Self-Efficacy and Sense of Belonging: A Comparative Analysis of Factors That Affect Differences in Participation in Information Technology Education by Gender

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SELF-EFFICACY AND SENSE OF BELONGING:
A COMPARATIVE ANALYSIS OF FACTORS THAT AFFECT DIFFERENCES IN
PARTICIPATION IN INFORMATION TECHNOLOGY EDUCATION BY GENDER

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# TABLE OF CONTENTS

List of Tables ..................................................................................................................... vii  
List of Figures .................................................................................................................... viii  
Abstract ................................................................................................................................ ix

1. INTRODUCTION ................................................................................................................. 1  
   1.1. Purpose ............................................................................................................................ 1  
   1.2. Problem Statement and Significance ............................................................................. 2  
   1.3. Research Questions ....................................................................................................... 5  
   1.4. Theoretical Framework ................................................................................................. 5  
   1.5. Research Design ........................................................................................................... 6  
   1.6. Assumptions and Limitations ...................................................................................... 7  
   1.7. Summary ....................................................................................................................... 7

2. REVIEW OF LITERATURE ................................................................................................ 9  
   2.1. Personal Interest ........................................................................................................... 9  
   2.2. Perception .................................................................................................................... 11  
   2.3. Prior Preparation ......................................................................................................... 13  
   2.4. Campus Climate .......................................................................................................... 13  
   2.5. Family Responsibility ................................................................................................. 15  
   2.6. Self-Efficacy Theory .................................................................................................... 16  
       2.6.1. Concepts and Propositions ................................................................................ 18  
       2.6.2. Women in IT ...................................................................................................... 23  
   2.7. Summary ....................................................................................................................... 25

3. METHODS .......................................................................................................................... 27  
   3.1. Research Questions ..................................................................................................... 27  
   3.2. Research Design ......................................................................................................... 27  
   3.3. Survey .......................................................................................................................... 28  
       3.3.2. Population and Sampling ................................................................................... 28  
       3.3.3. Instrument Design .............................................................................................. 28  
       3.3.4. Data Collection Procedures ............................................................................. 29  
       3.3.5. Data Analysis ...................................................................................................... 30  
   3.4. Interviews .................................................................................................................... 31  
       3.4.2. Population and Sampling ................................................................................... 31  
       3.4.3. Instrument Design .............................................................................................. 32  
       3.4.4. Data Collection Procedures ............................................................................. 32  
       3.4.5. Data Analysis ...................................................................................................... 33  
   3.5. Data Management ....................................................................................................... 33  
   3.6. Validity and Reliability ................................................................................................. 33
LIST OF TABLES

Table 4.1. Demographic and Background Characteristics: Survey ........................................36
Table 4.2. One-sample t test .................................................................................................38
Table 4.3. Independent-sample t test ....................................................................................38
Table 4.4. Demographic and Background Characteristics: Interviews ................................39
Table 4.5. Interview Persona Characteristics .........................................................................40
Table 4.6. Interviews Codes and Categories ..........................................................................72
LIST OF FIGURES

Figure 2.1. Sources of Self-Efficacy Information (Staples, Hulland, & Higgins, 1998) ..................19

Figure 3.1. Explanatory Sequential Mixed Methods Design .........................................................28

Figure 4.1. Word Cloud of Interview Themes ..............................................................................71

Figure 4.2. Interview Themes by Gender ....................................................................................72

Figure 4.3. Themes, Categories, and Theory Concepts .................................................................73
ABSTRACT

The recruitment and retention of women is a continuing problem in the Information Technology (IT) profession. Despite positive labor statistics for the IT field, American women are underrepresented. The belief that their skill sets are not as credible as their male counterparts keeps qualified women candidates from attaining key IT positions. There will be no growth in representation if women are not enrolling in the advanced degree programs necessary to end the cycle of underrepresentation.

While there are a number of studies investigating the reasons for the underrepresentation of women in Science, Technology, Engineering, and Mathematics (STEM) disciplines; there is not an abundance of research that considers the combined role that gender and self-efficacy play. The literature dealing with these issues in IT educational and the IT workforce separately is even more limited and particularly evident is the lack of research on the underrepresentation of women in IT.

This dissertation research study explored the sense of inclusion and factors that affect differences in participation in Information Technology (IT) education by gender. An explanatory sequential mixed methods design was used, and it will involve collecting quantitative data via an online survey and then explaining the quantitative results with in-depth qualitative data with interviews.
CHAPTER 1

INTRODUCTION

This dissertation research study examined the sense of belonging and factors that affect differences in participation in Information Technology (IT) education by gender. This chapter begins with an overview of the research purpose, a statement of the problem being considered, and the significance of this research. It then presents the research questions under consideration and an overview of the theoretical framework. The chapter concludes by reviewing the research design to be used and the assumptions the study will operate under. Chapter Two offers a thorough literature review of relevant research, while Chapter Three includes the details of the method, research procedures, data collection, and data analysis. Chapter Four reviews the findings of the study and Chapter Five discusses these findings, answers the research questions, and considers implications and future research directions.

1.1. Purpose

The purpose of this dissertation research study is to investigate factors which motivate women to major in IT. The Oxford English Dictionary (OED) defines IT as “[t]he branch of technology concerned with the dissemination, processing, and storage of information, esp. by means of computers” (Information technology, n.d.), not to be confused with computer science that is the OED defines as “[t]he branch of knowledge concerned with the construction, programming, operation, and use of computers” (Computer science, n.d.). In the School of Information (2016b), the IT program prepares students for careers in design and development, networking and security, health informatics, IT project management, and social informatics. The Information, Communication, and Technology (ICT) majors learn how to strategically apply and manage web-based and social media, and other digital and interactive technologies to support a
variety of communication needs in areas such as public relations, news delivery, promotion and advertising, and social marketing (School of Information, 2016a). Factors identified in this study may be further investigated in future research.

1.2. Problem Statement and Significance

The recruitment and retention of women and other underrepresented groups is a continuing problem in the Information Technology (IT) profession (Ahuja, 2002; Bystydzienski & Bird, 2006; Clewell & Ginorio, 1996; Cohoon & Aspray, 2006b; Herring & Marken, 2008; Ogan, Robinson, Ahuja, & Herring, 2006; Ogan & Robinson, 2008). Despite positive labor statistics, American women are underrepresented in the field (Zarrett & Malanchuk, 2005). The belief that their skill sets are not as credible as those of their male counterparts keeps women from enrolling in the degree programs necessary to end the cycle of underrepresentation and thus keeps qualified women candidates from attaining key IT positions (Jacobs, 2005).

According to the latest National Science Foundation (2015) statistical report of the state of women, minorities, and persons with disabilities in science and engineering (S & E):

- “The proportion of women in computer sciences is highest at the master’s level. Since 1993, the number of women in computer sciences has risen at all degree levels. Although the proportion of women with degrees in computer sciences has increased considerably at the doctoral level, it has declined at the bachelor’s level.” (p. 6)

- “White men constitute about one-half of the S&E workforce. In all racial and ethnic groups, more men than women work in S&E occupations. Together, Asian and underrepresented minority women represent about 1 in 10 persons employed in S&E occupations.” (p. 12)
• “Women’s share of full-time, full professorships has more than doubled since 1993. Despite this increase, women currently occupy only about one-fourth of these senior faculty positions.” (p. 16)

As the NSF places IT under the computer sciences category that resides under the greater science and engineering umbrella, the assumption is that what is occurring in the larger area is also occurring in the smaller IT discipline.

While there are a number of studies investigating the reasons for the underrepresentation of women in Science, Technology, Engineering, and Mathematics (STEM) disciplines, in 1996 Clewell and Ginorio (1996) noted a lack of research which considers how gender and ethnicity, both separately and together affects representation. The literature specific to underrepresentation in IT education and the IT workforce is even more limited, with Cohoon and Aspray’s (2006a) and Trauth, Quesenberry, & Huang’s (2006) work on gender being notable exceptions.

Factors contributing to underrepresentation that have been explored in the research literature include socio-economic and socio-cultural influences. “One reason may be related to the social networks that impact why individuals chose a particular occupation. Many people—family members, friends, teachers, counselors, and other role models, among others—have an impact on the decision of an individual to join a field” (Franklin & Jaeger, 2007, p. 198).

Blickenstaff (2005) found in research literature on women and science careers the following explanations for why women leave STEM careers:

1. Biological differences between men and women.
2. Girls’ lack of academic preparation for a science major/career.
3. Girls’ poor attitude toward science and lack of positive experiences with science in childhood.
4. The absence of female scientists/engineers as role models.
5. Science curricula are irrelevant to many girls.
6. The pedagogy of science classes favors male students.
7. A ‘chilly climate’ exists for girls/women in science classes.
8. Cultural pressure on girls/women to conform to traditional gender roles
9. An inherent masculine worldview in scientific epistemology. (pp. 371-372)

While Blickenstaff references science specifically, and there is significant variance in participation among STEM fields, ‘information technology’ could easily replace ‘science’ above and the explanations would fully apply. It should be noted that strides have been made in certain STEM fields, biological sciences and chemistry specifically, where the gender gap is lessening at a more significant pace as opposed to the male-dominated fields such as computer science and engineering (Shapiro & Sax, 2011). Past work to increase participation of women in IT has varied in approach and theme, but one persistent theme is the need to increase the visibility of IT careers beyond network administration and tech support (Ahuja, 2002; Bair and Marcus, 2007; Cohoon & Aspray, 2006b; Croadsdell, McLeod, & Simkin, 2011; Herring, & Marken, 2008; Servon & Visser, 2011; Shapiro & Sax, 2011; Wang & Degol, 2013; Wang, 2013; Wasburn & Miller, 2006). Jacobs (2005) elaborates:

Institutions of higher education could also do more to help both genders understand what jobs are possible with advanced degrees and work harder to keep people in the pipeline rather than weeding out those who may not have the appropriate background or skills when they arrive. (p. 92)

In addition, more effort needs to be put into promoting viable, but less well-known career paths, to high school students and new college freshmen (Bair & Marcus, 2007). Research in
this area will help fill the gap by providing a comprehensive look at the past, present, and future in the study of the underrepresentation of women in IT education programs in the United States. The results will allow for greater understanding as to why there is minimal participation of women in the field despite decades of initiatives.

1.3. Research Questions

This dissertation study focuses on the sense of belonging in women, an underrepresented population in the field of IT, during their undergraduate studies. While there are a number of factors that can contribute to the motivation of these women to major in IT, using self-efficacy as a lens to focus on the belief in their skills and couch that within their perception of their belonging or goodness of fit with other IT professionals. The following research questions were chosen to satisfy the purpose of this study:

RQ1. What factors motivate women to enter the undergraduate IT program?

RQ2. What role does self-efficacy play in the decision of women to enter into an undergraduate IT program?

RQ3. What perceptions do women have about what it means to be an “IT Professional,” and what role does this perception have on their desire to pursue an undergraduate IT degree?

1.4. Theoretical Framework

Grounding a research study in self-efficacy theory will allow for further exploration into what motives a person to choose to enter, or not enter, into an educational program and subsequent career path. Looking at motivation from the initial interest in the area or, say, a subject in school for a student is a good place to start. What leads from the initial interest into something more? Based on the concepts of self-efficacy theory, when students are exposed to
success in a subject area and display some sort of talent or skill, then they are more likely to pursue it further. The pursuit will be heightened if vicarious and persuasive experiences are also positive. However, if that student does not have the opportunity to form a positive sense of self-efficacy, then the interest, according this theory, will not flourish beyond that initial spark.

According to self-efficacy theory, a proper support system can go a long way in building the efficacy of a student to believe that she has the ability to continue being educated in her field. If students’ self-efficacy is lowered (be it gradually or not) by their prior experiences in K-12 education or initial experiences in higher education, without some sort of push for balance from other motivating factors, they will never pursue a higher degree, because of fear based in the belief that they are not capable to handle such a program. To be successful, students require belief, fortitude, and hard work in addition to skills and knowledge. Brown and Lent (2006) found that students with higher self-efficacy achieve higher levels of educational success than students with lower self-efficacy.

Students who believe that success requires hard work, may not elect to pursue loftier career or educational goals because they think “that it will take too much continued effort to be successful” (Brown & Lent, 2006, p. 212). The use of self-efficacy to explain the lack of participation of women in higher education in information technology works well due to the ability to apply the theory to several factors which research has shown to lead to a lack of enrollment and graduation, such as confidence in their ability to handle current course work based on their prior coursework performance.

1.5. Research Design

Creswell’s (2014) explanatory sequential mixed methods design was used to collect and analyze quantitative data and in-depth qualitative data. This study took place in two stages: (1) a
web based survey, and (2) interviews. Participants were students enrolled in undergraduate IT/ICT capstone courses at Florida State University (LIS 4708 Perspectives on Information Technology and LIS 4910 Information Technology Project). The survey used collected basic demographic information (age, year in school, major, etc.) to begin to address research questions about the impact IT courses have on the decision to enter into the IT program. Interview participants were selected from those who indicated interest on the survey. Interviews were conducted in person, audio-recorded, lasted approximately 30-45 minutes, and further explored the data collected from the surveys.

1.6. Assumptions and Limitations

The study made a few assumptions and had limitations and every effort has been made to minimize their impact as best as possible. The literature review presented in Chapter 2 is assumed to include relevant literature. However, the possibility exists that something has been missed and best efforts have been made to situated this study in a complete, accurate picture of the existing research and practice on motivating factors for women’s participation in IT. As a researcher my own biases and predispositions have influenced the choice of approaches, theory, and methods, but it is thought their use in this study is appropriate and justified throughout. This study assumed limited time and resources and further details can be found in Chapter 3.

1.7. Summary

This chapter introduced an overview of the proposed research problem and purpose. The research questions to be answered as well as the approach, methods, and theory to be used in answering them is presented. This chapter concluded with the research design and a discussion of my biases and the limitations of this research. Chapter 2 presents a thorough literature review on the factors of motivation for women in IT and the theoretical framework being used in the
study. Chapter 3 begins with a detailed look at the research design and methods used and then includes a discussion on the data collection and analysis, the management of data, the benefits and limitations of the study, its validity and reliability, and ethical considerations. Chapter 4 will review the findings of this study and Chapter 5 discusses the findings, answers the research questions, and considers implications and future research directions.
CHAPTER 2

REVIEW OF LITERATURE

This review of literature examines research results and scholarly works concerning the underrepresentation of women in IT education programs. The review consists of research that examines potential underlying causes for the lack of participation by women in this field that addresses the potential causes and/or solutions to the key points of the National Science Foundation (2015) report previously discussed. This literature review will look at research studies and theories concerning the underrepresentation of women in IT and/or STEM disciplines. The review is divided into categories of, causes for, and suggested solutions to the issues facing women in the aforementioned higher education disciplines concluding with a detailed overview of the theoretical framework.

2.1. Personal Interest

A large portion of past and current research is concerned with the motivation (both internal and external) of women to enter into STEM higher education programs and subsequent careers. However, very little of this research focuses on the field of information technology specifically, and even less addresses what might be a fundamental contributing factor of such motivation: personal interest (Heilbronner, 2013; Wang & Degol, 2013). Helibronner (2013) found that “[i]nterest appeared to be highly influential on these participants’ early experiences and occupational selection…. Interest, however, is a complex construct, and it is conceivable that it develops in part because of other mediating influences such as academic experiences and self-efficacy” (Helibronner, 2013, p. 49). The researcher proposes the promotion of interest in STEM to students, young girls especially, “would be a way to increase women’s representation in certain STEM domains such as computer science” (p.50). Helibronner (2013) suggests
“[g]ender-sensitive engaging activities such as speakers, career days, and hands-on, minds-on opportunities that spark interests and inform students of possibilities for careers raise not only interest and achievement but also awareness of opportunities (Renzulli & Reis, 1994)” (p. 50).

Wang and Degol (2013) caution that such efforts to increase participation in STEM may infringe on individuals’ free will in the pursuit of “harnessing the full potential of our young people for an effective STEM work force, specifically [of] women and minorities” (p. 327):

A final caveat, however, is that if career choices reflect personal interests, it is not recommended that males or females be forced to pursue any specific careers in which they show no interest. Free will in choosing careers should never be suppressed or undermined, and if males or females with high math ability choose to pursue other fields due to greater interest in those areas, then no attempt should be made to redirect them to STEM careers (Ceci & Williams, 2011). Instead, interventions should focus on instilling in girls (and boys) that there are no limits to their career pursuits, and removing societal (e.g., stereotypes and discrimination) and biological (e.g., optimal childbearing years coinciding with strict tenure deadlines) barriers that constrain women with children in the workplace (Ceci & Williams, 2011). In this way, girls and women with burgeoning STEM interests may be more motivated to choose and stay within these fields (Wai et al., 2010). The goal is to emphasize options, specifically for members of historically disenfranchised groups which may not consider enrolling in STEM professions. Ultimately, choices should be made freely, and not limited by any cultural, societal, or biological barriers. (Wang & Degol, 2013, p. 329)
2.2. Perception

American popular culture continues to portray workers in the IT industry using the same stereotypical male characters while all but ignoring women. For example, the rise in fame of those in the upper echelons of the IT industry like Apple’s Steve Jobs and Facebook founder Mark Zuckerberg, is documented in Hollywood feature films. Even when high profile female executives such as Facebook COO Sheryl Sandberg, and Yahoo’s president and CEO, Marissa Mayer are referenced, it is not their technical skills that garner attention, it is their looks, or the leadership that they have shown in pushing back against the notion of how women and working mothers are supposed behave in a male dominated industry. Other examples include the British sitcom, The IT Crowd, and a recent addition to HBO’s lineup. Silicon Valley. The IT Crowd centers on the three-person staff of the IT department of a London business. The two male characters are portrayed as IT experts—one is hyper-smart but severely lacks any social skills, especially when dealing with those of the opposite sex, and the other possesses significantly better communication skills, but can be condescending and a bit of a curmudgeon if challenged. The third member of the staff is a female who greatly exaggerates her IT skills in order to get a promotion as the department head, which leads to initial resentment from her male staff members, who automatically suspect she is a fraud. Silicon Valley, while also satirical in nature, has similar male personas and lacks prominent female characters.

Croadsdell, et al. (2011) noted:

Teachers and academic institutions should also address the misconception that information technology disciplines are only for social loners or computer geeks and stress that these careers are respectable and valued. They can also stress the idea that many jobs in the information technologies require individual initiative and creativity, and that new
social media and associated technologies benefit from strong interpersonal
skills….Similarly, it seems useful for IT recruiters to move discussions away from
questions about balancing family with career or at least counter them by noting that other
career paths are likely to be no different (Ahuja, 2002). The coursework required to
prepare for technology-related careers is challenging in nature, yet it is surprising to find
that the work required to become a computer programmer or engineer is perceived by
many young women as more difficult than that required to become a surgeon
(Weinberger, 2004). Further study of the formation and accuracy of perceptions about the
difficulty of information technology related coursework is needed. (p. 172)

When comparing themselves with the stereotypical view of those most likely to work with
computers, women lose confidence and interest because they feel as if they do not measure up to
societal expectations and norms (Margolis, Fisher, & Miller, 2000).

Research has demonstrated that individual differences in motivation beliefs can impact
career choices. Over time individuals develop ideas about their own aptitude levels in
various subjects, allowing for self-appraisal of competencies. Individuals that view
themselves as highly competent in a subject area will be more likely to develop an
interest in that area and pursue it as a career. While the gender gap in math performance
has been declining in recent decades, differences in career interests and lifestyle values
between males and females explain the large number of highly competent women bowing
out of STEM fields. Women report a greater propensity toward working with people and
valuing jobs that are more flexible and accommodating to their childrearing
responsibilities. Unfortunately, current research suggests that STEM fields are perceived
by women as being object-oriented, male-dominated, and not family friendly—issues that have yet to be addressed on a meaningful level. (Wang & Degol, 2013, p. 328)

2.3. Prior Preparation

When it comes to college entrance examinations such as the SAT and ACT, females tend to score lower than males in the quantitative portions. Women are also less likely to enroll in STEM-related courses or take advanced placement exams in STEM-related subjects, and when they do, their scores are lower (Hill & St. Rose, 2010; Wiswall, Stiefel, Schwartz, and Boccardo, 2014). Shapiro and Sax (2011) examined a study by Margolis et al. (2000) of computer science majors at Carnegie Mellon and discovered that while 40% of the first-year men had placed out of the introductory programming course by passing an AP exam in Computer Science in high school, none of the first-year women had done so. Men therefore reported having more advanced knowledge of the field than women, which negatively influenced the women’s confidence in their abilities to succeed in the field. Bair and Marcus (2007) found misconceptions about the field hold many students back from pursuing IT higher education. Students with no prior computer programming experience felt they would not be successful, and therefore never applied. They also found this mistaken belief among advanced students, including a woman “working toward a master’s degree in math, with perfect GRE scores, [who] initially chose computer science as her future career, but felt that she would lag behind male students who seemed to know all of the material already” (p.171).

2.4. Campus Climate

Blickenstaff (2005) found even when “females were better prepared than the males, as measured by their course grades and scores on national exams [and] [i]n spite of their strong preparation, girls still end up leaving science” (p. 374). Grade point average also predicted
degree attainment in the model, and the relationship between grades and degree attainment was stronger for men compared to women. An interesting finding is that women on average had higher grade point averages than men in the sample; yet women graduated with STEM degrees at lower rates compared to men. This finding suggests that for women, higher grade point averages do not translate into higher graduation rates. This puzzling finding perhaps suggests that other factors, such as campus climate or negative experiences with peers, may have a greater influence on degree attainment for women and may cancel out or weaken the positive relationship between earning high grades and degree completion (Gayles & Ampaw, 2014).

Clewell and Ginorio (1996) investigated the progress in the sciences towards the education and work experience of women, with special emphasis on the perspectives of women who are traditionally underrepresented including, but not limited to, ethnic minorities (defined as African Americans, Latino/as, and American Indians) and the physically disabled. This research was conducted in the K-12 context. They found that white students do not face four areas of difficulty encountered by ethnic minority students:

- ethnic cultural values and socialization,
- internalization of stereotypes,
- ethnic isolation and perceptions of racism, and
- inadequate minority program support.

Women in non-traditional majors face similar issues. Feminine gender role and socialization, internalization of stereotypes, and sense of isolation and perceptions of sexism “result from the clash between campus and student cultures where students of color or women are in the minority…[a]nd for women of color, the burden is double” (Clewell & Ginorio, 1996, p. 197).
Wasburn and Miller (2006) conducted a case study in 2001 of the Women in Technology organization at the Purdue School of Technology to discover if membership offers the support necessary for women to be successful in technology. Women in Technology, a student organization, was developed to try to counterbalance the feeling of isolation for females in this field. Washburn and Miller (2006) found that the women in the group felt they were capable of doing work with technology yet still felt isolated in their classrooms, and that the addition of more mentoring opportunities with other female IT professionals would be welcomed.

Research also suggests the lack of support networks available to women in technical majors is a limiting factor (Ahuja, 2002; Bystydzienki & Bird, 2006; Cohoon & Aspray, 2006b; Clewell & Ginorio, 1996; Herring & Marken, 2008; Ogan et al., 2006; Ogan & Robinson, 2008). Wasburn and Miller (2006) add that: “The absence of women faculty and mentors in the classroom and elsewhere, few women peers in their classes, and the lack of supportive networks can create a “chilly climate: for women in nontraditional fields. It is during this critical period that many women transfer into other fields…” (p. 61). Gayles and Ampaw (2014) found female student success in seeking bachelor’s degrees in STEM majors is positively associated with regular faculty interaction, especially when the interaction occurred outside of the classroom. “…[T]his finding lends support for the usefulness of academic integration as an important factor for women in STEM majors” (p. 461).

2.5. Family Responsibility

One possible explanation for the lack of pursuit of STEM careers in academia and corporate settings by qualified and capable women, is that they tend to be the primary care givers for their children and aging parents, thus they need to take time off while their male counterparts are able to focus on building careers (Heilbronner, 2013). Servon and Visser (2011) found 83%
percent of men reported earning more than their spouse, which is in contrast to 51% of women. Even when spouses have similar credentials and income, the women are most likely to put their careers on hold to raise children and care for elderly parents. If, and when, these women do return to work, their spouses have begun to earn more money and priority can shift to furthering his career while hers stalls.

The stories we heard during focus groups indicate that difficulties of balancing extreme jobs with ongoing family responsibilities account for at least some of the female attrition from SET fields. In the focus groups, many of our women participants mentioned that they knew of others who left the workforce entirely, some of our respondents opted for a flexible work arrangement, some stayed where they were (avoiding promotions) and some downshifted to a job with less pressure. Providing a longer career ladder with greater ability to pause on the way up, may help many women balancing the work/family pressures to remain more satisfied and productive. Of those women we surveyed, 44 per cent believed that allowing women to stay at one level for a longer period of time without being written off would increase retention. (Servon & Visser, 2011, p. 279)

Wang and Degol (2013) proposed flexible alternatives such as part-time start-up for tenure track positions, and extended tenure deadlines, but warn “it is important to keep in mind that not all women who have children work part-time, and not all women who exit STEM fields are mothers, so incentives to stay within the profession may need to be tailored to meet individual needs” (p. 329).

2.6. Self-Efficacy Theory

Self-efficacy theory comes from another theory by Bandura, social cognitive theory. The research studies involving snake phobias garnered greater results than just the loss of phobias.
After experiencing successfully overcoming their phobia the participants began to believe "in their efficacy to exercise control over their lives" (Bandura, 2006a, p. 66). Those people in the study were now attempting previously avoided activities and finding success. From this discovery, self-efficacy theory was born. Although initially the self-efficacy theory grew from behavioral research Bandura has since expanded his scope to look at the personal efficacy in a variety of ways. Bandura (1995) focuses on the effects of personal efficacy in youths’ and the belief they have in their ability to thrive in society. This collection of research ranges from the impact of family processes to career choice and development. Bandura (1997) looks at how self-efficacy is used by individuals in cognitive, health, clinical, athletic, and organizational development. Examples included are interdisciplin ary such as the discussion about students’ belief in their efficacy to understand their lessons or an athletes’ belief in their ability to outperform opponents.

This theory has been used in a variety of disciplines including but not limited to psychology, sociology, medicine, education, athletics, information technology, and business. Bandura (2006b) gives guidance as to how to construct a self-efficacy scale to be used for research purposes. Compeau and Higgins (1995a, 1995b) and Compeau, Higgins, and Huff (1999) constructed a computer self-efficacy scale. Their research uses self-efficacy and social cognitive theory in their research into the influence of computer self-efficacy, among other factors, on individuals. Lent, Brown, and, Larkin (1986) looked at the relation between self-efficacy beliefs and educational-vocational choice. Using social cognitive theory Lent, Brown, and Hackett (1994) constructed a framework for aspects of career development. Smith (2002) conducted research that used the computer self-efficacy scale (Compeau & Higgins, 1995a; Compeau et al., 1999) and career theory model (Lent et al., 1994) based on self-efficacy theories.
and SCT respectively. The construction of a new or modified version of a self-efficacy scale like those used by Compeau & Higgins (1995) or Smith (2002) could be one way to utilize this theory in a research project.

The use of self-efficacy to explain the lack of participation of minority women in higher education in information technology works well due to the ability to apply the theory to several factors which research has shown to lead to a lack of enrollment and graduation such as confidence in their ability to handle current course work based on their prior coursework performance.

2.6.1. Concepts and Propositions

According to Bandura (1995, p. 2) “perceived self-efficacy refers to beliefs in one’s capabilities to organize and execute the courses of action required to manage prospective situations.” As seen in Figure 2.1, self-efficacy theory has four concepts expressed in the form of the main sources of influence: prior (mastery) experience, observations (vicarious experience), social persuasion, and physiology and emotional states (Bandura, 1969, 1977, 1986, 1995, 1997). In turn “efficacy beliefs influence how people think, feel, motivate themselves, and act” through four major processes that include cognitive, motivational, affective, and selection (Bandura, 1995, p. 2). To summarize, self-efficacy is an individual’s belief in his or her ability to accomplish a task. It is not static and may fluctuate depending on the aforementioned influences. If you have had a successful outcome with a task then your self-efficacy for that task will be high. If you have not been very fortunate with the completion of that task then your self-efficacy for that task will be low.
2.6.1. Concepts. Grover and Glazier (1986) define a concept as “a definitive idea, including its adjunct relationships, which is articulated by a word or term associated with it…[that] outline the shape and content of theory” (p. 232). Shoemaker, Tankard, and Lasorsa (2004) add, “the theoretical definitions (sometimes called the conceptual definition) conveys the meaning we attach to the concept and generally suggests indicators of it” (p.26). It is the researcher’s job to specify what the meaning of the concept is and use the indicator to suggest the appropriate means of measurement (Shoemaker et al., 2004).

According to Meleis (1991) concepts should be evaluated based on the origin, primitive or derived, and also within the level of abstraction/concreteness. Meleis (1991) states, “Primitive concepts are those concepts introduced in the theory as new and therefore defined within the theory. Derived concepts, on the other hand, are concepts from outside the theory that have taken on a different meaning within the theory” (p. 220). As for the other evaluation criteria for concepts Meleis (1991) simply notes, “the more general a concept is…the higher the level of

Figure 2.1. Sources of Self-Efficacy Information (Staples, Hulland, & Higgins, 1998)
abstraction” (p.220). Therefore, the inverse is true, the less general a concept is, the higher the level of concreteness.

Self-efficacy theory has four concepts expressed in the form of the main sources of influence: prior (mastery) experience, observations (vicarious experience), social persuasion, and physiology and emotional states (Bandura, 1969, 1977, 1986, 1995, 1997). The terms and definitions of the four influences of a person’s belief concerning their efficacy provided by Bandura (1995) seem to follow the guidelines defining a concept established by Grover and Glazier (1986). We will now define and discuss each of the concepts to evaluate how they measure up to the above definitions and criteria.

Concept 1. **Mastery experience.** Mastery experience is the utmost effective way of creating a strong sense of efficacy because it provides the “most authentic evidence” of whether you have what it takes to succeed (Bandura, 1995, p. 3). “Developing a sense of efficacy through mastery experience is not a matter of adopting ready-made habits. Rather, it involves acquiring the cognitive, behavioral, and self-regulatory tools for creating and executing appropriate courses of action to manage ever-changing life circumstances” (Bandura, 1995, p. 3). The experience of success helps to build a resilient sense of efficacy that will allow a person to combat any setbacks brought on by failures and rebound quickly. “Some difficulties and setbacks in human pursuits serve a useful purpose in teaching that success usually requires sustained effort (Bandura, 1995, p. 3).

Concept 2. **Vicarious experiences.** Going along the same vein as mastery, vicarious experiences are those in which you witness someone similar to yourself
achieve success via “perseverant effort” and thus raises your belief that you too are able to be successful at the same task (Bandura, 1995, p. 3). On the flip side, if you see that same person fail despite putting in tremendous effort, you may not believe as strongly that you will be successful, thus lowering your self-efficacy and motivation to complete the task. The more similar you think the model is to you, the more your personal efficacy is influenced by their respective successes and failures.

Concept 3. Social persuasion. The third concept in which to build a person’s self-efficacy is through social persuasion. Verbal persuasion from another that you possess the necessary skills to master a task will boost your motivation to begin and complete the task in spite of self-doubts (Bandura, 1995). As with the other concepts previously discussed, the influence can be negative and positive. Social persuasion can also undermine personal efficacy more effectively than it can build it (Bandura, 1995). If another convinces you that you do not have the skills necessary to master a task, you are much more likely to lower your self-efficacy related to that task and not even attempt it.

Concept 4. Physiology and emotional states. The last concept used to assess capabilities is physiology and emotional states. Bandura (1995, p. 4-5) states, “The fourth way of altering efficacy beliefs is to enhance physical status, reduce stress and negative emotional proclivities, and correct misinterpretations of bodily states.” People “interpret their stress reactions and tension as signs of vulnerability to poor performance” (Bandura, 1995,
If you are engaging in physical activities and you experience fatigue or aches you judge yourself not capable of completing such activities. In that same way, mood affects self-efficacy. If you are in a good mood, your efficacy is higher than if you are in a bad mood.

2.6.1.2. Propositions. A proposition is “a logically and syntactically consistent statement of a concept which can be restated as a hypothesis for testing” (Shoemaker et al., 2004, p. 38). It provides descriptive information and can be in the form of an if…then… statement. Shoemaker et al. (2004) added that the function of a proposition is to convey the researchers view of how things should be according to the theory that it is based upon. Meleis (1991) state that a proposition connects two or more concepts together and “provide the theory with the powers of description, explanation, or prediction” (p. 220-221).

To find the propositions associated with self-efficacy theory one needs to examine not only the four sources but also the four major processes that according to Bandura (1969, 1977, 1986, 1995, 1997) regulate human functioning based on perceived self-efficacy. As with the sources the processes (cognitive, motivational, affective, and selection) usually occur simultaneously and are not mutually exclusive.

Proposition 1: Perceived self-efficacy “beliefs operate as casual factors in human functioning” (Bandura, 1995, p. 3)

Proposition 2: If a person has a low sense of self-efficacy then…

- they will “shy away from difficult tasks”.
- they will have “low aspirations”.
- they will have “weak commitment to the goals they choose to pursue”.

22
• when faced with difficult tasks they will “dwell on their personal deficiencies...and adverse outcomes rather than concentrate on how to perform successfully”.

• they will “slacken their efforts and give up quickly in the face of difficulties”.

• they “are slow to recover their sense of efficacy following failure or setbacks”.

• “they fall easy victim to stress and depression”. (Bandura, 1995, p. 11)

Proposition 3: If a person has a high sense of self-efficacy then…

• they will “approach difficult tasks as challenges to be mastered rather than as threats to be avoided”.

• they foster “intrinsic interest and deep engrossment in activities”.

• they “set challenging goals and maintain strong commitment to them”.

• “they heighten and sustain their efforts in the face of difficulties”.

• “they quickly recover their sense of efficacy after failures or setbacks”.

• they have an outlook that “produces personal accomplishments, reduces stress, and lowers vulnerability to depression”. (Bandura, 1995, p. 11)

2.6.2. Women in IT

As mentioned earlier women are not enrolling in higher education degree programs, thus perpetuating the cycle of under representation. Consistent with self-efficacy theory, the lack of opportunity for early exploration may also explain why a student later might not want to consider an academic field. If a young woman is only encouraged to engage in activities and hobbies that
are traditionally considered to be more appropriate for girls, such as art, knitting, and domestic tasks like cooking, and discouraged from pursuits traditionally considered to be more masculine, then the consequence is that she will shy away from what is frowned upon. Young men discouraged from pursuing pursuits traditionally considered more feminine will respond the same way even when talent is present. “As a consequence of differential exposure, experiences, and reinforcements, boys and girls are likely to develop skills, self-efficacy beliefs, positive outcome expectations, and interests in tasks that are defined by their culture as gender appropriate” (Brown & Lent, 2006, p. 207). As Bandura (1995) aptly stated:

The multiple benefits of a resilient sense of personal efficacy do not arise simply from the incantation of capability. Saying something should not be confused with believing it to be so. Simply saying that one is capable is not necessarily self-convincing. Self-efficacy beliefs are the product of a complex process of self-persuasion that relies on cognitive processing of diverse sources of efficacy information conveyed inactively, vicariously, socially, and physiologically. (Bandura, 1986). Once formed, efficacy beliefs contribute importantly to the level and quality of human functioning. (p. 11)

Keeping in mind the effect of having positive experiences in pursuit of an interest in a subject has on the efficaciousness of an individual, it is reasonable to predict that students will be more likely to choose to study further in their field of interest if that field falls within the prescribed cultural and societal norms to which they adhere. With self-efficacy theory, a supportive environment produced by an understanding family and/or social network, increases the likelihood that student will believe they can pursue career paths outside of any preconceptions about the appropriateness of the path for their gender, race, ethnicity, and or culture.
…we maintain that gender and culture-based socialization experiences, which give rise to differential patterns of efficacy beliefs and outcome expectations, add unique variance to understanding the unequal distribution of men and women in different occupations. One implication of this analysis is that many young women and men likely under-utilize their talents and prematurely foreclose viable occupational options because of unsupportive social learning conditions. (Brown & Lent, 2006, p. 207)

In the end, the student who believes that the only hard work will bring them success may not elect to pursue loftier career or educational goals because they think “that it will take too much continued effort to be successful” (Brown & Lent, 2006, p. 212).

2.7. Summary

The literature reveals interesting notions as to the cause of the underrepresentation of women in IT including but not limited to lack of interest in the subject, negative perception of the field, and the campus climate (Ahuja, 2002; Blickenstaff, 2005; Bystydzienski & Bird, 2006; Clewell & Ginorio, 1996; Cohoon & Aspray, 2006b; Croadsdell, McLeod, & Simkin, 2011; Gayles & Ampaw, 2014; Heilbronner, 2013; Herring & Marken, 2008; Margolis et al., 2000; Ogan et al., 2006; Ogan & Robinson, 2008; Renzulli & Reis, 1994; Wang & Degol, 2013; Wasburn & Miller, 2006). The primary way to overcome the low percentages of women in the IT workforce is to provide them the education and experience. If those in higher education are not properly addressing those external and internal issues, then we are fighting a losing battle. The same can be said about increasing the amount of women who hold full-time professorships. More needs to be done to create a sense of welcome and comfort in STEM educational programs as well as amongst faculty for women such as acknowledging the school related struggles of
women (Clewell & Ginorio, 1996) and creating better support networks (Washburn & Miller, 2006).

The lack of participation by women in IT higher educational programs and subsequent industry jobs is not a new issue. Unfortunately, it is not just as simple as promoting the vast array of career options available with a IT degree (Bair & Marcus, 2007; Jacobs, 2005). The research presented suggests that there are a myriad of reasons as to why this phenomenon is still so prevalent and that trying to find a single solution may not be the best option. This study will help fill the gap in the literature by providing a more comprehensive inquiry into which factors motivate women to enroll in IT higher education programs in the United States. This will allow for greater understanding as to why there is minimal participation in IT and other related fields despite decades of initiatives.
CHAPTER 3

METHODS

This chapter presents the methods used for this dissertation study. It begins by presenting the research questions and is followed by an overview the research design, participant selection, data collection methods, and data analysis. The chapter concludes with sections on data management, validity and reliability, and ethical considerations. The survey instrument and interview questions, informed consent forms for the survey and interviews, and documentation of FSU Human Subjects Committee approval are included in appendices.

3.1. Research Questions

1. What factors motivate women to enter the undergraduate IT program?
2. What role does self-efficacy play in the decision of women to enter into an undergraduate IT program?
3. What perceptions do women have about what it means to be an “IT Professional,” and what role does this perception have on their desire to pursue an undergraduate IT degree?

3.2. Research Design

Creswell (2014, p. 4) argued that mixed methods research “provides a more complete understanding of a research problem than either approach alone.” Mixed method research involves collecting and integrating both quantitative and qualitative data. The research design for this study utilized an explanatory sequential mixed method model, collecting quantitative data first, analyzing the results, and then using the results to plan a subsequent qualitative data collection and analysis, illustrated in Figure 3.1 (Creswell, 2014). A survey questionnaire was administered in the first phase, that data analyzed, and then interviews were conducted with a sub-sample to further explain and explore possible factors of motivation. The strength and
benefit of combining these two methods sequentially is that a fuller, richer understanding of the motivation of women to enter into and complete IT education programs is gained that each method on its own might not be able to achieve.

3.3. Survey

The purpose of the survey was to collect basic demographic information (age, year in school, major, etc.) and start to address the research questions about the impact IT courses have on the decision to enter into the IT program.

3.3.2. Population and Sampling

The initial sample was drawn from students enrolled in undergraduate IT/ICT capstone courses at Florida State University: LIS 4708, Perspectives on Information Technology and LIS 4910, Information Technology Project. Students enrolled in the capstone courses must have senior standing and have completed all of the Bachelor of Science in IT/ICT foundation course requirements prior to enrolling. This group was chosen to sample from due to their high level standing within the program, at a point in their academic career where they are fully committed to the major, and are preparing to go into the IT workforce.

3.3.3. Instrument Design

The instrument consists of six demographic questions as well as questions from the Commonwealth Alliance for Information Technology Education (CAITE) event survey and the Career Decision Self-Efficacy Scale-Short Form (CDSE-SF). From the CAITE survey the
twelve-item Information Technology Career Awareness and Interest Survey (ITCAIS) was used. The ITCAIS items dealing with concepts associated with the desire and interest in computers and confidence in having the skills to succeed in and the sense of being able to fit into the IT field. Each item uses a five-point Likert scale with the following labels for response choices: Decreased a Lot (1), Decreased a Little (2), No Change (3), Increased a Little (4), and Increased a Lot (5). The CDSE-SF has twenty-five items which can be used to identify patterns of confidence (lower to higher) as it relates to making academic and career decisions. Each item used a five-point Likert scale with the following labels for response choices: No Confidence at All (1), Very Little Confidence (2), Moderate Confidence (3), Much Confidence (4), and Complete Confidence (5). The new modified combined questionnaire consists of items pertaining to the themes of motivation in addition to demographic information, stress levels associated with their matriculation through the program, support systems available (academic, social, professional, and economic), and self-efficacy which serves to begin answering all three research questions.

3.3.4. Data Collection Procedures

The request for participation in the survey was sent out by the course instructor and extra-credit was offered as an incentive. The capstone courses, LIS 4708 and LIS 4910, each had two sections with a different instructor respectively. Permission was obtained by all of the instructors prior to and the invitation to participate was distributed through their individual course websites. The survey was launched February 10, 2016 and remained active for two weeks. The total completion time for participants to finish the survey was estimated to be no more than 5-10 minutes. A class visit was made toward the end of the collection to recruit additional participants.
3.3.4.1. **Compensation.** As previously mentioned, extra credit was offered by each instructor to entice participation. The amount and type of extra credit was left up to the instructor to decide. The students had the option to choose to receive the extra credit and since it was possible that they could be enrolled in both capstone courses simultaneously but only allowed to take the survey once, they were allowed to choose which class. With the participants’ permission, two weeks after the survey was closed, their name was shared with the selected courses instructor.

3.3.4.2. **Online Hosting.** The survey instrument was web-based with close-ended questions, and was self-administered. A web-based design was selected due to its relative ease of use and administration as well as the low cost. The FSU Qualtrics online survey software was used to host the survey. Participants accessed the survey using a link provided in the survey invitation.

3.3.4.3. **Consent and follow-up.** The first page of the survey included an informed consent statement which participants had to agree to before they could begin answering the survey questions. At the end of the survey participants were asked for their name in order to share with the instructor of their choice to receive extra credit. Their e-mail was requested if they were interested in participating in a follow-up interview for phase two of this study. These e-mail addresses are being kept confidential and are stored on the researchers’ personal computer which is protected by a password known to no one else.

3.3.5. **Data Analysis**

Data gathered from the survey results and interviews were analyzed separately. The survey data was used to inform the themes and topics for follow-up questions during the interviews. Using SPSS basic frequencies were found for on all the data. The two modified
scales, the ITCAIS and the CDSE-SF, were analyzed with additional statistical tests. Prior to, the mean scores for were transformed to create a total score by summing across all items of each scale respectively. For the ITCAIS the total score was transformed into the variable CC_all and for the CDSE-SF into the variable SE_all. A one-sample t test was conducted on each of the new transformed variables to evaluate whether the mean was significantly different from the accepted mean. Additionally, CC_all and SE_all, respectively, combined with the gender variable, was analyzed using an independent sample t test to evaluate if there was a difference in the levels of confidence about academic and career decisions between men and women.

3.4. Interviews

The second phase of this study was semi-structured, in-depth interviews. These interviews serve to expand on the data collected from the surveys in phase one to determine what, if any, factors motivate women to enter into and complete undergraduate IT programs that could not be readily identified with a quantitative survey alone.

3.4.2. Population and Sampling

The interview participants were drawn upon from the survey participants indicating interest on the survey questionnaire. Due to the limited number of people interested in being a part of phase two a convenience sample was utilized. An email was sent to all of the participants who initially indicated their willingness to do an interview after the close of the survey. The email included a link to a Doodle.com page, an online scheduling tool, where they could choose interview times. The researcher sent additional emails to interview participants once a time slot was selected to confirm the choice and give a location and a reminder within 24-hours of the interview. The interviews were conducted over three weeks with initiations being sent out each week to those who had not responded in any way in an attempt to increase the sample size.
3.4.3. Instrument Design

The interviews were semi-structured and the questions designed to serve as prompts only to facilitate responses from the participants as necessary. Selected survey questions were also asked to gain clarification on the participants’ individual responses. Since the purpose of this study is to identify factors that motivate, and motivation can be very subjective, free-form responses were encouraged.

3.4.4. Data Collection Procedures

The interviews will be conducted face-to-face, audio-recorded, and should lasted approximately 30-45 minutes. The researcher used two devices (iPhone and iPad) to digitally capture each interview. Both devices were used simultaneously and one acted as a backup for the other in the case of failure by either device. The recordings helped the researcher make sure that the interviews are conducted in a consistent manner, and that the researcher did not unduly influence the responses and/or reactions of the participants. The researcher transcribed each interview shortly after conducting the interview. Minimal notes were taken during the interviews to allow the interview to flow more conversationally and naturally to put the participants at ease and allow them to feel comfortable sharing.

3.3.4.1. Compensation. Each participant received their choice of either an $10 iTunes or Amazon e-gift card.

3.4.4.2. Location. The interviews were conducted in a private room on FSU’s campus in one of the classroom buildings.

3.4.4.2. Consent and follow-up. Each participant was given an informed consent form to read and sign prior to the beginning of the interview. After initial analysis an emailed was sent out with a link to the transcript for member checking.
3.4.5. Data Analysis

The interviews were transcribed and then uploaded to Dedoose.com, an online application for analyzing qualitative data. Using the Dedoose app, the transcripts of the interviews were analyzed following a six step procedure for analyzing qualitative feedback that includes: organizing the data, reading through to gather meaning, coding the data, creating a set of broad themes based on the coding, creating a narrative passage to represent the themes, and interpreting the meaning of the themes (Mehra, Black, & Lee, 2010). The researcher made an initial sweep through the through the interview transcripts to find meaningful sections of text and labeling those sections. The labeled sections were then used to make narrative profiles of the participants as recommended by Seidman (2013). Also those sections were sorted, relationships were identified between the labels, and grouped into categories. This process was repeated until a master list of coded categories was established. Along with the profiles, an examination of the categories will be used in the development of the discussion of the analysis. Pseudonyms will be used to protect the identities of the participants.

3.5. Data Management

To ensure confidentiality ID numbers will be assigned to each survey participant, which will connect to the interviews. For the interviews pseudonyms will be used in reporting of the data as well as in your notes of the interviews. The doodle poll link only allowed users to see their selection and not others, to also protect the identity of participants. The login and password for the Dedoose.com account is known only to the researcher.

3.6. Validity and Reliability

The items on the survey have pre-tested for validity and reliability in other research studies that they are actually measuring the motivation factors identified in the phase one and not
something else. Prior to the beginning of the study, the researcher conducted, recorded, and reviewed mock interviews to identify quirks, mannerisms, and/or bias in an initial attempt to minimize influencing the participants’ responses. The researcher also engaged the participants in member checking the transcripts, where selected passages of interest were selected. All of the participants responded with their agreement on the accuracy data.

3.7. Ethical Considerations

Since human subjects will be involved in this research study, IRB approval was sought and has approval has been granted. Due to the design of this project, confidentiality is of the highest priority. As there is only one researcher, the data will be collected and analyzed by a minimal number of people. All tapes, equipment, and printed materials will be kept in a secure location while not in use.

3.8. Summary

This chapter has presented the details of the methods used for this dissertation research study. Chapter three began by reiterating the research questions and is followed by a detailed overview of the research design, the data collection methods for both phases (survey and interviews, respectively), and data analysis process. It concludes with sections on data management, validity and reliability, and ethical considerations.
CHAPTER 4

FINDINGS

This chapter presents findings from the analyses of the survey and interview data. This chapter begins with the results of the survey of students in the two capstone courses and concludes with the presentation of the profiles of the participants and major themes from the interviews. Throughout the chapter quotations will be utilized to present the students’ viewpoint in their own voices. All survey participants have been assigned a pseudonym in order to protect their confidentiality.

4.1 Survey

The survey was sent out to the students enrolled in the two capstone courses, which included four sections with a total of 165 students enrolled. During the two weeks the survey was open, 84 surveys were started and 83 were completed (a completion rate of 99%). After the removal of incomplete and duplicate surveys from students attempting to get extra credit in multiple classes, a total of $N = 76$ responses were kept for analysis. While a 46% response rate for the survey is encouraging, the results generated may not be fully representative of the population of undergraduate IT/ICT students at this university and those at other institutions of higher education.

4.1.1. Demographic and Background Characteristics

4.1.1.1. Gender. Table 4.1 shows exactly half of all survey participants reported their gender as female ($n = 38$) and the other half reported their gender as male ($n = 38$).

4.1.1.2. Race/ethnic group. The majority of participants self-identified as White ($n = 49$), 26% self-identified solely from one of the recognized minority categories (Asian, $n = 3$; Hispanic/Latino, $n = 8$; Black/African American, $n = 9$), and the remaining 9% self-identified
from multiple racial/ethnic categories (e.g. American Indian/Alaska Native and Hispanic/Latino or White). Of those who identified in multiple categories, one participant choose not to specify exactly which groups she was a member and instead selected the other option and wrote in “multiracial”. The National Science Foundation (NSF) defines a minority as “a racial or ethnic group that is a small percentage of the U.S. population. Blacks, Hispanics, American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and Asians are minority groups” (NSF, 2015, p. 19). NSF further distinguishes the “three racial or ethnic minority groups ([B]lacks, Hispanics, and American Indians or Alaska Native) whose representation in science and engineering is smaller than their representation in the U.S. population” (NSF, 2015, p. 15) as an underrepresented minority (URM), which as previously noted includes those in Information Technology.

4.1.1.3. Age. Only five participants were over the age of 31. The remaining 93% were in the age ranges of 18-24 ($n = 67$) and 25-30 ($n = 4$).

4.1.1.4. Major. A little more than half of the participants were ICT majors ($n = 39$) while the rest were IT majors ($n = 37$).

Table 4.1. Demographic and Background Characteristics: Survey

<table>
<thead>
<tr>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
<td><strong>Major</strong></td>
</tr>
<tr>
<td>Asian = 1</td>
<td>IT = 11</td>
</tr>
<tr>
<td>Black = 7</td>
<td>ICT = 27</td>
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<tr>
<td>Hispanic = 3</td>
<td>Multiracial = 4</td>
</tr>
<tr>
<td>White = 23</td>
<td></td>
</tr>
</tbody>
</table>

4.1.2. Demographic and Background Relationships

As the main focus of this research study was to investigate the experiences leading up to the decision to and entering an undergraduate IT program the analysis, included comparisons by
gender.

4.1.2.1. One-sample t test. A one-sample t test was conducted on each of the transformed scale responses to evaluate whether the mean value of the variables was significantly different from the accepted mean of 3 (the neutral point) for both genders. The ITCAIS variable name CC_all, the CDSE-SF into the variable SE_all, and the complete list of scale items can be found in Appendix A. As shown on Table 4.2, for CC_all the sample mean of 3.98 ($SD = .59$) was significantly different from 3, $t(75) = 14.52, p < .001$. The 95% confidence interval for the CC_all mean ranged from 3.84 to 4.11. The effect size $d$ of 1.67 indicates a large effect. Similarly, for SE_all the sample mean of 3.98 ($SD = .56$) was significantly different from 3, $t(75) = 15.31, p < .001$. The 95% confidence interval for the CC_all mean ranged from 3.85 to 4.10. The effect size $d$ of 1.76 indicates a large effect.

4.1.2.2. Independent-sample t test. An independent–sample t test was conducted to see if these effects were significantly different across gender with the hypothesis that women will score themselves lower than their male peers due to lower interest in IT and confidence in their skills. The one-sample t tests revealed the survey participants were more positive after attending IT courses in dealing with concepts associated with the desire and interest in computers and confidence in having the skills to succeed in and the sense of being able to fit into the IT field (ITCAIS), as well as having a high confidence levels in their ability to make academic and career decisions (CDSE-SF). The test was significant for the ITCAIS scores $t(74) = -2.11, p = .04$. Female students ($M = 3.84, SD = .56$), on average, scored themselves lower than male students ($M = 4.12, SD = .59$), as seen in Table 4.3. The 95% confidence interval for the difference in means ranged from -.54 to -.02. The eta square index of .98 indicated that the variance was accounted for by the students’ gender.
The test was not significant for the CDSE-SF scores $t(74) = .47, p = .64$. However, male students ($M = 3.95, SD = .57$), on average, scored themselves lower than female students ($M = 4.01, SD = .55$). The 95% confidence interval for the difference in means ranged from -.20 to .32.

**Table 4.2. One-sample t test**

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>$t(75)$</th>
<th>p</th>
<th>d</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC_all</td>
<td>3.98</td>
<td>.59</td>
<td>14.52</td>
<td>&lt; .001</td>
<td>1.67</td>
<td>3.84 to 4.11</td>
</tr>
<tr>
<td>SE_all</td>
<td>3.98</td>
<td>.56</td>
<td>15.31</td>
<td>&lt; .001</td>
<td>1.76</td>
<td>3.85 to 4.10</td>
</tr>
</tbody>
</table>

**Table 4.3. Independent-sample t test**

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>$t(74)$</th>
<th>p</th>
<th>$\eta^2$</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC_all</td>
<td>Females: 3.84</td>
<td>56</td>
<td>-2.11</td>
<td>&lt; .04</td>
<td>.98</td>
<td>-2.65 to -2.13</td>
</tr>
<tr>
<td></td>
<td>Males: 4.12</td>
<td>.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE_all</td>
<td>Females: 3.95</td>
<td>.57</td>
<td>.47</td>
<td>&lt; .64</td>
<td>.98</td>
<td>.27 to .79</td>
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<tr>
<td></td>
<td>Males: 4.01</td>
<td>.55</td>
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**4.2. Interviews**

Invitations to participate in interviews were sent out via email to all those who indicated on the survey that they were willing to take part. Three additional sets of emails were sent out at a rate of once per week to those who had not previously responded. In the end, nine people ($N = 9$) agreed to be interviewed. The interviews lasted between 30-45 minutes and were all conducted over a three-week span.

**4.2.1. Demographic and Background Characteristics**

**4.2.1.1. Gender.** A little over half of the interview participants were women ($n = 5$) and the other 45% were men ($n = 4$), shown in Table 4.4.
4.2.1.2. **Race/ethnic group.** Of the interview participants, 55% solely self-identified as a single racial/ethnic group (White, $n = 2 = 22\%$; Black/African American, $n = 2 = 22\%$; Hispanic/Latino, $n = 1 = 11\%$) while the remaining 45% self-identified as multiracial ($n = 4$).

4.2.1.3. **Age.** The age ranges of the participants were as follows: 18-24 ($n = 7$), 25-30 ($n = 1$), and 31 or over ($n = 1$).

4.2.1.4. **Major.** A little more than half of the participants were IT majors ($n = 5$), while the rest were ICT majors ($n = 4$).

4.2.1.5. **Personas.** In order to further protect the identity of the participants their individual characteristics were grouped together into gender personas that include common traits discovered from the interviews rather than specific demographic information. While these personas do not fully encompass all of the individual interviewees, they are meant to best represent them as a part of the greater population as one type of student who choose to be IT/ICT majors and are shown in Table 4.5.

4.2.2. **Profiles**

Seidman (2013) describes the value of presenting findings in the form of a profile as “[i]t allows us to present the participant in context, to clarify his or her intentions, and to convey a sense of process and time, all central components of qualitative analysis” (p. 122). In order to fully tell the story of the participants using their own voices for this dissertation research study, profiles were created. The researcher chose not to combine the individual responses into the
personas presented in Table 4.5 because that would really limit the story told and, as Seidman
(2013) says, not truly reflect the “person’s consciousness” (p. 122). These profiles or vignettes
were crafted from the labeled sections of the transcribed interviews. Brackets were used to
delineate any text that was added by the researcher for clarification, transitions, and/or to conceal
identifying information. Omitted material is represented by the use of ellipses.

<table>
<thead>
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<th>Table 4.5. Interview Persona Characteristics</th>
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<tr>
<td><strong>Men</strong></td>
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<tr>
<td>• IT Major</td>
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<tr>
<td>• Very confident in technical skills</td>
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<td>• Feels prepared due to growing up using technology</td>
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<tr>
<td>• Focused on achieving work/life balance</td>
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<td>• Enjoys working with technology</td>
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<td>• Enjoys working with technology</td>
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4.2.2.1. **Bryan.** As a millennial, I can say that having an upbringing that started with the
technology and the creation of the internet and everything like that, I kind of grew up along that
path and learned along with it, and so where, I think, me and my generation are shifting along,
you know, IT is relatively new, and so we’re kind of building on top of that. And so, I guess for
the fit for me, I wouldn’t say it’s perfect, just because IT is an ever-changing environment and
everything’s getting newer and things … [but it’s close].

When you’re in college, everything’s so undecided. My experience being in the
profession, I talked to people, and I also talked to teachers who…you know, older high school
teachers in the IB program, who … [t]heir jobs are, half the time, not even related to their
degrees. So, there’s that just to think about where it’s like, yeah, you can get a degree, and sure,
you can follow that path, but likely story is that you’ll get that degree and possibly hop somewhere else. Your life decision isn’t set in stone after four years.

Two things that I like about my major … I do like the introductory aspect of it, because everybody’s not the same. Everybody’s not, you know, super hardcore programmer … Another thing that I kind of like is how you guys split up IT and ICT, because there are people out there who want to mess with information and technology, and it’s important to notice that that’s not just computers. It’s also people. So, to take two huge things, technology and people, and to say, “Let’s make it one degree.” No, that’s not going to work out. You can have the IT, which is kind of like the intermediary between the comp-sci degree and the ICT, but I really like how they segmented that.

Mentors are probably some of the biggest influences on people’s lives. I mean, I don’t know if you watch a couple of shows. There’s one really good USA show called Suits, and that’s really big on mentors and basically you get shoved into a crazy environment where you can’t operate without help, so I think mentors are important … [One of my professors] really showed us that IT is more than just computers. So, that was a cool thing. That was probably the biggest thing.

[T]he class that I’m in now … has a butt-load of content. There’s a lot of content just to take in and remember. It’s a bunch of big reports. You know, like three, four, five pages. Sometimes even eight page reports. I think what really got me with that class was it was more of a real world kind of setting, where they give you these expectations but there’s a hidden block of, “This is what you really should be doing,” kind of thing. And so, I feel like that connects with working in the profession workplace, just because somebody might give you this generic list of
things, and normally you’d have to really do a good job at it and look past just the generic instructions, and that’s what this class has been.

My ability is equal [to my peers] ... I don't want to be cliché and say [my] "work ethic" [sets me apart], but … it's all down to just you. Everybody's capable. Everybody can learn. IT doesn't just magically pop out of nowhere. It's a skill that people created. People are like…I can use this technology and I can combine it with information. It didn't just appear. It came somewhere. It came from somewhere. It came from someone's mind. It's not like it's this unreachable thing. So, there's that and then … So, when you pair that with just a work ethic where, it's like, let's get this work done. I need to think about my future. When you're more future-oriented, then it helps out.

With the awesome parents that I have, they have shown me to be ambitious and also forward-looking…When I was thinking about changing my major to IT, my mom was like, "Hey, check out this IT thing. You want to try this out?" And I was like, "Actually, that kind of works because all of the prereqs that I've done [for my previous major]--before dropping out of that--are already taken care of, so I could just hop on this train, hop on the next one, and then continue on." So, my mom threw that out there, and so along the line of thinking IT -- what's the top? That's the next thinking for me. And the next... The top is either CTO or CIO, and so I looked at those positions and I'm like, okay, that's definitely something to work for. People are making big money out there and a lot of stuff like that. And I was supposed to do an internship … last summer, and that... I mean, long story short, it fell apart due to some other things that were totally out of my control. I did get to have a conversation, though, when I was out there with the CIO who was there. And, you know, the typical gray hair, paranoia. He's got so much weight on his shoulders, and so for me to have that...way too much responsibility, it's become
less important to me to make it all the way up to the top just because when you do get there, your work is your life. And you know the saying "you work to live, you don't live to work," whereas... I don't know. Whatever floats your boat. Some people do work...live to work. They're workaholics and things like that and that fits that kind of person. But for me, I want to be able to have a life and also work something...work at a job where I feel fulfilled.

4.2.2.2. **Logan.** Well, I felt like a fish out of water in [my previous major], in a lot of ways. Mainly, I didn’t have a direction, and it felt like a lot of the kids in [my previous major] were going [a certain direction], and none of that really appealed to me. I didn’t have many friends before I got my AA, really. When I switched to IT, it felt like everyone was on the same level I was. I formed study groups with like-minded peers and I felt like a lot more accustomed to my environment. I’ve always been very short-term goal-oriented. It’s hard for me to picture the long-term. I definitely feel a lot more comfortable after taking some of the upper level courses in entering the career field and studying career goals and things like that.

I like the networking. I’m making all sorts of connections to professors, to classmates, and there’s a lot of opportunity for me to network professionally with companies, important people. So, that’s one of them. The other thing I like is the specialization, the way we can choose to specialize in design or information management, health informatics. There’s different paths for us to choose, and we don’t have to stick to any of them, really. We can pick and choose what we would like out of our bachelor’s.

I feel like I’ve kind of kept up to date on technology and I’ve always been pretty tech-savvy, and going into college I felt like I hit the ground running, but I was ready to start learning more about what I was learning about, as opposed to [my previous major], things like that. I was a lot better prepared to jump into it … We come from the same generation of growing up with
the internet, growing up on computers. Everybody pretty much has that baseline understanding of troubleshooting and installing. Just the basics, really. Some people had really done a lot with technology before even entering the college. I mean, some were way more prepared, but everyone was pretty much...they had the basics down...I’m very comfortable. I like what I’m studying. It challenges me, and I feel like it brings out a lot of organization in my life. I’m a lot more focused with this major than I was in one other … It probably would have behooved me to put myself out there a little more, make more connections, but I kind of made my own bed. People made themselves available to be mentors. I just guess I never stepped out of my way to make that happen.

I took an intro to C++ course before I had gotten accepted into the college, and that almost threw me off completely. It was more computer science, obviously, than it was information technology, but it totally shifted my view of the field, because you see all this demand for programming within … And it’s hard to separate that from just general IT. So, I guess that really changed my view, just that class in general … Well, I failed it pretty miserably, and it almost dissuaded me from continuing on that path, but it just gave me a little bit more of an insight as to what the job market had for graduating students.

I wouldn’t say that there is any incident that outright shifted my view of the field, but there have been people I’ve met that have done interesting things that just kind of shaped my view a little bit more clearly, I guess. For instance, [one of my professors] … is all about setting up the network infrastructure. That’s how he has made his career, and I just never really pictured IT doing that, like making a career just setting up the wires for a building. But, I mean, that just really rounded out my view of, like, you know, you can do this. I met a man who built a program for karaoke and he just automated the process, sold the software, and had passive income just
because he had already built this thing that people would subscribe to and use. There’s just so much you can do. I think that’s really what being in this program has showed me.

Security really challenged me, but it is a very necessary course to include within the college. It's important that I took it and kind of saw what it was, but it was pretty difficult … Security is the backbone of so many things. You don't really think to invest in security until an attack happens or something happens where information is compromised. And there's a huge demand for security out there and there's a lot of money in it and I'm glad that this college gives me the opportunity to see a little bit what I can do in that field, but it is extremely challenging, at least to me … I mean, all of [my courses] required me to think critically and to think a little bit more outside the box, but … I don't know. The workloads were pretty similar and I knew what to expect for the most part.

I'm a textbook … what's the word … procrastinator. I just procrastinate horribly, but I don't feel I'm at a disadvantage or anything. I feel that the workload that is asked of me is very reasonable and necessary … I feel like there's a lot more Greek life in the [my previous major]. Yeah. I mean, a lot less focus … [and] there's a lot less talking in class over the teacher and there's a lot less just being disruptive or skipping the class. I tend to see a lot more people showing up to class in this program. A lot more people are very serious about their education. And it is a great environment for me to jump into because I kind of went from slacking to getting on my game, you know. But, I mean, you got your slackers everywhere, but there just seems to be a better sense of focus and a better sense of students helping each other out in CCI.

I was just going down the list of majors offered and flipping through. Nothing really jumped out at me until I saw information technology. And I've always been figuring out technology, figuring out how it works, just trying out the new stuff, and just general interest, and
that inspired me to kind of push in the IT direction and it was a good decision because, I don't know, put myself back on track. I'm doing a lot better … I feel like IT is the perfect major for me on campus. I'm glad I've stuck with it and it really gave me a more positive view of what I was doing after school as well. I feel like there's a lot of preparation for that.

4.2.2.3. Juan. [I really enjoyed the] hands-on experience [of this program] … as well as the actual professors who taught. I am really close with a lot of my professors, whether it be playing golf with one or seeing one out all the time … So, I never got to experience that in my other classes in my other school. So, that's really cool. I feel like it's between the student and faculty relationships. You know, you really feel like they're there for you and that they're not just doing their research and are just kind of putting you off to the side.

I didn't really know a lot of programming. I mean, I was always good with technology and computers and the basic components of them, but as far as the actual hands-on knowledge, I wouldn't say that I really was. However, it was incredibly easier than my [previous major], mainly because [my previous university] is one of the top schools in the country for that major. So, I went from home to [my previous university], and then [my previous university] to FSU. So, that was kind of different. You know, I came up here. I didn't really know anyone, didn't really know much about the major. But I was just like, I'm really good at computers. Why not do something with computers? So, it was interesting that I went with IT over computer science, but it's really good that I did, because computer science is very programming, which I would have hated, and IT is more of the ethics behind it all. So, it's just... I don't know. I was very, very comfortable with it all and I think the professors did a really good job.

I feel like what they're trying to do is just to give you a wide scope of IT in its applicable fields, and not necessarily a bunch of in-depth knowledge about it, and you could kind of learn
the in-depth knowledge by the electives that you took, is kind of the way I came out feeling. So, had I been an uneducated student who, you know, had came here for my first year and worked my way through, I don't know if I would have taken the electives that I did, and I don't know if I would have been graduating right now with as much knowledge or actual value that I put on myself. Because, you know, when you're first in college, you don't know that you're supposed to do these certain classes this semester, this semester, this semester. So, I don't know. I just feel like, you know, people have a tendency to get lost in the major if they don't know what they want to do.

I've had a really hard time this semester balancing, because initially I was balancing a job, interviews, and school, because I was doing about four interviews a week, maybe a couple more, plus emails, plus the schoolwork, plus a job. So, I was missing due dates for assignments and I wasn't doing well, particularly in my management network class, and my capstone class, which is the perspectives in IT. And I mean, I'm an A, B student, so the fact that I would have a low C or D in these classes, I was like, okay, well, this is scary … So, I went to my teachers and I was like, "Hey, look." I was like, you know, "I'm totally not trying to play the sympathy card here. I'm just saying, I've had all this going on. I have proof that I've had all this going on. Let's be real here. This is more than a typical person would allow for. Is there any way that you guys can help me out with, you know … I can just submit my assignments?" And I was just like, "You know what? I don't even need points for them. I'll just submit them so it shows that I did them, and then if it gets down to the wire and I'm just a little points under, I would appreciate it if you could take that into consideration." So, really, not even begging them to re-grade my assignments, just saying, you know, "I'll do the work. That's fine. And if it just comes down to it, don't fail me." So, two times I did that this semester, two different classes. Both of those classes
now I have an A in, because I did all the work, turned it in. So, that would be an example of, you know, a good time to talk to the professors. I know there would have been a time two or three years ago when I wouldn't have done that, and I wouldn't be graduating. So, definitely knowledge comes with experience.

Well, I kind of always thought that [the IT field] was kind of like … had a little bit of a nerdier kind of cult following because normally it is. But, you know, it doesn't bother me. And then I guess kind of when I've been going out, doing these interviews, I have seen a collective mix of kind of nerdy, not so nerdy. So, it kind of changed that kind of bias that I had towards it. I guess that was probably the biggest change that I saw.

I would say that because I'm a little bit older and because I've done harder-level courses, I would say that it's relatively very easy. Just have a basic plan and get your stuff done. I was doing it with working 30 hours a week while doing classes while on a scholarship because, you know... I've seen other people, like I said earlier, a couple peers that are a little bit on the younger side that ask a million questions and don't take any time to really think about it. It's kind of like if they were to go to the grocery store, the first person they'd find they'd say, "Hey, where's your cereal at?" instead of looking up to see where it is. So, that's something that I've really noticed. And when I say that, I mean every single class, five or ten different questions on just how to do a simple … We're doing a hands-on lab and every lab there's a slew of questions coming. And very argumentative with the teacher as far as his grade and everything. So, I would say that's probably a big difference.

4.2.2.4. Sebastian. I'm a transfer. I got my associate's degree…then I came up here in the fall of 2013. I started majoring in [another STEM field]. I realized [it] wasn't for me after the first two semesters. They want you to have a lot of background information on the area, so I felt
as though I didn't fit in quite well in that major, which is why I switched over to IT, because I love computers, and I also love working with people. So, I think that this major is definitely for me, and it was a natural fit, I think, because not only am I working with technology, but I'm working with people as well. So, I think, of course, taking these classes, it re-emphasized the importance of me being in this major and how huge of an impact I can make once I get my degree and start my career. [W]hen you hear IT and the typical worker and the position, you think first, male, white, middle-age. You know, you don't think of young black male. So, I think I can definitely bring some diversity to the career field, and hopefully some insight as well.

I'm really in recovery mode right now, and it's hard. It's easy for your GPA to drop, but it's so much harder to make up to the point where you want it to be, so that's where I am right now, and my instructor, she told me, she said, "Even though your GPA isn't where you want it to be, highlight some other areas that you've been doing as related to leisure activities, leisure roles, or community service." … You know, just trying to put myself out there, let people know that, hey, my GPA isn't the best, but I am trying to be seen by different company … I am better now than what I used to be, but my confidence level has definitely increased over the past couple of years … [W]hen I was in [another STEM field], I just felt as though all hope was just lost, you know, and I couldn't grasp the concepts of the courses in a timely manner. I mean, a little longer, if I had more time, then of course, you know. But I was still used to it, and I think a lot of college students have this trouble trying to adapt to the college life, because, you know, all throughout public school years, we had a whole year with just one subject. And then, of course, middle school, high school, we had six classes, but it was just the entire year. But now, everything is really condensed now, especially with subjects such as intricate and sophisticated as computer science. So, it really wasn't for me and I knew it. I kind of wish I would have just entered into IT.
I would have been better off, no doubt. But all I can do is just, you know, go forth from there and just hope for the best, basically. But I think my confidence level has been influenced by my success here in the IT major, most definitely.

Two things [I like about this program] … [f]irst is the people. The people. I feel as though students and the faculty and staff and the IT majors is more close-knit, versus [the other STEM field where] … my classes were huge. Like, 300-plus students versus maybe 25 to 30 or 40, maybe 50 at the most, and IT. And I liked that, too, because you can have a one-on-one with your instructor. I feel as though this major is more career-oriented, because we work more so on résumés and, you know, trying to get a website up. With [my previous major], it was all about coding, coding, coding, computer this, computer that. But I really feel as though I was missing the soft skills that I really need to enhance. So, of course, you know, IT, you know, we have a little bit of hard skills as well as soft skills. It's first with the people and the skills, or I guess the lessons in the major

I really do [feel adequately prepared], because I feel as though if I was able to, I guess, make it through one semester in computer science, IT should be a breeze, and it has been a breeze for me. I've been making As and Bs like, oh my gosh, you know. And when I was at my community college, I think my first couple of semesters I was making straight As, and I think I failed my first course at my community college, simply because I was taking six courses, which is too much for me. But when I got to Florida State in computer science, my GPA, it plummeted, and my grades changed from As to Bs to Ds to Cs. The semester before I had decided to switch, I got an F in one of my courses, and I said, "This isn't for me. This isn't for me." So, I made the switch, and I'm glad. You know, I met great people, great students, great instructors, and everyone, they really want what's best for you in the long run. They want you to get a job. They
want you to succeed. They want you to be able to network with different companies and being able to, you know, put your foot in the door. They want you to be involved and take on these leadership positions and roles, and I think what sets people in our leadership apart from everyone else is because they're not afraid to just get out there. You know, you never know unless you try. And I think a lot of students are afraid to take that risk. I guess because they feel as though it may be too much for them or maybe too much of a burden, but they have to realize that there's going to come a point in your life where you're going to have to take that initiative, and I'm glad that I'm a natural leader, so I mean, “It's nothing for me to say, hey, this is what we’re going to do. This is how we’re going to implement it. This is how we’re going to succeed in the long run.” So, I think that’s what’s really helped me to become successful in this major.

Going back to [my previous major], you know, a lot of students don’t know what they want when they enter college. A lot of them enter an exploratory major, I guess you could say, trying to find their way and whatnot. But my thing is, I already knew I wanted to do something with computers. First of all, I could get the skills, the hard skills I wanted, and like I said, I’m glad I made the switch from computer science to IT, because it also helped me to enhance the soft skills that I also need in order to become successful and in a career, as it relates to communication, verbal or written, being able to network with different people from different career areas, being able to lead different projects, being able to work with people with different personalities and whatnot, and I felt as though I didn’t get that from computer science. So, that’s why I guess I feel as though I’m more successful than other students, because I already knew what I wanted, I already knew how to achieve it, I set goals for myself, and I’m working towards those goals.
For my initial perspective of IT before entering the major is... This is going to be easier than computer science. It’s going to be easier than computer science. I guess I didn’t know it was going to be as close-knit as it is, you know. I was expecting the classes to be just as big as computer science, but I quickly realized the change in the classroom sizes, compared to computer science. And it really opened my eyes. You know, say, these people are really here to help us and I feel as though I’ve met more friends in IT versus computer science. And I’ve had great relationships with the people who are in IT, and I feel as though I can become more successful as well, too. But basically, the classroom size is what kind of changed my perspective.

You know, I feel as though, as it relates to [changing your perspective of IT professionals], I’m more, I guess, behind the scenes of what’s going on in the IT profession, I guess you could say, as it relates to discrimination based upon how you look, your race, your gender, your sexual orientation, that sort of thing. I’m seeing the work that’s being done to change that. So, I mean, I guess that is a way in which my perspective has changed, knowing that people are actually doing something to change the way things are, so I guess that’s how it is in a nutshell.

Sometimes I feel as though I'm proactive, but other times I feel as though I'm not active enough. And I think this is what a lot of college students … We procrastinate. We procrastinate. You know, it happens. So, I think a major factor in that is time management, managing my time just right. With me, I am a busybody. If I'm not doing anything relating to work, I feel as though I'm missing out. I think that's why I really can't relax as much as I want to, because my work is never done or it seems to be. But I guess it's what separates me from other students. There was actually a time where the instructor, she I guess gave an instant poll of the class. She said, "Hey, y'all. Who here... If you had to choose, do you just relax all day, just watch TV on the couch?"
Mostly everyone raised their hand. And so she was just like, "Okay. On the other, who always has to be doing something, has to stay busy?" I think it was me and one other student raised our hands. She was like, "I guess what separates you guys from the majority, you guys always have to have something to do." And, I mean, I can admit I am a busybody, but I guess it's what separates me from everyone else.

4.2.2.5. Olivia. I just feel like the program in itself is actually really good, just the classes they offer and how they help you prepare for the field … Honestly, I’d never had any experience in [IT], and I didn’t honestly think I would get into tech stuff at all until I picked that as my major and I was like, okay, we’ll see how this goes. And then I just started liking it.

I don’t feel like I was prepared at all, honestly. I feel like a lot of people, at least in high school, they had some knowledge of what was going on. Maybe with HTML and CSS, but we never had classes like that, so I didn’t know about it … I think I would have preferred if my high school offered some kind of coding camp or something to that extent. Maybe classes for coding or anything that would give us experience in that field. But we really didn’t have that. For now--I’m putting [my comfort level in this program] on a scale of one to ten--maybe seven-ish, just because I feel like I still have a lot to learn because I still have a year left of school, and between that time, probably, I can figure out a lot more things and have more practice with the things I’m learning.

I think what made me like [this major] officially was a Java class that we took. At first, when I first took the class, I was so frustrated. I hated it. I did not like this. That’s when I was kind of doubting the major. I was like, if this is going to be the rest of it, I don’t know how well I’m going to do. But then I guess I started getting the hang of things and I started to like it and actually enjoy how challenging it was, and so that’s really what made me stay. I think I liked the
challenge of it, so I just kind of stuck with it, and that was really what made me change completely into liking tech stuff and all that kind.

I think knowing what my professors have done in the past has helped me think about other professions in IT. So, one of my professors of museum, he worked with the museum databases and stuff like that, and I was like, oh, cool. I didn’t know they could do that. He worked for military stuff, and I was like, oh, that’s another whole thing I didn’t know about. So, when professors talk about their prior experiences before they came to teach here, I think that’s really what changed my perspective on IT, and it made me branch out into finding out what else there is to offer … Well, at first I thought this was more language based, so more of Java, more JavaScript, more Python, more C+, all of those languages. I thought it was going to be really heavy programming. But once I started seeing the major and I saw that there was also databases that you could work with and HTML and CSS and design and all that kind of stuff, so I feel like that’s just how my perception has changed. I’ve seen that there isn’t just programming inside IT, that there’s a lot more.

When I took web apps and all that kind of...all those other courses, I saw that you can work with applications and there’s more to it than just programming. I think the courses really just help you and the professors in those courses, because they really give you insight into what else there is in that profession and stuff like that. I think if I would have had prior experience with it, or at least touched on the basics of that, I would have understood the class a lot more. I just honestly wish in high school I would have had some kind of path that I could have taken that would have been more technology-based, but we didn’t have that.

I just … don’t give up easily, and if I feel challenged, I think that encourages me a lot more to just keep pushing through it, because I know that at one point I’m going to hit the point
where I’m just like, that’s it, that’s how I know that I’ve finished it. And I feel like I’m just really resilient that way. I don’t let myself give up and then just quit. Maybe I’ll give up, but I’ll be like, okay, I have to do it again and try and try and try. So, I feel like that really...that ability to do that puts me above other people, because … Not above. I don’t want to say it like that. That sounds kind of snobby. I just don’t let myself quit, because I know that at some point, I’m going to overcome that obstacle that I hate, because … I don’t know. I’m just that kind of person.

I don't even have family members in IT ... I didn't know anyone...When I first got into college, I wanted to hit more of the media track, so I wanted to be more of a journalist/reporter thing. But then I realized that we didn't really have a major for that, so I picked ICT for that reason. I was like, if anything, I'll just get something media related later. And then I had the opportunity to apply for the media school, and then I just didn't do it because I ended up liking this major ... I think I just had a liking for technology, and that's what made me stay now. But I didn't do anything prior that would make me enjoy being here already, you know.

I just think the courses they offer are really unique, each of them, and they really help you see the different sides of IT. And I know a lot of people, usually what they say, "Oh, what do you do with that? Is that mostly just working with computers?" And I'm like, "Well, not really. There's a lot more that you can do with that." Yeah, you work with computers, but you also work with data behind it and things like that. And I feel like that's probably the most interesting thing I've learned here so far.

You usually see a lot more men in the classes than women, but it's kind of funny because I'm doing [classes in my other major and] I'm doing ICT. In ICT you'll see a lot more women than you do men and here I see a lot more men than women. So, it's kind of a weird little thing I've noticed, but that's just it. Usually, I would say it's more like 80% men and then 20% women
in the classes for ICT…I'm trying to think of maybe in group work if I can see any differences, but most of the time the guys that are in the [other] field, … they're very driven and they know that they kind of need to work at it because there's so many women in that major. But here, it's like … I usually notice more women trying to push through and trying to show people that they can do the work that the men are doing … Women work a lot harder in ICT than they do in [the other major]. That's just how I see it … I do feel like I need to work harder because it's a lot harder to get a job in the IT profession as a woman, and I know that just because of how many articles we've read in our courses already. I know that it's difficult. So, yeah, I do feel like I need to work hard to stay and, I guess, show that I can do what a man does … I think the courses I've taken and with our professors' help, I think we have … at least I have … I feel like I do match up with the guys, or at least … I do feel like I'm level with everybody here.

4.2.2.6. Mindy. Well, I was kind a nerdy kid, so I feel like I was always involved in IT web design kind of things. I like computers. But when I got to college and took intense programming classes, I realized that wasn’t for me. I don’t want to do the back end of things or coding in general. I want to do marketing and things like that, social media things, and media in general. So, taking those classes, taking certain classes took me further away from IT. Certain classes took me closer to communication in ICT.

People come to college and change their major to something else and then go out and do something entirely different, unrelated to what they were going to study. And so, I’m not sure just where I’m going to end up, too. I want to go this way, but I’m not sure if I’m going to go that way. Like, you never know how life ends up, so that’s why it’s kind of uncertain. I’m not positive that I’ll be in this field, because you never know what’s going to happen to the economy
and things like that. So, I hope that people always need marketing and people always need IT, but I’m never confident 100% that they’re going to need us.

[However, I like that ICT is] broad … That’s why I didn’t want to do PR, because I thought it was too specific. ICT is so broad. And that I don’t have to do all technical work. It’s kind of a mix. I hate technical work … [l]ike, coding, database management … I can do [programming]. I just was a nerdy kid. I just don’t like to do it, and I realize that’s more and more what the benefits of this [major] is.

I feel like I had the technical skills. I just needed to brush up on them. And I feel like this major, I had something to work with. I had a baseline, and I feel like that would benefit me in a lot of the classes I took, because those students become kind of lost and I just had a foundation, so I feel like I was adequately prepared … I didn’t go outside to play sports. I stayed inside to code and figure out how to do PHP and make a blog and HTML and CSS is what I did in middle school, high school … I feel like I was way more prepared because I had a set of foundation of a new … high technical skills I wanted to build on, whereas some students or most students didn’t have anything to work with. They were just kind of starting from level one. I feel like that helped me a lot to pass, do better, learn how to hone my craft rather than just start from scratch.

[My technical skills are] self-taught … I don’t know. I don’t feel like I picked it up from anywhere. My uncle, my dad, they’re programmers, but I don’t know if they love their jobs. I just thought it was cool, so I was like, I want to start a blog. I know how to start a blog. And I like pretty things, so I want to make things pretty, aesthetically pleasing, so I just want to know how to do better. I feel like there was … My mom was always like, you know, “Get off the computer. Why are you still there?” I’m like, “Mom, it was important. You’ve got to make your code valid.” I was a nerdy kid.
So my uncle is a programmer, so I feel like he’s always under a lot of stress, so when I took the programming class I kind of saw, oh, that’s why he’s so stressed. So, I don’t feel like I didn’t know of that, that was surprising or anything. So, I feel like I was prepared for that … I thought that IT was just cut and dried, like just, you know, programming and communication … not communication programming and coding and things like that, but the field is so large and there’s so much you can do with it besides just sitting behind a desk all day and fixing things, and so when I discovered that, that there was different facets of IT, you know, like communication brace and some marketing, social media, that was the perfect marriage for me. Like, technical skills, I can be people-y. I’m people-y anyways so I feel like that was a big surprise. That’s why I feel I found my calling.

My classes have changed and I feel like my peer communication classes--PR class and advertising class--those have changed my mind about going in that direction. I don't want to go [into] PR anymore, I don't want to go advertising because I think that just those disciplines by themselves are very one-sided. You can't go anywhere with that. But I feel like in the field of communication--not communication IT--it's just so big. You can pretty much go anywhere. There's so much you can do with IT. You can go into programming if you want to and network security kind of things. You can go the other way. You can do marketing in that kind of way, mixed media things. That's what I wanted to do.

4.2.2.7. Jessica. I feel like, after taking the classes, I got a better understanding of IT and IT disciplines, so I feel like I had more of a sense of belonging, especially with the subject area and with my peers. I felt like I knew more about the topic and can pretty much feel like a better sense of belonging, within the major, within the department, and within my fellow students… I don't have so much experience with IT jobs … For me, I like more hands-on
experience, but as far as technical experience, I have a basic understanding of it, and I would like to learn more about the technical aspects, because with IT, they look for both technical and non-technical, and I feel like with that, I feel like I need more technical experience, so I don't have such a strong sense of belonging with IT in the technical aspect.

I had a bit of a break period before I started at Florida State, so I just took a couple of months deciding what I want to do, what I want to pursue for my bachelor’s, and I saw with mathematics, for me, it was very limited and I didn't want to pursue math at a higher degree. But I was still interested in the concepts, like problem solving, you know, and just finding a solution to problems. So, with that mindset, I saw the ICT major. And I generally love technology. I've always loved technology and innovation, so I saw it kind of fit with my mindset, with the problem solving, and I decided to try it out, really. It was really trial and error at that point. And, you know, I was a little hesitant at first, but after coming to Florida State and taking my first couple of classes, it was a challenge at first, because it was a completely new way of thinking. As far as mathematics, you kind of have everything laid out for you. The formulas are put in front of you and you just kind of use them and solve the problems like that. With IT and a lot of the courses I've taken, you have to come up with a solution, and there could be several solutions, so it really fascinated me. It was still frustrating at first, but I was really fascinated with what I can do with IT and with the courses I was taking, and I saw there was a bunch of opportunities, as far as career choices, too.

I did consider computer science. I had a couple of people within the major, and I've heard with computer science, it's just very … It's very, I guess, more of problem solving, more technical. It requires a certain level of technical skills. And since I was not really confident taking those technical courses yet--I just wanted to get the foundation and possibly maybe take
the upper level courses--I was actually considering doing a minor in computer science, but then at some point I was so overwhelmed with the courses I was already taking, so I kind of just wanted to stick within my disciplinary, with an ICT, and maybe just do a couple of computer science courses so I can just get the feel of it. And I was talking to a couple of peers, and a couple of them had switched out the major, and they said they went from CS to IT because they felt like, also, IT is more like you not only work with technology, you work with people, and computer science is kind of behind the scenes. And I love talking to people. I love working with people. I just love that integration with people and technology. I feel like IT bridges the two together. So, that's why I stayed with it in my major.

The people [are what I like about this major]. Definitely the people. People can be like my classmates, students, and just people that I get to work with in my job and people that I get to help with any IT problems and stuff, because usually my family or people that I know, they would always come to me and ask me questions about troubleshooting or whatever, because they're like, "Oh, you're the IT person. I need help with this and that," and just that interaction with people, it just... I mean, I love it. And for my future career/job, I still want that interaction with people. I guess the second part about my major is just the technology itself, what you could learn. It's just like an ever-so-changing field, and I don't want to be stuck doing the same thing each and every day. I want to learn new things and stuff. I want to jump around departments and get a feel of everything. So, that's another thing I like about the major.

I felt like a lot of people that I was in courses with and classes with knew a lot more about IT and about the different disciplines, and also, they've had more experience working IT jobs. They've also been longer within the program, or just had more experience with it. So, I felt like I was not really prepared, and the people that I was in courses with, in classes with, people I
would talk to, were very knowledgeable about the subject matter. It did make me feel a little bit down, because I am very hard on myself, but you learn from those people, too. You learn from people that know more than you, and you go and ask them questions and just kind of, you know, get more insight about the topic, too. So, I also felt like it was a good opportunity to learn more, as well.

Right now, I feel a lot more comfortable. In the beginning, it was hard. It was tough, and I wasn't as comfortable as I am now … In the community college, I really didn't know what I wanted to do, in terms of career and just further education. I had a one-track mind. Just graduate, get my degree, and just... I would be at this crossroad where it's like, I don't know where to go from there. So, it was definitely a different feeling. I felt like I wasn't as mentally prepared as I am now, and I felt like community college did prepare me, in a way. It provided that basic foundation that got my basic courses out of the way, but in terms of further development, I wasn't prepared at the time. Now I feel like being here at Florida State, taking the courses, getting involved, doing projects on my own and teaching myself about what I want to learn and where my interests lie, I feel a lot more prepared and I feel like I know the direction I want to go in, as well. In terms of just, like, career and personal development, I feel a lot more mentally prepared.

So, I ended up dropping [a] course, and I took probably two, three months figuring out if this is what I want to do, because I don't want to be stressed out in a job environment. I mean, there will be days where it's really stressful, but I also want to enjoy what I'm doing, too. I know I'm very passionate about technology and technology is just something I've always been interested in. When it comes to the more technical aspects, at the time I was very … I was in a panic because I didn't really know much of what was going on and much of what the course
required of me, so I ended up withdrawing from the course and just kind of pursuing other interests still within IT, not so much with what the course was doing, because I felt like I wasn't really … one, I wasn't really motivated to do that subject, and two, it was at a point where a lot was going on, so I was just too overwhelmed to continue with that course, and at that point I was really considering changing my major. I went to a couple of people … I went to a couple of my friends, and they were just like, "Oh, but if you're really passionate about it, everything that anyone starts will be hard at first." You know, so if you're really passionate about it, you will get it. You'll learn it, and these things take time as well, too, so I just need a bit of time to figure out whether I want to continue with IT, ICT, and just kind of reassess myself, too…[I]t was something new I've never experienced, and it was just something I've never dealt with, so totally new subject, and I was so overwhelmed. It was a lot required of. That was a really intense course, a real live work setting course. You know, so it was very overwhelming. It was such a challenge. I regretted withdrawing from it later, because I felt like I was just giving up on something that I can learn and I'll be more passionate about it once I get a better understanding. I did manage to kind of go back on some of the materials they covered and taught myself a little bit of it and, sure enough, I started understanding it better, so I guess sometimes it's good, sometimes, when you're failing or when you feel like you're not getting anything out of a course, or anything really. You know, this may be a different approach to it, too, because I felt like the course was not really structured enough for me to get a better grasp of it…I ended up just learning some of the concepts on my own and got a better understanding of it.

In high school … it was just a lot of pressure being in those upper-level math courses, being with 90% of the room filled with guys. It was a lot of pressure and so I felt externally motivated to prove them wrong and to prove that I know what I'm doing and I know … I'm very
knowledgeable about the subject because math was a very … it came to me very naturally. I was very confident about my skills and abilities with math. I took all the math that you can take to a point where I was just like, I don't think I want to do this anymore. But it was not so much because of the guys. It was just I wasn't passionate about it anymore and there was not a lot that I felt you can do with it. But, yeah, high school, community college. Community college was more of a mix because it was a different mindset. They didn't have … They were more mature about it in terms of…in comparison to high school, so it wasn't as much of a problem, I guess. I would sometimes be the only one raising my hand and answering questions, and people would look at me and in some sense I felt a little off because I didn't want to be like I'm this know-it-all or just … And it was not so much because of the guys. It was just in general. People would just stare and be like, "Oh, why is she answering all the questions? She's being this arrogant ...” And I kind of felt that, so it was kind of definitely more external in that aspect, but internally I was motivated to also prove that I do know my material and just … Here, it's … I don't feel that pressure at all. Not so much. It's more so in my skills and abilities where I feel pressured because I deal with a lot of people who are very versatile and advanced in IT, and so sometimes it's just...I feel pressure to be better, to become better.

I felt like if I had done any other major, I probably would have quit or changed it. I just feel strongly passionate about what I'm doing. And I did consider other majors, especially when it got hard and overwhelming, but I knew that was just a phase where I had to just keep learning and keep applying myself, and then afterwards feel a lot more confident in my abilities. So, I felt like this major provided me with a lot of opportunities--a lot of opportunities--not only in the career aspect, but just for growth and just for being more confident about myself, too.
4.2.2.8. Lisa. I definitely feel like not only just the curriculum here, but the faculty influenced [the sense that I would fit in as an IT major and professional] heavily. I started as engineering because I didn’t think I was technical enough or I didn’t think I was strong enough for the boy’s club of IT, and then once I got here and got into this program, not only did I meet, especially male faculty, but the female faculty, as well, really pushing me, just saying, you know, it’s not about fitting in. It’s about just being yourself and sort of … There’s always going to be room for you. That was a big thing for me, especially my first after I switched, because I was a year and a half at engineering … there’s always going to be a piece of the puzzle open for someone like me, and they may not accommodate, but everyone’s really nice and just mature adults, basically. It’s not about trying to kick you out if you don’t fit a certain mold. So, everybody’s helping you grow, but not grow into something that they think you should be where you really want to be.

My first two years in high school, I always thought I was going to do a career right after college. But now I’ve been thinking of grad school. I’ve been thinking about doctorates and stuff and possibly teaching and academia. Not that they have changed my opinion, but they definitely opened all the faculty and all of the events we have, especially. Like, all the research, symposiums, and all of the career fairs and stuff. They’ve definitely just made me see that there’s more options for me, not that what I thought was wrong before, but that there might be another right answer. So, that definitely helped through this program and through … Honestly, it’s the faculty. The faculty are killer here, so they really help open up a lot of different avenues for me.

I feel like we’re getting so far away from pure technical jobs to be able to succeed right now in just literally any career right now. Yeah, there’s the computer science kids that need to program 90% of their job, but the soft skills and just the interaction between … not the
interaction between people, but the interaction between all these different systems and all these different requirements that all these projects need, all these companies need in general. I feel the communications overlap with IT is a huge, huge benefit. Not a lot of programs and colleges have ICT as a major, so that’s definitely why I think this one is special. So, not only is it special, but just the fact that it adds it. But it’s special because the faculty all really care about it. That’ll be my second point, is that this program’s really great because the faculty, they try. They know their stuff. They’ve all either been in research, are in research, or have had even corporate experience outside of academia. So, the curriculum overlap and the faculty are the two special stars.

I just think I was already more technical than most, so if I was not from a … I actually did a technologies magnet program in high school, so I feel like if I was an average student I wouldn’t have been, but because of the avenues I took pre-college and in my first year of college here, I actually knew I was going to switch into ICT before I was technically kicked out of engineering, so I started doing the prereqs. I started looking into the college. I was really happy that they had all the stuff about the ICT program online so I could read about certain courses, read about the program and stuff. So, I feel like I was pretty adequately prepared.

I wish when I did switch majors, I wish they would have sent me a little memo, because when you look at the course map, that’s my biggest thing about ICT, is the course map, is me slipping through it. I wish they would have emphasized, like, if you want to go on this track, these are going to be your courses, these are going to be great supplemental courses. Like, if you want to have some coding, more coding, you can do that. You don’t have to just stick to this map. I really wish … Someone personally didn’t have to reach out to me, but a little either intro email or intro link, “Hey, you’re new to ICT. Here’s a little blurb,” or, “Here’s a possible class schedule of a typical four-year student. Here’s what you can add in. Here’s what you can subtract
out.” Because when you look at the map, you know, there’s the health informatics. There’s the more technical one, all that stuff. There’s all these different tracks through the IT and ICT programs, so I wish someone could have said, “Hey, if you want to be more technical, you can. Just throw some classes in there on your own.” Or, “If you want to do to more communications or you want to do more project management or leadership, here are some extra leadership classes from maybe a joint with the business college,” or something. So, I think that would have helped a little bit more, because for some people, possibly, and possibly for me, looking back, I got a year, I got two semesters into this program. I’m like, wow, I wish I would have taken WebDAV instead of this first or something, because now I can do this track or something. So, I think sitting down with an adviser and really talking about your class track would have really helped.

I’m pretty comfortable in the program itself. I haven’t met that many ICT majors who I’m personally close with. That is a big part of college, though, is making your network and your peers and stuff. I get along with a lot of the pure IT kids a little bit more, but the program itself is a perfect fit for me, so I picked it over IT, because you can pick either one. No one’s forcing you … I’m not saying either one of us is more prepared than the other but, for me personally, developing through the curriculum, ICT really fits with me when I’m shooting for the project management star. So, it’s definitely a good fit. You can tell it was really well thought out, too. It’s not just, “Here’s four communications classes. Here’s four IT classes. You’re done.” They really try to mend them together pretty well, so that’s why I like it a lot.

[One of my professors] helped me see a lot that the...that it’s a lot more soft skills than people think, also. You know, you have all these methods and evaluation forms you end up filling out being in IT, but you’re also still a business person. You’re also still depending on other people to get this project done, and he sort of helped me see that it was a lot less coding in
a cubicle and more of collaboration meetings every day for more than just 15 minutes. These are
hour, two hour long sessions that all these people are getting into, whether they are just a system
admin or whether they are just a content creator. You know, they’re still collaborating a lot more.
So, that definitely changed my perception of IT professionals.

I'd say I'm a little more able and willing [than my peers]. From what I hear in classes and
what I hear in my clubs... "Lazy" is the wrong word to use, but a lot of people don't want to put
in the effort of something they're only going to use for one semester and might not use
afterwards. I really like learning and I really like being able to put an intro skill under my belt
because you're that more able to learn it in the future if you actually stick to learning the intro
stuff. So, I think my ability is a little bit higher just because I'm more mentally willing. Not
because I'm smarter, not because I'm better, but just because... I keep wanting to say "lazy", but
"lazy" isn't the right word. But I really like it…Yeah. I would say that [ I’m] more motivated.

This is a great program. I wish more people know about it. People get halfway into IT
and they go, oh, I wish I wouldn't have taken these three semesters of classes because now I want
to switch to ICT and I'm graduating late, blah, blah, blah. So, I wish we'd talk more about it. I
wish more schools had it so more people would know about it and really start honing in on that
intersection between technology and people, because that's a big deal right now and it's going to
be a big deal in the next 20, 50 years. So, yeah, I love ICT. It's perfect for me. I was really lucky
to be able to come here because I almost didn't come to FSU. I came to FSU last-minute after
rejections and stuff and ended up walking into this major pretty late. But very happy about it.

4.2.2.9. Rachel. At the beginning, I didn’t see myself fitting in at all. And then, as
through studying and getting more involved on campus, I saw myself more than fitting in,
actually. I actually saw myself outside of campus with a great career. I recently got these two
jobs so before that I didn’t feel like I had enough experience. I wasn’t too confident. But, after gaining these two jobs and getting more experience within the field, I’m very confident now.

The first thing [I like about being a IT major] is all the different fields you can go into, into IT. You can do web design. You can do programming developments, security. That’s my number one, what I really like about it, and that’s what actually made me want to do a double major. So, because I do like designing and being more creative with building my website, and you can still do that from scratch and do the back end. So, that’s the first thing, and then the second thing is some of the people that I’ve met within here, within the school, and also outside. I’ve had a lot of opportunities that my professors have granted to me outside of school, outside of school with job interviews and potential careers. So, that kind of gave me a little bit more push to do better in IT as well.

I didn’t know too much coming into the field, so I had to learn simple things. I had to learn basic HTML. I had to learn basic parts of the computer. What does this do? How does this connect? You know, I didn’t know all those things. And my first couple of classes, the first prereqs to get into IT, that helped me a great deal … [When] I started IT, the focus at that point to me around the world wasn’t technology’s going to be driven. I, personally, wasn’t seeing that. It was happening, but I wasn’t seeing that. So, before I chose IT to come into the field, I wish I could have prepared myself more. Definitely with maybe doing more research on certain things. But then again, I didn’t know I was coming into the field, so there was no way for me to have prepared myself. But since I have gone into the field, what I would have felt while in IT, I would have liked maybe a little bit more prereqs to kind of get a little bit more in-depth … With more hardware, dealing with more, like, with the computer. Definitely knowing how every part, piece … every part of the computer works, and maybe learning the different operating systems. I think
that would have been more beneficial to me, as well. I learned it. I just learned it on the side. It would have been nice to maybe have been able to have taken a class with it.

I’m very comfortable. Now, I’m very comfortable. After going back to mentioning prereqs and my foundation courses, now I’m in electives. So, I do feel that the steps to get to where I am was accurate and helped a great deal. So, I’m focusing now on the type of field that I want to go into, so I am doing programming on the side, but also, I want to do web design and be a little bit more creative with building things. So, I’m very comfortable. I wasn’t before, but right now … I graduate in the fall, but I’m very comfortable and very confident … I am definitely more comfortable with the IT department as opposed to the computer science department. I do like to program, I do like to code, but there’s so much more. It’s more in-depth. Whereas IT, currently what I’m doing is I’m focusing on one field. So, I’m focusing on web design. So, I do know coding to implement, let’s say if I do want to make a couple websites or whoever’s website, but learning the back end in computer science is very … I’m confident, but I’m not too confident. I’m probably … Between a one and ten, I’m probably, like, a four. Whereas IT, I’m a ten.

Something that changed my perception of IT professionals … [t]he career fairs, actually, believe it or not. We have different career fairs, so we have Seminole Futures--where it's everyone--and then we have a CCI career fair. The CCI career fair was a lot of IT professionals in there as well, meeting with some of those and doing follow-ups with them just to see...just to thank them for their time. I was very impressed how they communicated back with me and also they still kept reaching out to me throughout the semester, so asked me how the semester was going, asked me if I had plans for the future. And, yeah. I thought that was really interesting. I enjoyed that, meeting those IT professionals, a couple companies within them.
I did find out that some of the IT students are really lazy as opposed to other fields or whatnot. IT -- I feel like you're spoiled more with your technology. You get lazy … For example, I am building a site now. Okay, for example, I'm taking a class at the moment. It's a capstone class and in this class you have to build your own website. I chose to build it from scratch with just writing the code, as opposed to maybe going onto WordPress or something like that where it's doing it for you. And here it is, bam, we have a website. So, that's what I mean. You can get spoiled like that … I'm currently taking a class at the moment where it's a group … It's an IT proposal class, so we have to have a proposal. So, I'm a perfectionist, and so I need it done a certain way. I need you to do it this way. I am definitely more motivated than some of those students because I am focused on definitely learning something, but I'm also focused on my grade, too, as opposed to maybe just wanting to get by and get a C and just want to do the basic research. I kind of may want to dig a little deeper and get some more answers.

I thought that it would be more challenging [being a female and being a female in the technology field, being in IT], but as I continued getting more involved with organizations and doing different things and continuing to … and staying focused on a certain field in IT, it's gotten easier because from … if you choose a certain field, you can … For example, like I said, I'm choose web design, so I'm just trying to continue to learn all the different types of things you can do with that in that field. So, I'm very confident. Before I wasn't. I thought being a female would be really difficult, but as I've continued to have interviews and speak to people and add things to my resume, it's not now, for me … Because I feel it's male dominated somewhat. I mean, you have CEOs from Yahoo! who's female, but there's only a percentage … that's only that point-something percent that you see and you know. So, I just think it's male dominated. I mean, it's getting better, but currently that's what my opinion is.
4.2.3. Themes and Categories

The same meaningful selected transcribed passages utilized in creating the profiles were also analyzed for themes using Dedoose, an online application for analyzing qualitative data. Once all of the selections were made, they were uploaded to the Dedoose site, and the coding process began. These themes were sorted and grouped into categories with the assistance of the app. It became clear that an overarching theme from which all the responses stemmed from was “Choosing IT”. The other resulting themes, categories, and the relationships identified between them will be presented.

*Figure 4.1. Word Cloud of Interview Themes*
**Choosing IT**

<table>
<thead>
<tr>
<th>Prior Preparation; Finding their niche</th>
<th>Perceptions; Stereotypes</th>
<th>Connections (family, friends, faculty, peers); Influences</th>
<th>The Future (fear/excitement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>being influenced</td>
<td>being influenced</td>
<td>being able to have a specialization</td>
<td></td>
</tr>
<tr>
<td>changing view</td>
<td>bringing diversity to the field</td>
<td>being influenced</td>
<td></td>
</tr>
<tr>
<td>choosing a career</td>
<td>changing view</td>
<td>changing a career</td>
<td></td>
</tr>
<tr>
<td>difficult courses</td>
<td>choosing a career</td>
<td>comparing to peers</td>
<td></td>
</tr>
<tr>
<td>feeling challenged</td>
<td>connecting with peers</td>
<td>difficult courses</td>
<td></td>
</tr>
<tr>
<td>feeling fulfilled</td>
<td>difficult courses</td>
<td>feeling prepared</td>
<td></td>
</tr>
<tr>
<td>feeling overwhelmed</td>
<td>finding a niche</td>
<td>finding supported</td>
<td></td>
</tr>
<tr>
<td>finding a niche</td>
<td>fitting in/sense of belonging</td>
<td>finding a niche</td>
<td></td>
</tr>
<tr>
<td>fitting in/sense of belonging</td>
<td>IT stereotypes</td>
<td>gaining confidence</td>
<td></td>
</tr>
<tr>
<td>growing up with technology</td>
<td>lacking confidence</td>
<td>growing up with technology</td>
<td></td>
</tr>
<tr>
<td>high school prep</td>
<td>lacking experience</td>
<td>lacking confidence</td>
<td></td>
</tr>
<tr>
<td>lacking confidence</td>
<td>previous major programming</td>
<td>life path not set in stone</td>
<td></td>
</tr>
<tr>
<td>lacking experience</td>
<td>women working harder</td>
<td>looking towards the future</td>
<td></td>
</tr>
<tr>
<td>maturing</td>
<td></td>
<td>maturing</td>
<td></td>
</tr>
<tr>
<td>previous major programming</td>
<td></td>
<td>previous major programming</td>
<td></td>
</tr>
<tr>
<td>specialization options</td>
<td></td>
<td>specialization options</td>
<td></td>
</tr>
<tr>
<td>women working harder</td>
<td></td>
<td>women working harder</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.2. Interview Themes by Gender**

**Table 4.6. Interview Themes and Categories**
4.2.3.1. Themes. Figure 4.1 presents the sorted labeled sections of transcript netted a total of 28 themes and they are as follows: being able to have a specialization, being influenced, bringing diversity to the field, changing view, choosing a career, comparing to peers, connecting with professors/peers, course content, difficult courses, feeling challenged, feeling fulfilled, feeling overwhelmed, feeling prepared, feeling supported, finding a niche, fitting in/sense of belonging, gaining confidence, growing up with technology, high school prep, IT stereotypes, lacking confidence, lacking experience, life path not set in stone, looking towards the future, maturing, previous major, programming, women working harder.
4.2.3.2. Categories. From the codes generated out of the selected text, eight categories emerged (Prior Preparation; Finding their niche, Perceptions; Stereotypes, Connections (family, friends, faculty, peers); Influences, Fear of the Future, Excitement for the Future (Table 4.6). As this dissertation research study used Self-Efficacy Theory as a basis of which to ground, these categories were further grouped and mapped to following concepts of the theory and seen in Figure 4.3: Mastery (performance accomplishments, i.e., past experience), Observation (vicarious experience, i.e., modeling by others), Social (social persuasion, i.e., coaching and evaluative feedback, and Emotional (physiological and emotional states).

4.3. Summary

This chapter presented findings from the analyses of the survey and interview data. Chapter four began with the results of the survey and concluded with the presentation of the profiles of the participants and major themes from the interviews.
CHAPTER 5

DISCUSSION

This chapter begins with the presentation of the discussion of the findings for this study with regards to the research questions asked. The discussion is followed by the limitations of this research study. The chapter concludes with implications and suggestions for future research.

The three research questions that guided this study are as follows:

RQ1. What factors motivate women to enter the undergraduate IT program?
RQ2. What role does self-efficacy play in the decision of women to enter into an undergraduate IT program?
RQ3. What perceptions do women have about what it means to be an “IT Professional,” and what role does this perception have on their desire to pursue an undergraduate IT degree?

5.1. Motivating Factors

The 50/50 ratio of female to male participants in the survey portion of the study was much higher than would be expected based on the latest National Science Foundation (2015) statistical report of the state of women, minorities, and persons with disabilities in science and engineering (S & E) in which it was stated that only 1.4% of women intend to major in mathematics, statistics, and computer science versus the 5.2% of men. The self-identified minority participation rate in the interviews is notable for the similar reason with only 0.1% of minority women represented in STEM occupations according to the same report. What makes this group so different from the norm? What factors motivated the women in this study to select IT? We must first discuss the fact that majority of these women are ICT majors. The ICT major, despite having IT in the name, is far less technical in its orientation than most of the information
technology degree programs in the United States. Most IT degree programs in this country are found within computer science departments, and focus on information and information systems, without a strong emphasis on computer programming or software development. The IT degree program in this study is found in a School of Information within a College of Communication and Information. Neither the college nor the school includes a computer science department. The computer science department at this university is located within the College of Arts and Sciences. The IT degree program offers two majors: information technology (IT) and information and communication technology (ICT). Of these two, IT is the most technical and closest to those located in computer science. While both majors have programming pre-requisites, most students in the ICT major do not encounter programming courses in their major coursework. ICT coursework focuses primarily on human and social factors in the dissemination of information (e.g., social media marketing is a popular emphasis of many ICT majors, while IT majors are more likely to focus on mobile web applications development or systems analysis). The division into two majors is relatively new, and differentiation is ongoing, so the distinction between the two majors is more evident for incoming students than for the study participants. While the two majors share the same capstone courses, the aforementioned LIS 4708: Perspectives on Information Technology and LIS 4910: IT Project Management, they currently share just two foundation courses, LIS 3267: Information Science and LIS 3353: Information Technologies. There are 31 approved electives for ICT majors in the following areas: research skills, technical skills, oral communication skills, written communication skills, strategies, and perspectives (School of Information, 2016c). However, ICT majors are only required to take two courses from the seven choices in the technical skills category. This is in contrast to the IT majors, who have four additional foundation courses, and elective choices in areas such as design.
and development, networking and security, and health informatics (School of Information, 2016d). The communication skills portion, thus human and social factors, seems to be the key to the choice of one major in versus the other.

The amount and type of programming required for this major was a top concern for the women study participants. With ICT, they were able to find a happy medium between the tech industry they want to be a part of without having to acquire the higher level skills usually necessary in traditional IT courses. They rarely sought to take the more technical electives once they satisfied their required IT classes. However, the ability to have such electives as an option, as well as different specializations within the major, was also a strong motivator. It was noted by more than one participant that even though the IT courses, particularly the ones that had programming elements as part of the curriculum, were not their favorites, they appreciated the exposure to those skills as it solidified in their minds the type of career work they were not interested in pursuing. The ability to find their niche, an added factor for most of these women, is related. Most of the interview participants (both male and female), transferred from either a community college or another major within the university. Prior to beginning their current program, the women felt unsure of their future prospects in the workforce and it was not until seeking information about the IT and ICT programs that they found, as Lisa put it, “a perfect fit”.

Another factor that emerged during the interviews, in addition to how important it is to these women to have a sense of belonging, is that they feel supported in their current program. Sense of belonging and support were not being sufficiently addressed in their previous departments, and the difference was almost immediately felt when they transferred. A little less than half of these women came in with any technical skills, and upon beginning the major did not
feel penalized for not already being proficient as they did in their initial major. They felt the faculty and their fellow students, while challenging them, also wanted to them to succeed.

One last motivation for entering into this undergraduate program is that the women perceived that the degree would prepare them for a variety of job prospects, so their life paths would not be immediately set in stone. The very fluid nature of technology and information today is so that predictions about the next trends can only be projected so far in the future and that excites this group. Not having the same sets of duties and tasks each day is a draw and that one of the reasons they ended up coming to the major.

5.2. Self-Efficacy

This decision by the women in this group to go with the more people-focused technology major is not surprising and supports claims by Wang & Degol (2013). However, this is where self-efficacy does come into play. The primary factors identified by male interview participants influencing their choice of the major were: the lack of success in their previous major, and feeling prepared to handle IT/ICT due to having elevated comfort levels with technology. Despite disappointment in their past performance in other STEM degree programs, these men nonetheless exhibited high self-efficacy for IT/ICT. This was due in part to the belief that the new program coursework would be easier for them to handle as compared to the coursework in their previous major(s).

According to the survey results, all the participants exhibited high self-efficacy across both scales. Attending IT classes had a positive influence on their desires and interest in computers, confidence in having the skills to succeed in, and sense of being able to fit into the IT field, as well as their ability to make academic and career decisions. The differences between genders became more evident in the interview responses. During their discussions about their
experiences leading up to and going through the IT program, the men rarely, if at all, spoke about lacking confidence in their skills. Similarly, not much was said about having minimal exposure to formalized IT programs in high school. Lack in experience was not important in their decision to choose this major, as they believed they could easily overcome any deficiencies.

This is in contrast to women, who consistently spoke about feeling overwhelmed, even though they were just as successful in their IT and ICT classes as their male counterparts. Despite scoring themselves higher on the CDSDS-SF, there was a sense that no matter how much they learned, and how talented they might be at both the technical and social aspects of IT, there was still an ever-present current of self-doubt. This is in line with the research by Bair and Marcus (2007) and Blickenstaff (2005), and may be one of the reasons the majority of the women chose to major in ICT over majoring in IT. Their self-efficacy is higher when it comes to the communication skills, because they have had more experience using them and are more comfortable with them versus those skills needed in IT projects, such as website and application design, where they may not have as much practice and do not trust that what they know is enough to be continually successful.

5.3. Perceptions

The biggest misconception that was shared amongst the women participants prior to entering the degree program was that being an IT professional meant that your job would consist of a lot of programming and that was all you would do, day in and day out. However, as suggested by Gayles and Ampaw (2014), after taking classes, talking to faculty, attending workshops, and other career oriented events like job talks and fairs, they have come away with a different perception of what being in the IT field means. This new found knowledge has increased their desire to pursue more communicative, soft-skilled professions, such as social
media and project management, rather than traditional IT careers such as database management. By the time they have entered the capstone courses at the end of the program, they are still much less interested in coding and working with information systems directly, and would rather work with people in a more social environment in person and online, similar to the findings in Wang and Degol (2013).

The men shared a similar opinion to the women in that they also initially believed that majoring in IT would require them to be what Bryan calls a “super hardcore programmer.” Even this incorrect perception did not dissuade any of them from pursuing an IT degree. At least half of the men credited others, including parents and professors, for helping them change their views of what being an IT major would involve and the types of career options that would be available to them upon graduation. Nevertheless, the perceptions held were not a factor in their decision to choose this major, which is in contrast with the women interviewed in this study. As Juan admitted, the “nerdier” aspects of the profession were never a deal breaker and his view of the profession only really began changing after going on interviews and witnessing first hand that his bias might be incorrect.

Calling back to Blickenstaff (2005), replacing science for IT, and basing these on the data produced in this study, I believe these statements on possible explanations as to why the lack of women in the field are sadly still applicable:

1. There are differences between men and women but not just biological. Culture and societal roles are also factors.

2. Women’s lack of academic preparation for a IT career due to lack of interests/relevance or availability of training in their K-12 years.
3. Women’s negative perception toward IT and lack of experiences with IT in childhood (be it positive or negative).

4. The absence of female IT professionals as mentors or role models.

5. The pedagogy of IT classes favors male students, who have more experience using technology inside and outside of the classroom.

6. Women face cultural pressure as well as to conform to traditional gender roles.

7. An inherent masculine worldview in IT epistemology.

5.4. Limitations

One of the main limitations of this study related to the population from which the participants were selected. The recruitment of students enrolled in select higher level capstone courses limited the number of those who responded, and may account to some degree for the high self-efficacy and homogeneity of the students’ perceptions of the program. Also, this study deals specifically with students studying IT and ICT, which has previously been distinguished from the more-CS oriented programs studied in previous research, which means that the results of this study may not be comparable to those of similar earlier studies. As this is an exploratory study, the results may not be generalizable outside of the set population.

5.5. Implications and Future Research

One of the major implications of this dissertation research is that it will help fill the gap in the literature that specifically explores the lack of the underrepresentation of women in IT education programs in the United States. The results of this study contribute to our understanding of why there is minimal participation of women in the field despite decades of initiatives, and are encouraging in that they appear to confirm suggestions from prior research that women are more likely to be recruited and retained in programs that place more emphasis on
human and social factors. While the results of this study are not generalizable, they set the stage for future research and have practical implications for recruitment and retention of women into the field.

As the results of this study have shown women have or are able to gain the technical skills, however there still needs to be a push to make the study of technical IT skills more appealing. There seems to be a major disconnect between the skills are required to major in IT, and what potential students perceive are required. Better public relations and marketing has the potential to resolve the issue that students who have potential for success in the field do not immediately recognize it as a “fit”, because they assume that the need for high level programming skills is paramount to success. Once the women participants figured out what career options were available to them by majoring in ICT versus IT and computer science, their attitudes changed entirely. Being able to reach students, and especially those from underserved populations, such as women, from the beginning of their college careers could be beneficial in increasing their self-efficacy. The women participants would not have wasted time in another major that could have been devoted to gaining positive experiences using technical skills which could go a long way in their retention in a future IT career.

Future research should include a larger population and be conducted at different institutions, including other iSchools as well as more traditional computer science programs, to explore whether those women share the experiences of the women in this study. One unanticipated finding was that all but two of the interview participants had transferred into the degree program, either from community college or from other STEM majors. In forthcoming studies an additional item should be added to the initial survey to inquire about previous majors. This will help to investigate if major-changing is prevalent amongst students in the field and
what, if any, implications this may have on recruitment efforts of underrepresented students, like women and minorities. Lastly, future research should include exploration using placement data for comparison.

5.6. Summary

This dissertation research project reported on factors that affect differences in participation by gender in undergraduate IT programs. The study found that for the women computer programming, having the option of a less technical degree, finding an area niche area in IT that allowed for a variety of career prospects, and feeling a sense of belonging and support while in the program as strong motivating factors to pursue an IT degree. Although these women had acquired the necessary skills to be IT professionals in traditional positions such as database administration most preferred to go with the less technical route of ICT due to lack of confidence in their ability to handle the work required. The men, having a high sense of self-efficacy about their technology skills, were not concerned by lack experience working with computers and information systems as a factor for majoring in IT. Instead their deciding factors included feeling prepared to handle the major due to growing up with technology and having a greater sense of ease working with computers and the like. Further research should to further explore these factors on a grander scale and whether transferring from another department and/or academic institution plays a significant role in the decision to enter IT programs by both genders.

The primary purpose of this study was to discover factors of motivation in which women decide to pursue a degree in IT. The goal of this dissertation research was to understand how self-efficacy and perception play on these factors and what if any role those play on the decision of the participant to major in IT. There are a number of studies dealing with the participation of women in other STEM or STEAM fields like engineering and computer science but not IT
specifically. This research study will also add to literature and hopefully encourage further investigations. The results will be of great significance to IT academic programs as the recruitment and retention of women is an ongoing struggle.
APPENDIX A

INFORMATION TECHNOLOGY CAREER AWARENESS AND INTEREST SURVEY

1. What is your gender?  ○ Male  ○ Female

2. What is your race/ethnic group? (choose all that apply)
   ○ Native American or Alaska Native  ○ African American or Black
   ○ White  ○ Asian or Pacific Islander
   ○ Hispanic  ○ Other (please specify)

3. What is your age?
   ○ Below 18  ○ 18 to 24  ○ 25 to 30  ○ 31 or older

4. What is your educational level?
   ○ First Year
   ○ Second Year
   ○ Third year or later
   ○ Graduate student
   ○ Transfer Student
   ○ Other __________

5. Have you declared your major?  ○ Yes  ○ No

5A. If yes, what is your current major?

6. What career(s) are you interested in pursuing? (you may choose more than one or say “undecided”)

6A. Did you change your mind about possible careers as a result of attending IT (Information Technology) classes at FSU?  ○ Yes  ○ No
7. How much did each of these change because of your participation in IT classes at FSU?

<table>
<thead>
<tr>
<th></th>
<th>Decreased a Lot</th>
<th>Decreased a Little</th>
<th>No Change</th>
<th>Increased a Little</th>
<th>Increased a Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>My desire to learn more about computing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My desire to get a career in an information technology field</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My interest to pursue a computing-related degree</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My enjoyment of working with computers and other information technology</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My confidence that I will be able to succeed in a computing field</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Confidence in my knowledge and skills in computing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My understanding of what people in information technology fields do</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My knowledge about what education I need to become involved in information technology</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The sense that I would “fit in” if I were to major in information technology in college</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The sense that I would “fit in” if I were to have a job in information technology</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The sense that there is a lot of personal support for a career in Information technology</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My desire to continue on to the next level in my education</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
8. How much confidence do you have that you did/could:

<table>
<thead>
<tr>
<th></th>
<th>No Confidence at All</th>
<th>Very Little Confidence</th>
<th>Moderate Confidence</th>
<th>Much Confidence</th>
<th>Complete Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find information in the library about occupations you are interested in.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Select one major from a list of potential majors you are considering.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Make a plan of your goals for the next five years.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Determine the steps to take if you are having academic trouble with an aspect of your chosen major.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Accurately assess your abilities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Select one occupation from a list of potential occupations you are considering.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Determine the steps you need to take to successfully complete your chosen major.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Persistently work at your major or career goal even when you get frustrated.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Determine what your ideal job would be.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Find out the employment trends for an occupation over the next ten years.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Choose a career that will fit your preferred lifestyle.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Prepare a good resume.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Change majors if you did not like your first choice.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Decide what you value most in an occupation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Find out about the average yearly earnings of people in an occupation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Make a career decision and then not worry about whether it was right or wrong.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Activity</td>
<td>No Confidence at All</td>
<td>Very Little Confidence</td>
<td>Moderate Confidence</td>
<td>Much Confidence</td>
<td>Complete Confidence</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>------------------------</td>
<td>---------------------</td>
<td>-----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Change occupations if you are not satisfied with the one you enter.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Figure out what you are and are not ready to sacrifice to achieve your career goals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Talk with a person already employed in the field you are interested in.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Choose a major or career that will fit your interests.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Identify employers, forms, institutions relevant to your career possibilities.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Define the type of lifestyle you would like to live.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Find information about graduate or professional schools.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Successfully manage the job interview process.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Identify some reasonable major or career alternatives if you are unable to get your first choice.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

9. Would you be interested in participating in a follow-up interview? ☐ Yes ☐ No

If yes, please provide your email address below.

Modified from the Commonwealth Alliance for Information Technology Education (CAITE) event survey from the University of Massachusetts Amherst. Accessed at caite.cs.umass.edu/files/CAITE%20Event%20Survey(2).doc

APPENDIX B

PRE-INTERVIEW QUESTIONNAIRE

1. In what year were you born? ____________

2. What is your gender?
   □ Female
   □ Male

3. Are you a: (Please check only one)
   □ U.S. citizen?
   □ Non-U.S. citizen with permanent residency?
   □ Non-U.S. citizen with a temporary visa?

4. Please indicate your race. (Please check all that apply)
   □ American Indian/Alaska Native
   □ Asian
   □ Black/African American
   □ Hispanic/Latino
   □ Native Hawaiian/Other Pacific Islander
   □ White
   □ Other (Please specify): _________________________________

5. When did you begin pursuing your bachelor’s degree?
   Month: ________ Year: _________

6. When do you anticipate finishing your bachelor’s degree?
   Month: ________ Year: _________

7. What was your major? _________________________________________
   Minor? ______________________________
   If you changed your major, what did you change it from? ______________

8. Have you or do you plan on doing an internship before completing your degree?
   Are you also currently employed? Is it in an IT setting?
APPENDIX C

INTERVIEW QUESTIONS

1. Tell me two things that you like about your major?
   a. Do you feel you were adequately prepared before beginning your current degree program?
   b. How prepared were you compared to other students in the program?
   c. What kinds of preparation would you have wanted more of?
   d. How comfortable are you in your program or department?
   e. How often do you meet with your professors outside of class?
   f. Do you have a faculty advisor or mentor whom you can go to and discuss career plans, problems with coursework, etc.? If not, would you like one?

2. Tell me about a specific incident that gave you a different perception of IT than you had before you started your degree than you do now?
   a. Of IT professionals?
   b. What specific perceptions that you had have changed since you’ve been in your degree program?

3. Tell me about one class in particular that seemed extraordinarily difficult in your degree program?
   a. Are there other classes?
   b. Are these courses considered weed-out courses?
   c. Have these courses caused you to consider dropping out of the major?
   d. How would you describe your own abilities to do your coursework in comparison to the other students in your program?

4. After completion of your bachelor’s degree what are you plans?
   a. Would you pursue a graduate degree in your current area?
   b. In another area?

5. Is there anything else you’d like to add?
APPENDIX D

INFORMED CONSENT FOR SURVEY

Florida State University
Informed Consent for Participants in Research Projects Involving Human Subjects

Title of Project: Examining a Sense of Belonging and Belief in Student Success in Undergraduate Information Technology Education

Investigator: Lenese M. Colson, School of Information, Florida State University

Background Information:
The purpose of this study is to explore the sense of belonging and belief in student success of those enrolled in an undergraduate Information Technology program. This study is being conducted by Lenese M. Colson, School of Information, Florida State University, working in consultation with her major advisor, Dr. Kathleen Burnett.

Procedures:
If you agree to be in this study, we would ask you take an online survey. The short survey has 9 questions and should take no more than 3-5 minutes to complete.

Risks and benefits of being in the Study:
There are no apparent risks and benefits involved with participation in this study.

Compensation:
If your instructor has agreed to give extra credit for this activity, you will be asked to provide your name, course number and title, the name/s of your instructor and TA (if applicable) at the end of the study. This information will be kept in a secure and separate database and will not be linked to any of your responses in the survey. Your instructor will decide how many extra credit points you can earn for this activity. You can only participate in the study once.

Extent of Anonymity and Confidentiality:
The records of this study will be kept private and confidential to the extent permitted by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records.

Freedom to Withdraw:
Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University. If you decide to participants, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions:
The researcher conducting this study is Lenese Colson. You may ask any question you have now. If you have a question later, you are encouraged to contact them at [redacted] or [redacted]. Alternatively you may also contact Kathleen Burnett at [redacted] or [redacted].

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the FSU IRB at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306-2742, or 850-644-8633, or by email at humansubjects@fsu.edu

You may request a copy of this information to keep for your records.

**Statement of Consent:**

☐ I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered and understand the objectives, procedures, and rights as a research participant.

☐ I hereby acknowledge the above and give my voluntary consent for participation in this project.

___________________________________________                           ______________
Signature of Investigator                           Date
APPENDIX E

INFORMED CONSENT FOR INTERVIEWS

Florida State University
Informed Consent for Participants in Research Projects Involving Human Subjects

Title of Project: Examining a Sense of Belonging and Belief in Student Success in Undergraduate Information Technology Education

Investigator: Lenese M. Colson, School of Information, Florida State University

Background Information:
The purpose of this study is to explore the sense of belonging and belief in student success of those enrolled in an undergraduate Information Technology program. This study is being conducted by Lenese M. Colson, School of Information, Florida State University, working in consultation with her major advisor, Dr. Kathleen Burnett.

Procedures:
The interview will be recorded and should be approximately 30-60 minutes in length. It will take place on campus and be scheduled at a time convenient to your schedule.

Risks and benefits of being in the Study:
There are no apparent risks and benefits involved with participation in this study.

Compensation:
I will give interview subjects a choice of either a $10 iTunes or Amazon.com eGift Card.

Extent of Anonymity and Confidentiality:
The records of this study will be kept private and confidential to the extent permitted by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Tape recordings or videotapes made will only be accessed by the investigator and will be erased ten years after the completion of this study.

Freedom to Withdraw:
Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions:
The researcher conducting this study is Lenese Colson. You may ask any question you have now. If you have a question later, you are encouraged to contact them at [redacted] or
Alternatively you may also contact Kathleen Burnett at [redacted] or [redacted].

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the FSU IRB at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306-2742, or 850-644-8633, or by email at humansubjects@fsu.edu

You will be given a copy of this information to keep for your records.

**Statement of Consent:**
I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

___________________________________________                           ______________
Sign
Date

___________________________________________                           ______________
Signature of Investigator
Date
APPENDIX F

HUMAN SUBJECTS APPROVALS

Office of the Vice President for Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 - FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 12/11/2015
To: Lenese Colson <lmc07k@my.fsu.edu>
Address: 207 Lovelace Drive, Apt 5, Tallahassee FL 32304
Dept.: INFORMATION STUDIES
From: Thomas L. Jacobson, Chair
Re: Use of Human Subjects in Research
Examining a Sense of Belonging and Belief in Student Success in Undergraduate Information Technology Education

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 12/09/2016 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Kathleen Burnett [Advisor]
HSC No. 2015.16706
APPROVAL MEMORANDUM (for change in research protocol)

Date: 02/05/2016

To: Lenese Colson

Address: [Redacted]

Dept: INFORMATION STUDIES

From: Thomas L. Jacobson, Chair

Re: Use of Human subjects in Research

Project entitled: Examining a Sense of Belonging and Belief in Student Success in Undergraduate Information Technology Education

The application that you submitted to this office in regard to the requested change/amendment to your research protocol for the above-referenced project has been reviewed and approved.

Please be reminded that if the project has not been completed by 12/09/2016, you must request renewed approval for continuation of the project.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Kathleen Burnett, Advisor
HSC NO. 2016.17505
REFERENCES


BIOGRAPHICAL SKETCH

Lenese M. Colson earned a Bachelor's degree in Computer Science from Norfolk State University in 2000, a Master's of Education in Curriculum and Instruction from Virginia Tech in 2002, and a Master's of Science in Library and Information Science from Florida State University in 2008. Her research interests include diversity, women in STEM, and social justice for underrepresented populations.