowledge her expertise. When she called him concerning a technical issue and told him,

This is what I’m seeing, there is something wrong here. They literally drop back to square one and walk me back through every single thing. I’m like, ‘This is what I see every day folks, this is my job. I know what I’m talking about, just learn to believe me.’ There is one person in particular, still to this day, every single step I have to go through completely and totally.

The men responsible for the servers are unwilling to accept that she has gone through the appropriate diagnostic procedures to isolate the technical problem back to their servers. The assumption is that she does not know what she is talking about and may
have done something wrong herself. For Gail, she described that “when I took my first job as a network engineer, I almost left just because it was just - I felt really - they thought women should not be working in that capacity.” The culture within both society and organizations will dictate the reactions towards a female assuming an information technology position according to the existential feminist perspective.

Both Betty and Faith talked about their experiences in a helpdesk environment. Even though there may be a female technician on staff, the users of the organization had a tendency to gravitate towards the male technicians. This observation was seen with both the male and female computer users of the organization. Faith described how she had two male technicians and one female technician whom she supervised. The users in her organization would always ask for the two male technicians, even if they were busy and the female technician was available. Within the existential feminist ideology, it is expected that both sexes will reinforce the gender stereotypes in an effort to maintain cultural expectations.

The issue of being prepared and earning the respect of others has been previously discussed with respect to effective career strategies. While these women may have provided their recommendations to aid future women choosing to enter the field of information technology, the rationale for the recommendations also serves as evidence for the existential feminist perspective. Iris talked about always being prepared because a woman will have a hard time earning any credibility. Iris’s thoughts were echoed by other subjects in the study as well. Faith described how she has “had some male bosses that they’re like . . . they treat you more like a secretary until they realize, maybe she does know what she’s talking about.” The existential feminist would argue that these
comments show how female technicians will have to be more prepared than their male counterparts since the value society places on the technology capabilities of women is minimal.

The counterpart to these recommendations is the impact these subjects hope to make on the culture within their organizations. By virtue of being prepared and proving their worth, these women are attempting to influence the culture of their organizations in order for them to reassess the value they place on women in information technology. Ellen has found success with this strategy as she explained that “once they get an inkling of what you know and that you’re okay, they’ve just been tremendous.”

At the same time, Ellen warned that trying to change this social construct is not for the weak. We took the weight of the world on our shoulders because we were trying to prove that we were bright enough to do it and we were clever enough to do it and maybe that’s why we didn’t yell ‘uncle’ as soon as we should have because we were still trying to prove to others that you could get the job done.

In order to gain her status, Ellen worked hard to change the mindset of those in her bank.

Marxist/Socialist Feminism

The Marxist/socialist feminist perspective is characterized by the belief that the capitalist structure dictates interactions in our society (Lorber, 2001). In this structure, there is the capitalist class that controls the access to work and the working class. Rosser (2005) stated that it is this focus on class that is at the heart of the Marxist/socialist feminist perspective. Within this perspective, the dominant male culture has viewed women as resources. Their purpose is to bear children and maintain households for the
purpose of raising the next generation of workers (Lorber, 2001). Even when women do enter the workforce, they are still treated as a resource. Rosser (2005) noted how women are usually employed in the “worst-paid, most tedious and health-destroying segment of the labor market in electronics” (p. 3).

*Women’s Work*

Betty showed support for the Marxist/socialist feminist perspective in her portrayal of women in the workforce. She commented on how “in the profit world, they have to think about the bottom line and which one is going to stay longer. Which one, if they invest dollars in professional development, is going to utilize those dollars later?” In effect, the dominant male ruling class views women as just another raw material in the production process. Her assessment indicated a belief that the decision to hire a woman is done in much the same way as determining which accounting software to purchase. Which product is going to provide the company with the greatest utility for the lowest cost?

Betty also mentioned that men will “relegate the menial tasks to the women.” The higher end technology positions appear to be reserved for men. This observation can be seen across several of the women interviewed. Diana observed that while there may be more women in the lower support levels of technology, “it’s definitely still a guys game when it comes to IT. I’m the only women in IT at my current employer.” She recalled how at a recent meeting of the officers, directors, and managers in her company, there were only six women. And of those, she was the only in technology. Gail shared the same observation. At her organization, which has operations globally, she has seen women in the desktop support positions. However, when she considered the higher level technology
positions, there were over a hundred technology engineers with only six of them being women.

Iris also spoke at length about the impact of executive decisions on the working class in her organization. She was very concerned with the impact of off-shoring in the information technology area. Off-shoring is the practice of exporting jobs to foreign countries. She claimed that governmental and organizational policies supported the practice of off-shoring. She supported the Marxist/socialist belief that the controlling class will use technology to maintain control of the lower working class. In particular, men can use technology to control the number of women permitted to work in the information technology field. By virtue of men controlling the access to employment in information technology, Iris wondered,

Why would women, with IT already being a pretty male-dominated role, much as engineering, why would a women knowing that these jobs aren’t secure, why would they look into them. Especially when they can be done from elsewhere in the world.

Ultimately, Iris considered off-shoring to be a significant barrier to women persisting in the field of information technology.

Carla provided the most pronounced support of the Marxist/socialist feminist perspective. While other subjects alluded to the phenomenon of women being used as resources in information technology, Carla displayed an active interest in the topic through her own research into the topic. She talked about Susan Faludi’s 1991 book, *Backlash: The undeclared war against Americal women*. Carla described that when the economy is in decline and there are fewer high-end jobs in technology, there will be a
“backlash against women.” She talked about how when she was promoted into a management position during the recession in the 1970’s, there were those that accused her of taking a job away from a man who needs to provide for his family. They told her that she should step down so that a man could take the job.

*Good Old Boys*

Another common theme across several of the women is the presence of “Good Old Boy” networks. These “Good Old Boy” networks were characterized as groups of male employees who worked and socialized together, while excluding those not in the group. The male management class can keep women in the working class by restricting access to the resources they need to do their job effectively. This need to maintain class distinctions clearly displays a Marxist/socialist perspective.

Anastasia described how “you either play along or you don’t” get to participate in the inner circle of management. She implied that you need to be a “yes” man to succeed in technology management. Carla shared this opinion. Carla explained how the men in technology management may be:

In a job because of who they know or because they have a really good relationship with somebody. They were in the right place at the right time. Or that they’re a good ‘yes’ man.

Carla also warned that if a woman is going to enter the technology industry, she better expect to have to deal with “yes” men.

The presence of these “Good Old Boy” networks can serve as a significant barrier to women in information technology. A common complaint was that the men in the organization would gather socially and use those gatherings as impromptu business
meetings. By virtue of not being present at these get-togethers, the women were not able to participate in the discussions or even be privy to the decisions that were made. Diana spoke of how the male managers frequently got together outside of work. Although she had no desire to join them, “sometimes you miss out on conversations about servers or infrastructure, what we should do [would] creep in at lunch or when they’re fishing and you’re not there for those.” She also talked about how she will frequently have to ask the male technology managers repeatedly for the information she needs to perform her job responsibilities.

In accordance with Marxist/socialist feminism, the men are able to covertly protect their class or status by restricting women from access to information and preventing them from participating in the decision making process. Diana shared how after a man was named director of information technology at her organization, she wondered whether “he just was the right person at the time. I don’t know if it was because he knew anybody or you know. He and the other IT manager go fishing together and stuff.” It appears as though Diana likes the company she works for and does not want to accuse the business of engaging in discriminatory practices. However, these incidents apparently occur with enough frequency that she felt the need to share those experiences. Iris summed up this Marxist/socialist feminist observation when she stated that “it’s all about who you hobnob with, who you know, who you’ve, who knows you.”

Intragender Conflict

While the behavior of men with respect to the Marxist/socialist feminist perspective can be anticipated, this ideology is not restricted to men. Rosser (2005) explained how class can be just as significant an influence of behavior as gender within
the Marxist/socialist philosophy. The difference in class can result in women erecting barriers against other women. That is, women of higher rank or responsibility may try to maintain their status by differentiating themselves from working class women.

A subtle underlying theme that has appeared in several of the women’s testimony has been the belief that they are somehow different from others. By virtue of their difference, they have been able to persevere while others have failed. There were several observations that supported this notion.

All of the women were asked about their transition into the information technology field. Only one of the nine women graduated with an information technology related degree in pursuit of her first career choice. The remaining women either received information technology education after deciding to change career paths into technology or received a degree in an unrelated field and entered the field with no formal technology training. And yet despite these differences, almost all of them made comments indicating a belief that they were different from other women. Anastasia talked about how she thought her entry into technology was different since her degree was in teacher education. So while there commentary may indicate a desire to bring more women into information technology, there is an underlying theme that they are somehow different or better than other women.

A common observation among the women interviewed were statements indicating a belief that they had characteristics that would typically be considered masculine. Carla mentioned how for her and her sisters, “my dad raised us like boys mentally.” This could be viewed as a belief that by possessing traits associated with men set her apart from other women. In turn, this increased her ability to enter into and maintain a status in
technology management while other women could not. For Faith, it was because she was raised by her mother in a single parent household that pushed to be self-sufficient. Again, this could be viewed as a masculine characteristic that differentiates her from other women. Similarly, Anastasia’s statement that she didn’t need to have a support structure to persevere was stated in such a way that implied a differentiation from other females.

For Helen, it was the issue of femininity. She stated, “I’m not the most feminine person. I mean, I’m not real girly. I’ve never been girly.” And yet, she was not unattractive or masculine in appearance. Though she did talk about how she used to wear more rugged clothing and less business attire, this was because her job at the time required more physical labor that would damage business clothes. Her statement still supports the Marxist/socialist perspective by setting herself apart from other women.

Many of the women also attributed their perseverance to factors related to their work environment. Helen worked in an environment in which she perceived that there was no discrimination against her on the basis of sex. When asked about barriers or discrimination, her responses reflected a lack of awareness that these exist in the information technology work environment. However, at other points in the interview she talked about not having very many women in technology at the hospital where she is employed. She also mentioned how “you can’t let the guys get to you” and how the guys will “tease” her because she is female. This contradiction in her responses could be evidence of a Marxist/socialist feminist perspective. It could be that by claiming a lack of awareness of the barriers and discrimination faced by women, she is elevating the status of her work environment over that of other women.
These observations are not intended to minimize their importance towards the career persistence of these women. Each instance will have played a role in the individual woman’s ability to persevere in the male-dominated field of information technology. The observations simply show support for the Marxist/socialist feminist philosophy that class can be a source of conflict between women. To varying degrees, each of the women in this study displayed this trait of the Marxist/socialist feminist perspective.

Radical Feminism

Radical feminism was built on the belief that the female condition is a result of “men’s pervasive oppression and exploitation of women” (Lorber, 2001, p. 10). This belief extends beyond discrimination in that this oppression and exploitation will occur any time men come into contact with females. Activists within the radical feminist perspective would argue that women are likely to endure aggression, exploitation, oppression and sexual domination in their interactions with men. This expectation is independent of location, whether it was at home, school, or work environments.

Aggression and Oppression

With respect to the information technology industry, the radical feminist would expect both overt and covert acts aggression and oppression. An example of overt actions would be sexual harassment in the workplace. The radical feminist perspective would view sexual harassment as a means of male aggression and domination over women in the workplace. At a minimum, women would be at risk of unwanted sexual advances. In the most extreme cases, there is the possibility of rape or death. The radical feminist perspective would argue that regardless of whether this threat of sexual aggression is overt, implied, or only perceived, the impact on women is real. It creates a threatening
environment where women are forced to submit themselves to male deprivations or leave the environment. This outcome need not be restricted to sexual aggression. The radical feminist would also expect women to be the victims of purely physical and emotional attacks as well.

This aspect of the radical feminist perspective was most pronounced in Carla. Of the subjects in this study, Carla has maintained the longest career in information technology. She shared how she has been the victim of male harassment throughout her career. Her descriptions of these incidents are indicative of a radical feminist perspective in their emphasis on sexual harassment and abusive conduct.

Carla provided the most pronounced examples of radical feminism’s expectations of aggression towards women. She described how throughout her career she has been the victimized for the sole reason that she is female. Early in her career, she was the subject of unwanted sexual advances. She mentioned that “when I was younger and prettier and thinner, it was much worse. Much worse.” Carla has reached a point in her life and career that “it’s much nicer now in my career now that I’m older and fatter.” While she still may be the subject of male oppression, the sexual harassment and aggression has subsided.

In addition to sexual domination, the radical feminist perspective stresses that the dominating male culture is constantly trying to maintain control over females because of their perceived inferiority. Included in this type of activity would be attempts to undermine the authority or credibility of women. Early in her career, Carla entered into information technology management. It has not been uncommon for men to spread claims that she did not earn her management positions. She talked about “allegations of promotions that, ‘Oh, you must of have slept with so-and-so to get the promotion.’
Constant in my career.” Spreading such rumors was intended to undermine her authority as a manager. By making such personal attacks, the men were showing that they thought Carla was inferior and should remain under the control of a male supervisor. By repeatedly attacking her, as Carla indicated, these men were trying to get Carla to doubt herself and to believe that she was inferior. The radical feminist would also claim that these actions were also intended to undermine Carla’s managerial effectiveness by introducing doubt into the minds of the employee’s she was responsible for managing. The combined effect would be to create an environment that increased the likelihood that Carla would fail in her managerial responsibilities.

As mentioned, the radical feminist perspective anticipates that acts of aggression and oppression will be pervasive throughout a woman’s career. Carla mentioned that “I’ve seen [men] tear [women] up and spit them out. Even very capable women.” This statement shows the frustration of seeing men breaking down women in order to maintain their dominance. Ellen supported Carla’s feelings and the radical feminist perspective when she talked about feeling that the actions of men made her feel like she was “always up against the wall.”

While the overt acts of aggression and oppression are bad, it is the covert acts of aggression and oppression that radical feminists would argue are insidious among men. Covert aggression and oppression would be those acts that are more subtle. Anastasia expressed a radical feminist perspective when she described the actions of men during the hiring process. She described how the male coworkers that were part of a hiring committee would undervalue the qualifications of the female candidates for the technology position. The male coworkers were also willing to overlook the actions of
male candidates that reinforced the belief that women in technology are inferior.

Anastasia explained how a male job candidate would ignore the two female interviewers and only respond to the two male interviewers. Despite this behavior, the male interviewers were willing to overlook the blatant behavior and recommend that he be hired over the female job candidate. Anastasia stated that she and the other female interviewer had to argue with the male interviewers about this behavior before they would concede and offer the job to the female job candidate.

Even more subtle is the radical feminist perspective on the epistemology of how technology has been developed. Lorber (2001) presented that radical feminism holds that the male dominance in the sciences lead to the development of information technology based on masculine characteristics. Male scientists created the technology to support the needs of men. Faith noted that “the language [of technology] has been set up based males and the male usage.” Faith supported the radical feminist perspective in her belief that this structure served as a barrier for women in information technology. Carla supported Faith’s stand in her belief that for men, technology is “more power oriented.” Men will use technology as a means for maintaining dominance without having to engage in any overt actions against women.

Betty spoke of how the perspective that technology is the domain of men starts in childhood. During her first career as a teacher, Betty observed how “if you put a group of kids in front of a machine, it’s always going to be the boy who reaches for the mouse and grabs it away from the girl.” From a radical feminist perspective, the boys were already engaging in aggressive behavior to establish dominance over the computers and the girls.
Femininity

In an attempt to elicit responses that would indicate a particular feminist perspective, subjects were asked whether or not women should suppress their femininity in an information technology work environment. Dialogue that indicated a belief that women are victims of aggression or oppression as a result of their femininity was considered to be in support of the radical feminist perspective.

The first group of responses that supported the radical feminist perspective acknowledged how men are more sexually aggressive towards women who are considered to be more feminine or attractive. Anastasia claimed that female job candidates “almost need to downplay the fact, if they are cute or pretty, that they are because you are going to get those people that are making the hiring decisions be concerned.” Because of the sexual urges of the male staff, she described how male supervisor’s feared that introducing a female into the male-dominated information technology department would create too much of a distraction. The radical feminist would argue that because of their insatiable sexual appetite, hiring an attractive female would result in decreased productivity. The men would spend their time trying to establish sexual dominance over the women, instead of focusing on their work responsibilities. As a result, Anastasia said, “I will say in all honesty that the pretty girls don’t get hired around here. They will hire the not so pretty girls because it is less of a problem for them.”

By recommending that women should suppress their femininity, Anastasia acknowledged the radical feminist expectation of male sexual aggression. Carla
reinforced this observation when she described how “one of the challenges is that you cannot be feminine in any regard in the workplace or you’re attacked for that.”

At the same time, Ellen makes the case that women should not surrender their femininity. This second set of responses supports the radical feminist perspective in that it rejects the idea that women should abandon their feminine identity. Even though suppressing her femininity might be a strategy for avoiding sexual harassment, it would be considered an acknowledgement that men are the superior gender. By stating that women should not surrender their femininity, Ellen is telling women to take a stand against the oppression of male coworkers by staying true to their feminine identity.

*Replacement of the Dominant Gender*

Radical feminists have typically been associated with passionate beliefs and bold actions (Lorber, 2001). It is the voice of the victim that has come back for revenge against her aggressor. Radical feminists work under the assumption that the only solution to the female condition in the information technology workplace is the removal of its male dominance. One step towards this reversal in gender dominance in the workplace is an active commitment to hiring female candidates for job openings. Betty mentioned that in her desktop support area, she tries to hire more females. Carla has also made it a priority in her professional career to hire, nurture, and retain female employees for the information technology positions in the organizations for which she has worked.

By bringing more women into information technology, the radical feminist would push for them to replace the men in positions of authority. To do so would create an environment where women were encouraged to explore the possibilities of technology without the threat of aggression and oppression from men (Lorber, 2001). Betty believed
that the men in charge of the information technology in most public school systems used their position to maintain their superiority and control over the predominantly female group of teachers. She anticipated that as more women get into technology, they would move into those technology administrator positions and facilitate the use of technology among the female teachers.

Carla provided the most significant example of the replacement of male dominance. After considering what recommendations she would make to young women entering the field of information technology, Carla stated that women should try going into business for themselves. They should become entrepreneurs and start their own businesses. In so doing, they would be establishing a female dominant management structure in which women would be encouraged to foster new ways of creating or implementing technology that would benefit more than just the male patriarchy (Lorber, 2001).

This rationale for starting up female lead businesses was also evident in discussions about women in information technology support groups. Of the nine women interviewed, only Carla expressed a radical feminist rationale for her support of these support groups. Her testimony provided two significant examples of support for radical feminism. The first was in her description of the benefits of women in information technology support groups.

I think they are important for the ability to share experiences and to be supportive of people starting out in their careers. I think that when I reflect back to my twenties, I think it would have been great to have an organization like that to go
to. Where issues that were important to women and women’s learning were discussed.

Carla’s description is supportive of the radical feminist perspective due to its focus on women’s issues. While other women commented on issues related to the technology industry, Carla was more concerned with priorities for women.

The second reason Carla expressed support for women in information technology support groups was that notion of replacing the dominant male structure of the industry. She stated that:

You’re going to find more women willing to hire women. And if you don’t know who those gals are, then how are you going to network. But entry into the workforce always has a gate with a person. And I know I hire women. I think that some people are open to that and some aren’t.

_Liberal Feminism_

The liberal feminist perspective holds that “gender differences are not based in biology” (Lorber, 2001, p. 3). Essentially, men and women are equally capable in everything other than their biology. The liberal feminist would argue that if men and women are basically the same, then they should both be provided with equal opportunities and afforded equal protection under the law. In effect, there should be no distinctions as to what an individual can do based on sex.

Anastasia supported this perception when asked if there were any inherent differences between men and women within the field of information technology. She responded by saying,
No, I don’t think there are any at all. I think there are men just as capable and
capable and I think it comes down to an intelligence level and a
level independent upon their gender. I’ve seen good men. I’ve seen
crappy men. I’ve seen the same in women.

Anastasia’s response shows her support of the assertion that biology is not the
primary determinant of an individual’s capability. Not only does she support the notion
that men and women are equally capable, but Anastasia also points out that both sexes
have the potential for failure. Diana also supported this position when she stated that
“there’s very little a woman can’t do that a man can.”

Awareness

Liberal feminism holds that the basis of the discrimination and barriers faced by
women is a lack of awareness (Lorber, 2001; Rosser, 1998). With the discriminatory
practices of the past, the development of information technology has been based on a
patriarchical dialectic (Rosser, 1998). Without the involvement of women in the dialogue
process, technology has been designed based on the masculine characteristics of the men
that were responsible for its research and development. Liberal feminism would claim
that the men in the information technology field need to be made aware of their actions
and the impact that those actions have on women. By doing so, men would realize their
short-sightedness and choose to rectify the situation.

This philosophy has manifested itself in many forms among the women
interviewed. Anastasia addressed the issue in its most basic form. When asked what can
be done to get men to stop discriminating against women, her response was that “first you
got to get them to recognize that they are doing this. That they are actually doing it.” This
statement exemplified her belief that awareness can bring about change. Her belief in this liberal feminist philosophy is supported by her actions on the job. When faced with a situation in which she feels she is being discriminated against, her preferred coping strategy was to approach the situation directly. By making the person aware of what they were doing, her assumption was that they would choose not to engage in such behavior again.

The notion of awareness serving as a catalyst for change is also evident in the recommendations for how to increase the number of women in information technology. One of the barriers that the women stated was associated with the stereotype of information technology jobs. The common stereotype is that the common information technology professional works in isolation and either fixes computers or programs. Anastasia mentioned that when she tells people that she works for the technology department at the university, most people assume that she writes programs.

It should be noted at this point that the perception of this stereotype can be construed as support for an existential feminist perspective. While the existential feminist perspective may explain the development of the negative stereotypes, the forthcoming recommendations display a distinct liberal feminist perspective. A recurring recommendation was that girls and young women need to be exposed to the range of possible careers in information technology. When asked for recommendations that she would give to a girl considering a career in information technology, Anastasia stressed how important it was “to keep their mind opened to all aspects of information technology. That there is just more than, you know, the programmers and to try to explore each of the different areas of information technology.” The problem which Iris
noted was that the technology classes offered in high schools are usually focused on programming. She felt that these programs were “geared around varied technical aspects like lots of hardware and stuff that generally women, most of them just aren’t interested in.”

In response to these situations, Betty stated that these young women need to be made aware of the job opportunities within information technology. Betty further emphasized the need for exposure when she shared how her transition into the information technology field was made possible by a raising of awareness. Betty stated that “When I came back to school, the first class I took was in [technology], and that opened all kinds of worlds to me that I didn’t even know existed.” She then went on to take all of the technology courses available in her graduate program. Her newly found passion for technology was noticed by the program’s director who gave Betty her first job in information technology. Betty’s liberal feminist perspective is apparent in how she attributed her transition into information technology on the awareness of opportunities presented in technology classes.

Ellen noted that there are more opportunities for women in information technology since “the field has more specialty opportunities than it had before. It used to be one big lump that they called data processing and that was everything. And now there’s a lot of subsets.” By making girls and young women aware of the varied opportunities within information technology, the liberal feminist would expect that the barrier of ignorance would be lifted.
Parity

Along with raising awareness, one of the goals of liberal feminism in the information technology field would be to achieve parity in the workforce (Lorber, 2001). Until women are able to achieve equal representation in the technology workforce, the partriarchical orientation of the technology field will not change. From a liberal feminist perspective, this is achieved through the removal of the barriers that prevent women from both entering and persisting in the field.

One method for obtaining parity is through governmental intervention. Carla shared that when she was in high school, she was restricted from taking courses in physics and calculus because she was a girl. Girls were enrolled in courses that would lead to careers as secretaries or nurses. As a result, she studied business in college even though that was not the career path she wanted to follow. Carla’s support for liberal feminism is evident as she described how the passage of Title IX changed everything. She explained how the common conception of Title IX is that it forced school districts to provide equal access to athletic activities. However, Carla noted that Title IX also mandated that schools must provide equal access to all academic courses regardless of sex. Girls were able to achieve parity in the classroom with the lifting of this restriction. By having the opportunity to take the higher level science and math courses, the barrier of not being academically prepared for the education and training that leads to careers in information technology was removed.

Another example of governmental policy that aligns with the liberal feminist perspective is affirmative action. With the development of the Equal Employment Opportunity Commission, organizations both public and private that fall under its
jurisdiction were prohibited from discriminating based on race, color, religion, sex, or national origin. This lead to affirmative action legislation requiring organizations to rectify historical discriminatory practices by requiring them to engage in hiring practices to ensure minimum levels of diversity. Lorber (2001) noted that liberal feminist activists used these governmental programs and policies to achieve parity in the workforce.

While not specifically attributing it to these governmental actions, Carla commented that when she was working in Texas and California, diversity was not an issue. Despite these governmental policies, Carla noted that in the Midwest, “I think it’s much more challenging to even get diversity addressed, let alone the inclusion of women.” So while she is in agreement with the liberal feminist position of diversity and parity, she does not see it happening in the information technology industry in the Midwest. Carla’s comments throughout the interview indicated that she does not feel that companies or the community at large in the Midwest embrace the need for diversity. In light of this situation, Carla pointed out the need for diversity training to make people “more aware of people’s diverse needs. The value of different cultures. The value of the difference between men and women.”

Not all that hold a liberal feminist perspective are in agreement with the governmental practice of affirmative action. By virtue of enacting laws requiring minimum diversity standards, some liberal feminists will argue that the practice of hiring to meet a quota is counter to liberal feminist ideologies. While women use to be discriminated against due to their sex, now they are afraid that they are only being hired because of their sex. Such practices would be considered evidence that corporate cultures
are not truly adopting a philosophy of equal opportunity based on the quality of one’s work and not one’s sex. Faith warned that a woman needs to be wary if she:

Just got promoted because she was a female or got hired because she was a female. You know, I think that’s one thing you have to watch for, too, is be careful that they’re not hiring you just to meet their quota.

Iris described that:

The company I work for now is actually a big diverse company. And they thrive on diversity. Now whether that’s true to the beliefs of the company or it’s true to the beliefs of following government policy when it comes to making sure that you have a quota for diversity. Whether it be ethnicity or gender.

She felt very strongly that the practice of hiring based on a quota system is now serving as a barrier to women entering the information technology field.

The women in this study have shown how liberal feminists can take different sides of attempts to achieve parity through governmental intervention. And yet, despite these differences on the means, the goal of diversity remains the same. Gail sums up the importance of this diversity when she observed that “you’ve got to have that mix of personality, but at the same time, you know, I, the manager, don’t want everybody cut from the same cookie mold, too. . . . Because, you know, you’re not going to get any new ideas.”

A liberal feminist perspective was also observed in some subjects’ reaction to women in information technology support groups. During the second interview, subjects were asked for their opinion of these programs. Unless specifically requested, there were no definitions of women in information technology support groups provided. For the one
subject who asked that this be defined, she was told that the purpose of these groups was
to provide women with a forum for sharing their experiences and an opportunity for
professional networking. This was done with the purpose of also determining the
subject’s awareness of the existence of such activities. The responses to this question
provided insight into the feminist perspectives of the subjects.

Anastasia stated that she probably would not participate in an information
technology support group just for women. She mentioned that she would not be in
support of any activity with restrictions based on sex. Anastasia’s perception was that
these groups excluded men from participation. If this were the case, a liberal feminist
perspective would reject such activities because they did not promote diversity and
inclusion of not only under-represented populations, but men as well. Anastasia also
suggested that participation in such groups “implies to me that because we’re women we
don’t get enough opportunities so we need to support each other.” This statement
supported the liberal feminist ideology that success should be based on a person’s
abilities, not their sex. With her career progression of increased responsibilities and
statements that she has not experienced significant barriers or discrimination in her work
environment, Anastasia’s comment is indicative of a belief that men and women should
support each other towards the shared goal of supporting their employer’s technology
needs.

The problem associated with all female support groups is that as Iris described, “it
could be construed and it could lead very easily to basically a bitch session.” That is why
Iris warned that such a group would need a strong facilitation leader that could keep the
conversation constructive. Faith described how she thinks that:
If you just have women talking to women, then it turns into a complaining session. You know. This happened. And then it can deteriorate easily into a gossip of, ‘Did you know that this happened or that happened?’ As opposed to, if you have mixed genders, then hopefully you can work on seeing what works for somebody else and how to move up. Because if you’re all here at this same level and it’s all women talking to women, I don’t know how you can promote yourself into those positions where men are.

Faith’s liberal feminist perspective was also apparent when she explained how men should be incorporated into a support system. She stated that:

If all you’re doing is complaining that as a woman I’m not getting what I should get. I mean, it’s nice to have women who support you. But I think you need men to support you to. And I think the same thing men. If men only talk to men about IT, then men would only want to promote men. And if they don’t learn that, hey, this woman may actually know what she’s talking about.

Instead of getting involved in a group that only focuses on women, the liberal feminist would suggest participating in a group that brings together a diverse group of people working towards a common goal. Faith warned that professional organizations are prime examples of these types of groups. Diana mentioned getting involved in the Society for Technical Communications. Carla also mentioned the American Society for Quality and the organizations programs for youth. Ellen summed it up when she noted, “I think you have to have a willingness to work with others and getting along with men.”
Postmodern Feminism

The postmodern feminist perspective suggests that the binary approach of other feminist ideologies serves as a limiting factor. Postmodern feminists argue that there is no single voice that speaks for all women (Rosser, 1998). To go even farther, any concrete descriptors used to categorize women for the purpose of explaining the female condition would only serve as constraints. Individuals are the sum of the internal, environmental, interpersonal, and any other influencers that contribute to the development of one’s identity. As such, each woman has a unique situation and no single strategy is expected to result in large scale improvements for the female condition.

The postmodern feminist would recommend that attempts to address the under-representation of women in IT would be to develop multiple strategies that target a broad range of conditions (Rosser, 2005). At the heart of any of these strategies would be the need to provide women with the flexibility to meet the demands of both a professional career and motherhood.

Based on these characteristics of the postmodern feminist ideology, the analysis found that only one subject, Diana, expressed a predominantly postmodern feminist perspective. This perspective was evident in her recommendations for balancing work and family responsibilities. After the birth of her third child, Diana approached her manager and stated that she did not want to work a standard 8 – 5 work schedule any more. Instead, she asked if she could telecommute from home part of the time. Her argument was that her work ethic and discipline would allow her to continue at the same level of productivity even if she is working from home part of the time.
Diana was the first employee at her organization to be given the opportunity to telecommute. Based on her description, there had not been any policies and procedures that conformed to postmodern feminist ideologies. Diana had to push the management to consider adopting flexible alternatives. Even after giving her permission to telecommute, the company did not adopt a broad based policy allowing the telecommuting option. There was still a hesitation to trust employees to remain productive without direct supervision. Since Diana started telecommuting, the company has slowly adopted a more postmodern feminist philosophy. She stated that they have begun to explore policies and procedures that would allow employees to work from home.

Diana’s postmodern feminist perspective was reinforced when she identified flexible work policies as a key contributor for improving the conditions for women in information technology. She stated that “the more and more women that get into the field, the more and more women will be able to push the things . . . the better, the easier work schedules that are more accommodating to families and children.” This philosophy was reinforced in the second interview. When asked for key factors that would enable more women to have sustained careers in information technology, Diana stated,

I think that flexible schedules are huge. Letting women have time to go take care of their kids. Take them to school. Taking part in field trips and things like that. And that goes for men too. That’s a big thing, flexible schedules. It did for me.

As a result of these opportunities, Diana expressed the belief that having more flexible options would attract more women to careers in information technology.
Aside from Diana, the only other subject to provide postmodern feminist commentary was Carla. Similar to Diana, Carla stressed the importance of negotiating time to balance work and family. At her current employer, Carla was able to lobby for a flexible work schedule. She does not go into the office on Wednesdays and rarely on Fridays. On those days she telecommutes from home. Like Diana, her employer had no policies or procedures for the practice of telecommuting. Unlike Diana’s employer, the company Carla works for did not use the successful experience with Carla as a catalyst for more broad-based telecommuting acceptance. Despite this lack of change within her own organization, Carla emphasized that it is important for women to ask for flexible scheduling options if they are not already offered by an employer.

Summary

This study investigated two issues related to women in information technology. The first looked into the persistence factors of women that have had sustained careers in information technology. It was found that how they transitioned into the information technology field played a role in their career longevity. The women of this study also shared certain personal traits such as aptitude, ambition, self-confidence, and character. In addition to personal traits, effective career and coping strategies were found to be significant contributors to career persistence for women in the field of information technology.

The second issue was to determine the prevailing feminist theoretical perspectives among the women that have sustained careers in information technology? The feminist perspectives under consideration were liberal feminism, Marxist/socialist feminism, radical feminism, existential feminism, and postmodern feminism. While all of these
feminist perspectives were evident in the interviews with the subjects, the existential, Marxist/socialist, and radical feminist perspectives were the most prominent.

In the final chapter, the implications and recommendations that these findings suggest will be discussed.
CHAPTER V

CONCLUSIONS, RECOMMENDATIONS, AND LIMITATIONS

Project Summary

The field of information technology has been predominantly male since its inception. Women constitute less than a third of the technology workforce in the U.S. and that percentage is shrinking. This declining trend continues despite an increasing demand for qualified information technology professionals (Hecker, 2005). While the number of women in information technology may be comparatively low, there have always been some women that have successfully pursued careers in the field. This exploratory study sought to investigate the factors that have contributed to the career persistence of these women. Associated with this was an exploration into the prevalence of feminist ideologies expressed by women in information technology.

The study was designed based on a multiple case study methodology where nine subjects participated in two rounds of interviews. The first interview utilized a semi-structured interview guide for all nine women. The second round of interviews served two purposes. The first was to provide the subjects with an opportunity for member-checking. The women were given the chance to clarify or expand on what was discussed during the first interview. The second purpose was to allow the principal investigator to determine whether a factor expressed by a subject during the first interview was shared
among the other subjects. The second interview utilized an unstructured interview format centered on the individual subject.

The findings from the interviews revealed several themes shared by women who have had sustained careers in information technology. The circumstances around their transition into the information technology field were found to be a factor that contributed to their persistence in information technology. Several of the subjects transitioned into technology positions after having established themselves in non-technical positions in the company. For the women who were transitioned from non-technical positions, they have maintained their entire career in technology at the same company that offered them their first technology job opportunity. The findings also suggested that there are certain personal traits shared by the subjects. Among these traits were an aptitude for technology, ambition, self-confidence, and moral character. Another factor contributing to the career persistence of the subjects was the presence of effective career and coping strategies. These included strategies such as proving oneself, being thick skinned, the use of humor, and having personal support systems.

This chapter will consider the conclusions that can be drawn from the findings related to the research questions. Each of the two research questions will be discussed independently. The discussion of the first research question will focus on how the findings may impact the career persistence of women in information technology. The second research question will consider the implications of the feminist ideologies expressed by the subjects and their relevance to career persistence. When possible, the findings will be associated with the previous literature on the topic. However, the focus of most of the literature has been on determining why women are not entering the field of
information technology. The study of the factors that contribute to a woman maintaining a sustained career appears to be unprecedented. These considerations will be followed by a presentation of recommendations for future research and limitations of the study.

Research Question One: Persistence Factors

Recruitment

Employers need to reconsider their hiring pool for entry level IT positions. They should look to their non-technical and office staff for potential talent that can be developed. The findings indicated that many women that have sustained careers in technology worked in non-technical positions in those organizations that hired them for their first information technology job. Bush, Henle, Cohen, Jenkins, and Kossy (2002) found that many women enter information technology without a computer-related degree. They observed that secretaries and office managers were common non-technical positions from which women transitioned into technology positions. Bush et al. noted that women can transition into technology positions from a broad range of non-technical positions. Employers should investigate their internal staff for women that express an interest or aptitude in technology.

Hiring women from within will benefit both the employee and employer in several ways. The women will benefit from having already established themselves within the organization in their non-technical positions. In so doing, it is likely that they will experience fewer barriers than women from outside of the organization starting in an information technology position. With fewer barriers experienced, women are likely to have greater job satisfaction.
In turn, the employer is going to benefit from a lower rate of technology employee turnover among the women that they recruit from within. It is also more likely that women will stay with the organization that transitioned her into an information technology position for the remainder of her career. The trust that the organization displayed in their willingness to offer women an opportunity to pursue a new career in information technology will be rewarded with increased organizational loyalty from those women.

**Self-Confidence and Ambition**

To increase the likelihood of career persistence, women need to develop a strong sense of self-confidence and ambition when they enter the information technology workforce. It could be argued that these personal traits are important for anyone who works, regardless of sex. It is true that all employees benefit from having self-confidence and ambition whether they are male or female. However, it is of greater priority for women in light of the barriers they are likely to experience that men may not.

A woman that does not possess a high level of self-confidence and ambition may still be able to have a long career in information technology. However, those with self-confidence and ambition may have a higher likelihood of promotion in their career. These traits appear to provide women with the tenacity to excel within the technology industry. Bush et al. (2002) found that women in technology believe that they need to be assertive in order to be successful. The characteristics associated with self-confidence and ambition share similarities with assertiveness. However, this description was not chosen due to potential negative connotations with which assertiveness can be associated. Assertiveness may be associated with aggressiveness and other stereotypically male
characteristics. Instead, self-confidence and ambition were thought to be positive descriptors of an individual taking action to improve his or her situation.

Stay True to Your Identity

Women need to remain true to their own identity. That is, women should not compromise who they are in an effort to try and fit into the male dominant culture. Women need to resist the temptation to behave like they are “one of the guys.” Engaging in “impostership” only leads to frustration. It is important for women to avoid placing themselves in situations where they do not feel that they belong.

The conclusion to stay true to one’s identity may appear to conflict with the previous conclusion that women need to possess self-confidence and ambition. The need to develop a self-confidence and ambition is not a call for women to change their identity. Instead, it is a recommendation that women believe in themselves and have a desire to improve themselves. The conclusion that women should stay true to their identity relates to how they conduct themselves. If their actions are not in alignment with their inherent personality or character, then they are not staying true to their identity. For example, women should not sacrifice her ethics in order to please or blindly follow the directives of a male supervisor. There is no requirement for men or women to possess a high moral character in order to have a sustained career in information technology. However, women are less likely than men to be forgiven for infractions.

Improve Opportunities for other Women in Technology

As women establish themselves in their careers, they should engage in activities to create opportunities for other women in information technology. Helping others is not inherently an activity that would appear to contribute to the career persistence of women
in technology. However, the findings support the conclusion that women with sustained careers in information technology felt a need to remove the barriers for future women in the field. In turn, this need serves as a motivator for career persistence.

One way in which women can improve the opportunities for other women in information technology is to serve as mentors or role models for newly hired women in information technology and for girls/young women considering a career in information technology. The literature supported the need for women who have already established themselves in their careers in information technology to become role models. The literature provided research indicating that the lack of role model discourages girls and young women from entering the field of information technology (Bush, et. al., 2002; Catalyst, 2003; ITAA, 2003;). Because of the lack of female role models, females may feel that there is no opportunity for growth when there are only men at the top of the top of technology organizational chart. The conclusion is further supported by the research which indicated that having a role model or mentor is a major contributor to women’s success in information technology (Catalyst, 2003; Nobel, 2007).

The findings also gave rise to a second action that women in information technology can do to improve the opportunities for other women in technology. If in a position to influence hiring decisions, women should actively recruit qualified female job candidates. Women who are already in the midst of their careers in information technology can improve their own situations by providing other women with the opportunity to enter the field. By bringing in more qualified women, the organization is more likely to consider policies and practices that contribute to the career persistence of women.
By engaging in these forms of activism, women in information technology are providing themselves with a higher purpose in their careers. The findings support the conclusion that women who engage in activism derive a cognitive or emotional benefit from their activities that serves as a motivation for continued activism. In turn, there is a motivation to persevere in their careers in order to be able to effectively engage in these forms of activism. In this regard, women engaging in activism can be considered trailblazers. They are navigating the jungle of the male-dominated field of information technology. At the same time, they are clearing a path and making a map for the next generation of women to follow in their footsteps.

_Effective Career Strategies_

_Prove Yourself_

Women must be prepared to prove their professional capabilities at all times. There will be situations where the actions or statements of a male subordinate will be in question by a male supervisor. When this occurs, the male subordinate may be given the benefit of the doubt. The male supervisors may overlook when a male subordinate makes a mistake or shows poor judgment. The male supervisor will assume that a proposal from the male subordinate is well prepared. The same cannot be said for female subordinates. The actions and judgments of females are attacked or more highly scrutinized.

For this reason, it is particularly important for women to prove themselves. They may be presented with more challenges than their male counterparts. In order to overcome these challenges, women will need to be prepared to respond to the increased scrutiny. This means that women need to more thoroughly research their proposals. This is done in an effort to mollify those who would question their judgment. Women also
need to have greater technical expertise than their male coworkers. If women show a weakness in their capabilities, the dominant male culture will latch onto this perceived weakness as a justification for driving those women out of the information technology field. Based on the testimony of women that have sustained careers in the field, it is imperative for women information technology not to allow their capabilities to be called into question.

The conclusion that women need to prove themselves more than their male counterparts is one based out of necessity. The findings that supported this conclusion indicated that the challenges facing women in information technology and the strategies needed to overcome them are not fair. The hope is that there will be positive changes in how industry and society at large will view women in information technology. However, in order to persevere in their careers until such changes occur, women will continue to have to prove themselves.

Know What You Want and Get It

Women need to develop a set of career and personal goals that they would like to achieve. Based on those goals, they need to develop a strategy for how they are going to achieve those goals. A key to long-term success for women in information technology is the ability to identify what they need in order to be successful. Whether a result of oversight or sabotage, the findings support the assertion that women in technology may not have access to the resources they need.

This could be access to information or other resources required for women to effectively fulfill their job responsibilities. In these situations, women need to actively pursue access to those resources. This may require tracking down information needed to
make a decision. In instances where the resources are being withheld, women need to prepare a documented request providing a rationale for why they need access to those resources.

Women may need more than organizational resources in order to maintain a successful career in information technology. The findings support the conclusion that working women are still expected to bear primary responsibility for family care. This has a negative impact on career persistence among women in information technology. In order to satisfy the obligations of both work and family, women need to negotiate arrangements that will provide them with flexible work schedules. This could range from telecommuting options to a partial workweek.

While women should not feel guilty about asking for what they need, they should not approach their supervisors with a sense of entitlement. The employer is going to need assurances that productivity will not suffer if flexible scheduling arrangements are made. When approaching a supervisor, women need to have a plan that will show how the organization will also benefit from the flexible scheduling arrangement. This conclusion was supported when Nobel (2007) observed that it was common for technology professionals to have to prove themselves by completing a large project before they will begin receiving major promotions. Nobel noted that this expectation was applied to both men and women. The problem was that these projects typically occurred during women’s child-bearing years. Without the benefit of flexible schedules or telecommuting options, women are less likely to succeed at these major projects. Additionally, Nobel indicated that having flexible work schedules fosters a highly productive workforce that is loyal to the organization.
Effective Coping Strategies

Women will need to develop effective coping strategies to deal with the barriers that they will experience as a result of being women in a male-dominated industry. The findings supported the conclusion that women need to find ways to handle the stress of regularly running into barriers in their careers.

Thick Skin

The first coping strategy is to develop a “thick skin.” When women entering the field of information technology are faced with barriers such as discrimination or harassment, they have to choose how they are going to react. One choice is to react with indignation and seek legal action. The findings support the conclusion that women will experience lesser degrees of these barriers frequently in their career. In light of this expectation, women need to develop a barrier to insulate themselves from these actions. Strong reactions to every remark made by male counterparts would be counterproductive to sustaining a career in information technology. This conclusion is not a call for women to ignore the behaviors of the men in their workplace. Instead, the men engaging in these behaviors are trying to get a reaction from the women that they are targeting. Having a thick skin should be interpreted as a coping strategy in which women do not give men the satisfaction of seeing them react by choosing not to attend to their childish behaviors.

Use Humor

Women should use humor when faced when the behaviors of others that serves as a barrier to their career persistence. This conclusion serves the same purpose as having a thick skin. When others are engaged in discriminatory or harassing behavior, women can use humor to deal with these actions. It can be used in two ways. The first is in response
to comments of others. Instead of reacting in indignation, women can respond by making a joke out of the situation. That is not to say that women should make light of their situations. Instead, humor is used as a response intended to make the other person feel foolish for their behaviors.

The second use of humor is as a stress reliever. The findings support the conclusion that women can either obsess on the negative aspects of their jobs, or they can use humor to release the stress and anxieties associated with being women in the field of information technology.

*Embrace the Positive*

Women should embrace the aspects of the job that they find enjoyable. It is expected that women will experience barriers to varying degrees during their careers in information technology. In order to sustain a career in this male-dominated field, women should not focus entirely on the negative aspects of their jobs. Doing so will likely increase the probability that women will choose to drop out of the information technology field.

Instead, women should remember what attracted them to pursue careers in information technology in the first place. What was it about the job that motivated them early in their career? It may have been the problem solving, personal interactions, finances, or other reasons. When the pressures of being a woman in the male-dominated field of information technology increase, women should refocus on what they liked about the field. Women need to identify and embrace the characteristics about the job that brought them satisfaction.
Seek Out Support Systems

Women need to find those that are willing to support them personally and professionally. When the pressures of being a woman in information technology are too much for women to cope with on their own, women need to have others that they can turn to who will provide a sympathetic ear. This can be peers or mentors within their organization. Peers and mentors provide an audience for women to express their frustrations. They can also give recommendations on how women can deal with situations in the future.

Support systems can also be friends or family outside of work. Instead of dealing with their frustrations at work, some women may find turning to friends and family a more effective method of dealing with the pressures of being women in information technology. The findings support the conclusion that the support of family is a major contributor to career persistence.

Research Question Two: Feminist Perspectives

The primary conclusion related to the second research question is that women in information technology do not claim that they are feminists. However, their words and their actions reveal that they support a variety of feminist perspectives. This should not be construed as attempts to hide their feminist beliefs. It only indicated that they did not express an awareness of feminist ideologies and how they manifest in thoughts and behaviors.

Also, these information technologists express multiple feminist perspectives as they discuss different aspects of their lives and careers. There is no single feminist theory that adequately captures the interpretations of how women in information technology
conceptualize their experiences. The investigation of feminist perspectives among women in information technology was undertaken to gain a better understanding of how the subjects were conceptualizing their experiences. Lorber (2001) developed a taxonomy of feminist perspectives and described how she thought these ideologies applied to the field of information technology. This taxonomy was utilized in the findings as a framework for the how subjects’ statements may be classified into the different feminist perspectives. Unlike Lorber’s study, the current study used feminist ideologies as an overlay for understanding the testimony of women in information technology about their perceptions concerning career persistence. The lack of previous research provided the primary investigator a blank canvas on which to provide an interpretation of the findings.

Existential Feminism

The existential feminist perspective is most prominently expressed by women in information technology to explain why women are under-represented in the field of information technology. With its emphasis on societal expectations and the need to maintain societal norms, the existential feminist perspective was used to explain the “why’s” of the female condition within the field of information technology. Whether talking about why girls were less likely to be interested in computers or why women were not expected to work with technology, women in information technology consider societal expectations to be the root cause.

Even though women may present an existential feminist perspective, it does not mean they all interpret situations through the same lens. Existential feminism holds the belief that societal expectations are a social construct of the values that people place on the appropriate choice of career paths. It should be expected that the cultural norms of
different segments of society will have different values. It is likely to find variations along geographic and demographic boundaries. Despite any differences, the underlying conceptualization is that the choice of career paths is influenced by societal expectations.

The most important conclusion that can be drawn from the existential feminist perspective is that there is a need to change the way society views the role of women in information technology. While the literature (Barker & Aspray, 2006; ITAA, 2003; Newmarch, Talyor-Steele, & Cumpston, 2000; von Hellens, Nielsen, & Trauth, 2001) supports this conclusion and highlights efforts to make these changes, the findings indicate that there has been minimal improvement in how society views the role of women in information technology.

To effect change in societal expectations, the findings support the conclusion that change will occur by increasing the number of women in information technology. The problem of changing societal expectations is similar to the concept of inertia in that when there are only a few women in technology, their ability to move the weighty mass of cultural bias against women is minimal. Eventually, the increasing number of women in technology will provide enough force to begin to move or change that cultural bias. Once this change to improve society’s outlook on women in technology begins, each additional women in this activist movement will have an increasingly greater impact. This is the point at which most of the subjects believe society to be. Almost all of the subjects believe that while there are still barriers facing women in information technology, the field is seeing increased numbers of opportunities for women.
Marxist/Socialist Feminism

The Marxist/socialist feminist perspective is used to explain how women may feel used as a resource in the information technology industry. The Marxist/socialist feminist perspective is its belief that people are stratified into classes. As it applies to the field of information technology, the dominant male ruling class uses women of the working class as a resource in the technology industry. The findings support the conclusion that women in information technology may feel that they are being used by their male supervisors. Instead of being a viewed as a contributing member of an organizational unit, women may feel that they are treated as raw materials that male management can utilize or dispose of as needed. This is true whether the individual was a front line technician or a technology manager.

Another important conclusion drawn from a Marxist/socialist feminism interpretation is the presence of intragender conflict among women in information technology. While women may express a desire to see an increase in the number of women in the field of information technology, many women in information technology feel that they are different from other women. It is as if their experiences or situations set them apart, or put them in a higher class, from other women in information technology. For those women that feel this way, there could be negative repercussions for the improvement of the female condition in information technology.

If female technology managers feel that they are in a higher class than women beginning their careers in information technology, there will likely be limited effort made by these women towards improving the situations of other females. It could be expected that these female leaders may be willing to assist other women in entering the field of
information technology. However, that need to remain in a higher class may result in actions that inhibit growth opportunities for women in lower positions. They may engage in behaviors that were discussed in association with “good old boy” networks. The women in leadership may restrict other women from access to resources that would aid them in their career development.

*Radical Feminism*

Women in information technology who have been subject to significant barriers in their career may express radical feminist perspectives. For these individuals, the radical feminist perspective is used to explain the female condition in information technology. The radical feminist perspective holds that women will suffer sexual harassment and oppression by the dominant male culture in the workplace. This harassment and oppression can be either real or perceived. As a result of previous experiences, women may interpret the actions of others as harassing or oppressive even though the man did not have those intentions.

With the radical feminist interpretation that men try to dominate and control women in the information technology field, women may choose actions that are intended to replace the dominant male culture by creating female only opportunities. This could be starting their own businesses with a predominantly female organizational structure. It may also manifest as a rationale for participating in all female support groups for women in information technology.

*Liberal Feminism*

Women display the liberal feminist perspective when discussing strategies for changing the technology industry and society as a whole. Within this framework, women
who support the liberal feminist perspective believe that change can occur through increased awareness. By making people aware of how their actions are impacting women, the belief is that people will take actions to rectify the situation.

The findings support this conclusion when women recommend people should be made aware of the range of job opportunities. Women who adopt the liberal feminist perspective in this manner believe that educating girls, parents, and guidance counselors will make the information technology field more attractive. The literature also supports this conclusion in that it has been found that girls and young women do not find careers in information technology appealing because of the belief that you either fix computers or write programs (Catalyst, 2003; Nobel, 2007). By making girls and young women aware of other job opportunities within information technology, the expectation is that more will choose information technology as a career path. But Lorber (2001) warned that many of these types of liberal feminist initiatives have failed to produce any improvements in the number of women entering the field of information technology.

Women also express a liberal feminist perspective when they talk about achieving parity or balance. The issue of parity involves efforts to bring the proportion of females working in information technology in line with the percentage of females in the nation. Women that support the liberal feminist perspective will cite federal actions such as Title IX and the Equal Employment Opportunity Commission as efforts to increase the number of women in information technology.

However, there is a counterpoint to the issue of parity. Title IX and the Equal Employment Opportunity Commission may have increased the opportunities for women to enter the field of information technology, but that does not mean that it has changed
the beliefs of the dominant male culture. The concern is that organizations will hire women for the sole purpose of meeting a diversity quota to satisfy regulatory requirements. If this is the case, women may not be hired for their qualifications or a belief that women are equally capable with information technology. In these types of situations, the entry barriers may have been removed, but the career growth and persistence barriers may become more formidable. Women need to be aware of this possibility.

Postmodern Feminism

The postmodern feminist perspective is displayed most prominently by women in information technology when they discuss flexible scheduling arrangements. Rosser (2007) supported the conclusion that organizations should try to adopt policies that provide telecommuting and flexible scheduling opportunities for women in information technology.

Of the feminist perspectives, the postmodern feminist philosophy was the least frequently expressed. However, flexible scheduling arrangements associated with this perspective were among the most significant factors contributing to career persistence. The primary conclusion that can be drawn from the postmodern feminist perspective is that women should seek out opportunities to find a balance between work and family responsibilities.

Recommendations for Future Research

Currently, there are more opportunities for training and education in information technology. Individuals can attend vocational, two-year associate degree, and four-year bachelor degree programs to prepare for employment in the field of information
technology. Future research should investigate the effectiveness of the respective training programs in relation to career persistence of women.

The relationship between serving as a role model or mentor and career persistence needs to be investigated further. It would be beneficial to study in more detail whether being involved in a “Women in Technology” role model or mentoring program for school aged children has an impact on career persistence. Does involvement have a positive effect on career satisfaction? Does it provide a sense of purpose that serves as a motivator for career persistence?

Additional research needs to investigate the extent to which organizations are implementing policies that contribute to the career persistence of women. This would include flexible work schedules, hiring policies, and retention strategies.

A review of literature for this study was unable to find any research studies that used feminist theories to interpret the lived experiences of women in information technology. The research consisted of either overviews of how feminist theories might view technology (Lorber, 2001) or books written by feminist theorists on the subject of technology (Wajcman, 1991, 2004). Further investigation into the feminist perspectives expressed by women in information technology needs to be done. More interviews need to be conducted to determine whether the findings of this study are consistent across geographic, socioeconomic, and cultural boundaries.

The issue of intragender conflict warrants further research. There needs to be a determination of the extent to which this Marxist/socialist feminist behavior is present among women that hold positions of authority within information technology. The study would need to determine whether women that have successfully navigated past the
barriers facing women in information technology feel that they have elevated to a higher
class than those women that are trying to enter or are newly entered into the field of
information technology. If so, how has that impacted their treatment towards other
women in information technology?

Limitations

The qualitative nature of this study will limit the generalizability of the findings.
The primary purpose of the study is not to discover generalizable facts. Instead, the goal
is to develop a deeper understanding of the experiences these women have had in the
field of information technology. It must be recognized that the experiences of the subject
pool may not be representative of the larger population of women in information
technology. However, the findings may be used as the basis for future research, as
recommended.

Another potential limitation stems from being a male interviewer investigating
gender issues in a male-dominated industry. A female subject may choose not to disclose
as much information to a male researcher. There is the potential that the investigator may
represent an oppressive, dominant group. If so, the subject may be concerned that the
intentions for the interview could have a negative impact on her. For example, a subject
that has experienced sexual harassment may withdraw from a male interviewer. With this
possible limitation comes the need to establish a rapport with the subject. Over the course
of the interviews, the primary investigator was able to establish rapport with the subjects.
The subjects were forthcoming in their responses and did not appear to be holding
anything back. There were a couple of instances where a subject seemed a little hesitant.
When reminded that their responses would remain confidential, the subjects were more
comfortable sharing experiences that had the potential for implicating others. The only subject who was limited in her responses was Helen. It did not seem that she was trying to hide anything. She appeared to have a more reserved disposition than the other subjects. Despite her disposition, her responses still provided relevant data.
REFERENCES


Electronic and Information Technology Accessibility Standards; Final Rule, 36 Federal Register, 80,500 (Dec. 21, 2000) (to be codified at 36 C.F.R. pt. 1194).


Ramnanan, R. (2001). Project demonstrating excellence: A study on increasing the interest and involvement of females (ages 14 to 18) in technology through skills


Appendix A: Sample Informed Consent
Appendix A: Sample Informed Consent

Persistence Factors of Women in Information Technology

The purpose of this research project is to examine the experiences of women who are employed in information technology positions. For this project, you will be asked to participate in a series of two interviews. It will take you approximately 45-60 minutes to complete each interview session.

All data will be maintained as confidential and no identifying information such as your name will appear in any publication or presentation of the data. Data will be stored in a locked filing cabinet in the researcher’s office.

For purposes of accuracy, with your permission, the interviews will be audio recorded. The electronic audio files will be stored on CD and secured in a locked cabinet. These files will be transcribed into electronic text files which will also be stored on CD and secured in a locked cabinet. The transcripts will be used as data for the final report of this study.

The foreseeable risks or ill effects from participating in this study are minimal. If the questions during the interview make you feel uncomfortable and you wish to stop, please say so and the investigator will give you time before continuing or you may choose to end the interview.

The intent of this study is to develop a better understanding of the factors that contribute to the career persistence of women in information technology. Information gathered from your interview may at some time be used as the data for a research publication. Again, your confidentiality will be maintained by removing identifying information.

Your participation in this study is completely voluntary and you are free to withdraw from the study at any time for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before signing the Informed Consent form and beginning the study, and at any time during the study.

For one’s rights as a research subject, the following person may be contacted:, Coordinator of Research Compliance, Office of Academic Research and Sponsored Programs, Ball State University, Muncie, IN 47306, (765) 285-5070.

I, ___________________, agree to participate in this research project entitled, “Persistence Factors of Women in Information Technology.” I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I can receive a copy of this informed consent form to keep for future reference.

________________________________________  _______________________
Participant’s Signature     Date

Principal Investigator:       Faculty Supervisor

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Appendix B: First Interview Guide
Appendix B: First Interview Guide

A. Introduction

Thank you for meeting with me today.

I am conducting a study of women in information technology. Many studies have looked into the reasons why women are not entering into the field of information technology. Fortunately, there have been women who have chosen to pursue careers as information technology professionals. The purpose of this study is to investigate the factors that contributed to women entering into and persisting in the field of information technology.

Before we can begin, this is an Informed Consent release form. It indicates that the any information that you give me will remain confidential. Your identity will not be divulged in any published materials. Also, you are not obligated to participate in the study or answer any questions that make you uncomfortable. You also have the option of withdrawing from the study at any time.

In order for me to accurately document our conversation, I would like your permission to record our interview. The transcripts and recordings will not identify you personally, but will be labeled with a pseudonym. All other names and locations will also be changed. The recordings will remain in my possession and nobody else will have access to them. Only those professionals associated with this study will see the transcripts.

If I have your permission to continue, please sign the release?
Background Information

What are the positive and negative factors that influenced the choice to pursue a career in information technology?

I would like to start by learning more about your background.

1. When you first became interested in information technology, what were the reactions of your family or friends?

2. Were there positive or negative factors that influenced your decision to enter information technology?

3. What education or training prepared you for a career in information technology?

4. What barriers do you feel have a negative impact on women choosing to pursue careers in information technology?

5. When you were trying to get your first information technology position, could you describe any barriers you experienced?

6. If so, why did you continue to search for a job in this field?

7. What helped you overcome these experiences?

What barriers to career persistence are reported by women in information technology?

1. Tell me about your first information technology job (company, position, responsibilities). [Below are follow up questions as appropriate]
   
i. How did you learn about the job?
   
ii. What was your self-image coming into this position?
   
iii. Were there any other women in IT positions?
   
iv. Were there barriers for women IT professionals in this organization?
   
v. What was your supervisor like?
vi. Were there any respect issues?

vii. Were you made aware of advancement opportunities?

viii. Was there a “Good Old Boys” club?

ix. Do you feel that you were underpaid compared to your male coworkers?

x. How did your self-image change while in this position?

xi. Why did you leave this job?

2. Tell me about your current position (company, position, responsibilities). [Below are follow up questions as appropriate]

i. How did you learn about the job?

ii. Were there any other women in similar positions?

iii. Were there barriers for women IT professionals in this organization?

iv. What was your supervisor like?

v. How were your colleagues?

vi. Were there any respect issues?

vii. Were you made aware of advancement opportunities?

viii. Was there a “Good Old Boys” club?

ix. Do you feel that you were underpaid compared to your male coworkers?

*What factors contribute to the career persistence in women in the field of information technology?*

1. What is your self-image now that you have been in the IT field for a number of years?

2. Can you describe a time when you may have considered leaving the profession?

3. What has kept you moving forward in this field?
4. What are the prevailing feminist theoretical perspectives among the women that have sustained careers in information technology?

What are the prevailing feminist theoretical perspectives among the women that have sustained careers in information technology?

1. Having been in the information technology field for a number of years, how do you think women’s position in the industry has changed?

2. Why do you think women remain under-represented in information technology despite efforts to increase their representation in the field?

3. What role, if any, do you feel you have in shaping the industry for future women in the field?

What recommendations do women have for future women in information technology?

1. What recommendations would you give to women considering information technology as a career?

2. What changes do you think need to be made in order to increase the number of women in information technology?

Thank you again for meeting with me. I will be forwarding a copy of the transcripts once they are completed. This is to ensure that I accurately convey your thoughts, experiences, and opinions. In our second interview, we can make any clarifications or corrections. It will also give us an opportunity to explore other relevant topics that we may not have covered today.

Before I go, do you know of any other women that have held positions in information technology for at least five years whom I might interview?
Appendix C: Case Utility Worksheet
Appendix C: Case Utility Worksheet

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<th>Utility of Cases</th>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
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H = high utility; M = middling utility; L = low utility. High utility means that the Case appears to be one of the most useful for developing this Theme. As indicated, the original Themes can be augmented by additional Themes even as late as the beginning of the cross-case analysis. Descriptions of each Theme can be attached to this worksheet, so that the basis for estimates can be readily examined.
Appendix D: Theme-Based Assertions Matrix Worksheet
Appendix D: Theme-Based Assertions Matrix Worksheet

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H = high utility; M = middling utility; L = low utility. A high mark means that for this Theme, the Case Finding is of high importance. Parentheses around a Theme number mean that it should carry extra weight in drafting an Assertion. The notation “atypical” after a case means that its situation might warrant extra caution in drafting an Assertion.