

A Phenomenological Study of Cybersecurity Technologists' Decision to Become Educators

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Abstract

Nationally, a shortage exists of qualified cybersecurity persons entering the field, posing challenges for higher education institutions in locating qualified educators to help fill the gap. A wealth of literature discusses the needs of students, yet literature outlining qualities of attracting graduates to become educators is lacking. The purpose of the qualitative phenomenological study was to examine, recognize, and describe the lived experiences that influenced cybersecurity graduates to the field of higher education. The study was guided by Lent, Brown, and Hackett's social cognitive career theory and Mezirow's transformative learning theory, as each focuses on the awareness of self and motivating behaviors in choosing an occupational career path. The research questions that directed the study were created to examine the experiences that prompted cybersecurity graduates to become educators in the field of higher education. Seventeen postsecondary educators from Texas completed a video-conferencing interview and member-checking review. The data revealed three emergent themes and eight subthemes from the participants' experiences regarding how the decision was made to enter the field of higher education. Findings from the study can benefit stakeholders in the fields of academic advising and admissions, and human resources guiding the recruitment process of future cybersecurity educators.

Keywords: occupational choice, higher education, postsecondary education, cybersecurity, educators

Dedication

I dedicate this doctoral dissertation to my parents, who worked so tirelessly to provide for their children, as I was growing up. I know you both, more than anyone, were waiting to see this day come when I finished this dissertation, to honor you both. I cannot thank you enough, mom and dad, for all you did to encourage me through the years, as well as every journey I embarked upon in my life. I feel honored and truly blessed you were my parents.

I also dedicate this dissertation to my wife, who never allowed me to give up on my dream. She was there to support me through health concerns and her support was instrumental in enabling me to complete my doctoral program. Additionally, I am dedicating this doctoral dissertation to my sons. I started this journey when you were both so young and witnessed a never-ending time going to school. I want you to know you can achieve your dreams in life, work hard and push on and remarkable things will continue for you both. Continue and strive to break out of the norm, and always be a leader.

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Chapter 1: Introduction

Cybersecurity discussions are a focus of organizations worldwide, and guarding intellectual property is a challenging task for cybersecurity teams (Kim, 2014). Internet-based cyberattacks against corporations and universities are forcing leaders to pay greater attention to cybersecurity to guarantee an adequate level of protection (Imboden et al., 2014). These cyber-related attacks can range from minor breaches of email phishing to large-scale credit card breaches costing millions of dollars (Alder et al., 2015). Organizations struggle to attract academically qualified cybersecurity persons to design, implement, and support solutions to guard digital assets (Crumpler & Lewis, 2019). The Center for Strategic & International Studies commissioned a survey that described an impending shortage of trained cybersecurity persons to meet the country's cybersecurity needs (Crumpler & Lewis, 2019). Career decision-making processes can be related to the student's academic program of interest, directing the student to become a postsecondary educator or corporate professional role. The phenomenological qualitative study described the lived experiences of cybersecurity educators' decision to enter the field of higher education; the chapter includes the background of the problem, problem statement, purpose of the study, significance of the study, research questions, conceptual framework, and other key components of the study.

Background of the Problem

The background of the problem is less than 3% of undergraduate degree holders pursue a cyber-related degree, perpetuating a shortage of qualified professionals entering academic educator roles (Freeze, 2019; Prescod et al., 2019). Consequently, having a lack of skilled cybersecurity educators creates pressure on existing educators to produce skilled graduates. The degree of the problem was discussed in a report provided to the president in response to

Executive Order No. 13800 (2017) showing the shortage of individuals entering the cybersecurity labor force. Statistics show a shortfall in enrolling students who major in cybertechnology-related careers (Crumpler & Lewis, 2019). Cybersecurity-related academic program students are driven by a critical decision to enter the field of higher education or a corporate professional setting. A growing concern exists within the global cybersecurity community: Fewer students are entering cybersecurity-related majors, contributing to a market shortage of cybersecurity professionals (Crumpler & Lewis, 2019). Further, the U.S. Department of Commerce and Department of Homeland Security detailed the results of a survey directed by the Center for Strategic & International Studies, demonstrating the United States is encountering a shortfall of roughly 314,000 trained cybersecurity personnel (Akman, 2016; Crumpler & Lewis, 2019; Roy, 2019). Colleges and corporations are directly affected by the problem. As skilled cybersecurity professionals are lacking, the shortage creates tensions placed on existing professionals. Professionals express concern institutions of higher education are not producing adequately skilled graduates (Akman, 2016; Roy, 2019). A rich description of the lived experiences of cybersecurity-related postsecondary educators offered a source for understanding the academic degree preparation traits. The literature lacked a description of the traits that deter entry into cybersecurity careers and showed a shortage of professionals entering postsecondary educator roles.

Statement of the Problem

The problem is a shortage of graduates in the field of cybersecurity who choose to enter higher education over corporate roles (Anderson, 2016; Castro, 2018; Guth, 2019). Anderson (2016) and Castro (2018) stated, due to a growing number of unfilled cybersecurity positions, states are supplying programs in secondary school to attract students to enter cybersecurity-

related programs and professions. Furthermore, Dawson (2020) showed the need for a cybersecurity educational framework to support and educate degree-seeking students in offensive and defensive cybersecurity skills to help fill cybersecurity roles. Guth (2019) described cybersecurity as constantly evolving and further stated the challenges in keeping curriculum current as being exacerbated by a shortage of faculty.

The shortage of cybersecurity faculty creates challenges in developing relevant curriculum, as described by Guth (2019). Crumpler and Lewis (2019) stated, graduates need extensive training before beginning work and, is further exacerbated as students graduate under- or unqualified to enter the workforce. Crumpler and Lewis further stated employers are finding graduates lacking in foundational skills needed to meet the evolving cybersecurity landscape. Chan et al. (2018) found a cybersecurity faculty shortage affected the quality of courses and hindered the development and advancement of foundational technological skills.

A lack of professionals entering academic programs is described within the literature and yet does not clarify the factors stifling cybersecurity career interest (Anderson, 2016; Castro, 2018; Guth, 2019). Cybersecurity-related lived experiences are absent from the literature. Rich descriptions and understanding of the lived experiences of cybersecurity educators help academic and career counselors make stronger alliances by offering a richer understanding of the population's individual experiences through narrative (Creswell & Creswell, 2018). Interviews supplied rich and deep insight into the complexity of interactions by the cybersecurity educator population's experiences (Creswell & Creswell, 2018). Revealing specific issues cybersecurity educators experience, the phenomenological study added rich narrative information for future creation of academic and career development tools.

Purpose of the Study

The purpose of the qualitative phenomenological research study was to explore how lived experiences influence the career decision making of 17 cybersecurity persons in Texas who enter postsecondary education (Guth, 2019; Nakama & Pullet, 2018). Using phenomenological inquiry, a deeper understanding of how postsecondary academic program preparation and experiences impact the career decision-making process can be revealed (Chipidza et al., 2019). The study used qualitative interviews employing video-conferencing collaboration tools. Through the interview process, semi-structured interview questions were used to drive data inquiry focused on the lived experiences of cybersecurity persons. The study contributed to the narrative body of knowledge by supplying a richer understanding of authentic lived experiences of cybersecurity educators. Through the examination of the data, richer meanings of cybersecurity educators' experiences in Texas were supplied. Supplementing the existing qualitative research, the study used the frameworks of social cognitive career theory and transformative learning theory grounded in cybersecurity decision making (Chipidza et al., 2019). The study uncovered events of cybersecurity educators' experiences leading to the decision to become educators and adding deeper insights for the future construction of academic and career development instruments.

Significance of the Study

As technology has evolved, colleges can offer different formats enabling students to attend classes from any location. With the added flexibility and availability of class formats, colleges are reporting fewer students entering technology fields. Research suggests students are abstaining from entering technology-related fields at growing rates (Aeschlimann et al., 2016) and instead enter academic-related roles.

The study's findings and recommendations can enable academic recruitment professionals to establish new strategies of identifying potential cybersecurity faculty and recognizing appropriate cultural fit, furthermore allowing human resource personnel to assemble a clear picture of what technology professionals may add to an organization. The research identified pertinent information that can be used to improve the candidate selection process in information technology organizations. The study benefited recruiting practices in the fields of academic advising and admissions as well as informing the literature of human resource management.

Research Questions

The research was phenomenological in nature and described the experiences of cybersecurity educators' occupational decisions yet lacked a depiction of the factors inhibiting career interest. The design of the research questions was to elicit, in the words of cybersecurity educators, the experiences that influenced the occupational choice to enter cybersecurity postsecondary education. The following questions guided the study:

Research Question 1: What personal experiential factors prompt cybersecurity technologists to enter the field of postsecondary education rather than corporate employment?

Research Question 2: How does the experience of cybersecurity technologists pursuing academic degree programs influence the career choice to enter postsecondary education?

Theoretical Framework

Social cognitive career theory and transformative learning theory provided the theoretical foundation of the qualitative phenomenological research study. Upon graduating college, a key decision of which career focus to enter should be made (Lent & Brown, 2019, 2020). Graduates ask themselves how to use the skills learned and the type of workplace setting most appropriate

for occupational success. Understanding the detailed experiences leading to a satisfying and rewarding occupation is vital. The level of commitment is adjusted when looking through the lens of interest and earlier experiences (Lent & Brown, 2019, 2020).

Previous research ascertained the impacts of immersive experiences and rates of persistence through academic programs of individuals who transitioned from a career in cybersecurity to higher education (Brooks, 2015; Kennedy et al., 2015; Onwuegbuzie & Hwang, 2019; Xu, 2018). Speculation surrounds the experiences affecting a person's economic status (Mwangi et al., 2017) or religious beliefs (Cannon & Morton, 2015). Subsequently, the studies were viewed through the lens of two theoretical frameworks, ensuring the chief ideologies of career decision making were the focus. The theories grounding the study were social cognitive career theory and transformative learning theory.

Social cognitive career theory was used for measuring how occupational decision making and implications of career development relate (Akman, 2016; Carrico et al., 2019; Ehrhardt & Sharif, 2019). Lent and Brown (2019, 2020) and Bandura (1986, 2019) established social cognitive career theory to aid the understanding of influential characteristics throughout the occupational decision-making process. Three baseline social cognitive methods are the foundation of social cognitive career theory: offering understanding between (a) the relationship of occupational interest, (b) the act of decision making, and (c) career perception (Carrico et al., 2019; Lent & Brown, 2019, 2020). Drawing on the predominant quantitative method, social cognitive career theory is grounded in practitioner descriptions of rational analysis questioning, with credible decision makers who recognize the traits impacting the decision-making process (Samson et al., 2018).

Transformative learning theory is grounded in cognitive and developmental psychology

(Landry-Meyer et al., 2019; Mezirow, 1991). The transformative learning model's underpinnings surround the activity of learning experienced by a student and the educational experiences designed to cultivate the educational activity, resulting in a medium for a transformation to transpire (Landry-Meyer et al., 2019; Mezirow, 1991). Transformative learning theory describes a framework for connecting individual experiences that shape occupational choice and occupational opportunity (Coke et al., 2015; Landry-Meyer et al., 2019; Mezirow, 1991).

Definitions of Terms

Several terms are dominant in the literature on occupational preparation. The terms and concepts are germane to the study and emerged from the review of the literature. The key concepts and terms applicable to the study are defined as follows.

Academic Persistence. Academic persistence is the continued movement toward the completion of an educational degree program (Brubacher & Silinda, 2019).

Cybersecurity. Cybersecurity is the defense of networks, computing devices, software programs, and data from attack, corruption, or unauthorized access through the body of technologies, processes, and practices designed to facilitate protection (Hatfield, 2018).

Executive Order. An executive order is “a signed, written, and published directive from the President of the United States that manages operations of the federal government” (American Bar Association, 2018, para. 2).

Experience. Experience is the interlacing of human interaction or observation of an event or fact within the context of the individual's environment (Wroblewska, 2019).

Information Security. Information security is the defense of networks, computing devices, software programs, and data from attack, corruption, or unauthorized access through the body of technologies, processes, and practices designed to facilitate protection (Hatfield, 2018).

Nash/Pareto Equilibrium. Game theory relies on a mathematical comparison of the benefits of self-interest when individuals interact with others. A game consists of at least two players, at least two actions for each player, and a set of payout functions, one per player. A Nash equilibrium is a strategic profile in which each player's strategy is a best response to the strategies chosen by the other player. A Pareto equilibrium is a strategic profile in which no player's strategy dominates (Lozan & Ungureanu, 2012).

Self-Efficacy. Self-efficacy is the confidence of personal competencies. Self-efficacy refers to the individual judgment of one's competence to shape and perform a course of action necessary to achieve a specific level of performance (Bandura, 2019).

Social Cognitive Career Theory. Social cognitive career theory is based on the description of features enabling patterns of lived experiences through the development of basic occupational traits and decisions (Lent & Brown, 2019, 2020).

Technologists. Technologists possess larger volumes of field knowledge in the technology discipline and tend to look after technical equipment (Song & Chen, 2019).

Transformative Learning Theory. Transformative learning theory is based on learning practices grounded in developmental and cognitive psychology involving 10 concepts resulting in a transformation of learning (Dirkx et al., 2006; Mezirow, 1991).

Underrepresented Student Populations. Underrepresented student populations include students from groups having traditionally struggled to be represented in higher education, including groups of racial/ethnic minorities, first-generation college students, students with disabilities, and students from families of lower socioeconomic status (Piatt et al., 2020).

Assumptions

Qualitative researchers possess an inherent assumption of reality being subjective and

multiple as seen through the lens of the study's participants (Moustakas, 1994). A key philosophical assumption of qualitative research, as Merriam (1998) stated, is reality is constructed by individuals interacting within the context of the person's social world. Throughout the interview sessions, an assumption was all research participants spoke candidly and truthfully when responding to interview questions. All participation was voluntary, and all participants understood the study intended to pursue publication (Mertler, 2016). Maintaining anonymity for each participant was critical (Creswell & Creswell, 2018; Moustakas, 1994). The expectation was the study's participant pool was agreeable to the findings being included as part of the published report (Mertler, 2016). The study's results should not be presumed to be valid and transferable for all cybersecurity educators throughout the United States (Creswell & Creswell, 2018; Moustakas, 1994).

Scope and Delimitations

The study centered on cybersecurity educators in Texas. Sampling was delimited to university and college cybersecurity educators who possess an appropriate academic degree, possess a minimum of 3 years' employment, and participate in the Texas regional cybersecurity user group. The scope and type of study placed restrictions on the transferability of findings to a larger, geographically diverse population of cybersecurity educators (Creswell & Creswell, 2018). The study used interviews with cybersecurity educators; an extended interview period was not selected due to time restrictions related to data collection.

The research delineated the explicit characteristics and location from which the participant pool was sourced (Simon & Goes, 2017). Qualitative study outlined specific time limits on gathering findings (Simon & Goes, 2017). The study's credibility was maintained through the use of member checking. Member checking provided participants with an

opportunity to correct interview transcripts and expand on responses (Creswell & Creswell, 2018; Peoples, 2020).

Limitations

The limitations of the study methodology include the sample size and convenience of sampling, impacting the identification of significant relationships from the data, which created difficulty in generalizability or transferability (Creswell & Creswell, 2018; Moustakas, 1994). The interview questions did not include issues emergent in the study, and the usage of virtual-conferencing technology reduced personal interaction (Creswell & Creswell, 2018; Moustakas, 1994). Other limitations include the use of myself, the researcher, as the primary instrument for data collection and analysis and participant job-related time restrictions. Potential for bias exists due to the geographical location of the participant pool used (Creswell & Creswell, 2018; Moustakas, 1994). Cybersecurity professionals and educators are located around the globe, but the research population for the study was restricted to the state of Texas. All of the participants were cybersecurity educators across Texas, located in various family, professional, and educational settings, comprising a variety of perspectives. The participant pool was diverse in nature, yet centrally focused in the predefined sampling area. The focus was on participants who possess skills in postsecondary cybersecurity education only, in an educator role.

Interviews were set to a maximum of 90 minutes, with an initial interview period lasting up to 60 minutes and a follow-up lasting up to 30 minutes for transcript review and the addition of any details overlooked during the initial interview session (Moustakas, 1994). Time allowance was shorter based on participant requirements but lasted no longer than the allotted time, to respect the schedules of the participants (Moustakas, 1994). The break between the interview and follow-up sessions was no less than 3 days to allow the participant adequate time to reflect on the

previous interview session and consider experiences for the follow-up and transcript review session (Creswell & Creswell, 2018). Furthermore, the data collection method was limited to the use of online video-conferencing technology. The study acknowledged not having an opportunity to observe participants' nonverbal cues to aid in guiding the interview process as part of the limitations of camera view using video-conferencing technology.

Chapter Summary

Due to a shortfall in trained cybersecurity people, colleges and universities need to attract faculty to support degree programs. The United States needs an infusion of postsecondary educators to create exciting activities which can help sustain cybersecurity program achievement. The qualitative research study advanced the understanding through the lived experiences of cybersecurity majors who decided to enter an educator role in the field of higher education. The objective was to present participant decision-making processes as a shift from college graduate to full-time educator was undertaken.

The study findings inform academic advisors and recruiters of the challenges and obstacles being faced before and during the occupational decision-making process. The research questions that guided the study, operational definitions of key terms, assumptions, limitations, and delimitations were described. A review of literature in the next chapter, associated with subject matter expert experiences and connections to the existence of a gap in the focus on the key area of occupational preparation for a career in higher education, is explored in greater depth and frames the need for the research study.

Chapter 2: Literature Review

In the United States exists a shortage of skilled cybersecurity personnel entering the field of higher education. Numerous academic programs exist in the United States, yet only 3% of undergraduate degree recipients possess a degree in the field of cybersecurity (Executive Order No. 13800, 2017; Freeze, 2019; Guth, 2019; Prescod et al., 2019). The problem is a critical need for cybersecurity persons entering postsecondary education (Executive Order No. 13800, 2017; Guth, 2019). The purpose of the phenomenological qualitative research study was to explore how lived experiences influence cybersecurity persons to enter postsecondary education (Guth, 2019; Nakama & Pullet, 2018). Both public and private sector organizations fight to employ skilled and trained cybersecurity persons to guard digital technology assets (Crumpler & Lewis, 2019). A survey by Crumpler and Lewis (2019) while at the Center for Strategic & International Studies noted the United States is facing a shortfall of educated cybersecurity persons to meet the country's cybersecurity needs. Individuals enrolled in cybersecurity-degree programs are driven by a decision to join the ranks of higher education faculty versus a corporate professional role (Crumpler & Lewis, 2019). The literature review for the qualitative study is presented in this chapter detailing the literature search strategy, the theoretical frameworks used to guide the research study, the review of literature as pertains to the research topic, and a summary of the literature as related to the research study.

Literature Search Strategy

A compilation of literature used various keyword and phrase searches developed from the context of the research questions. The search responses were reviewed and categorized by theme to aid in the literature review assembly process (Grewal et al., 2016). The categorization process arose through a systematic grouping of the literature into diverse themes. As a result, five major

themes emerged: academic persistence, career progression, social factors, academic institutional factors, and religious involvement. The grouping method arose from a methodical organization of the literature divided into corresponding themes, guiding the organizational structure of the literature review.

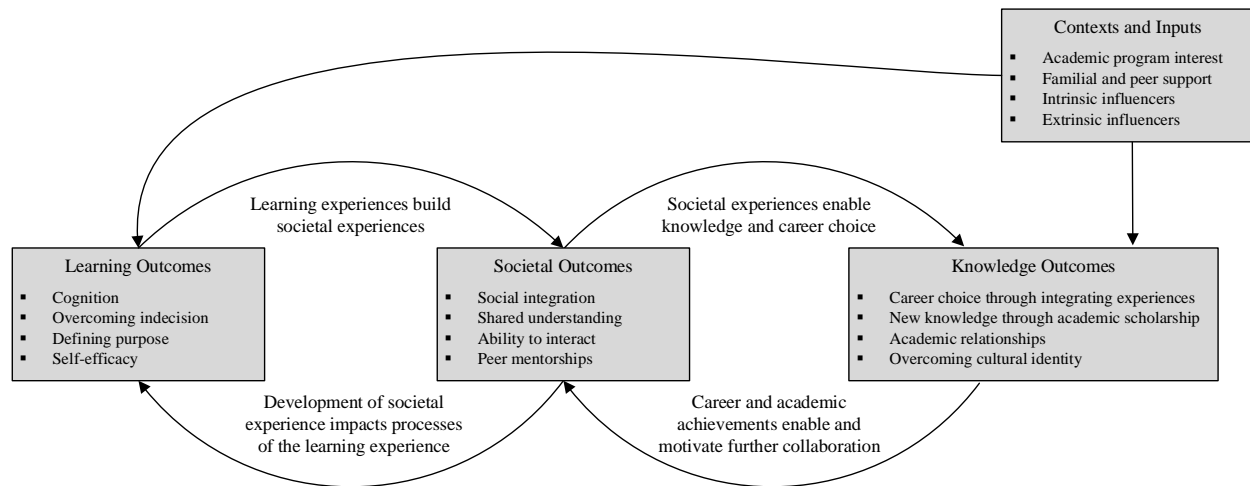
The literature search was conducted using the online databases in the American College of Education library and sought scholarly literature using Google Scholar. Scholarly peer-reviewed articles were sourced using online scholarly databases. Additional resources discovered online and retrieved for the study encompassed governmental reports and executive orders, scholarly journals, books, and historical data from the websites of the Federal Register, APA PsycNET, Institute of Education Sciences, International Scholarly Research Notes, Health and Human Services Public Access Library, Multicultural Education Journal, Educational Leadership Journal, Cybercrime Magazine, and Education Sciences Journal, and hard copies of books were retrieved from personal and professional libraries. Key search terms included *career development, career counseling, influential factors, experiential traits of technology professionals, cybersecurity as a career, psychological adjustment, decision theory, career theory, social cognitive theory, technology and cybersecurity competencies, cybercrime, information assurance, information assurance education, information security education, information security, educational technology, computer science education, higher education, game theory, information technology education, and information technology*.

Theoretical Framework

The theories used in the study are Lent et al.'s (1994) social cognitive career theory and Mezirow's (1991) transformative learning theory. Social cognitive career theory emphasizes three core ideas: self-efficacy, outcome expectations, and personal goals (Bandura, 2019; Lent,

2005; Lent & Brown, 2019), whereas transformative learning theory emphasizes the usage of a 10-step learning process (Mezirow, 1991). Central variables in the process to decide on a career are commitment to the selected field and the time investment to secure viable cybersecurity employment (Lent & Brown, 2019).

Figure 1 depicts social cognitive career theory's applied decision-making process within the context of cybersecurity career choice. Starting on the right, the contexts and inputs relate to the factors informing Lent and Brown's (2019, 2020) social cognitive career theory's prediction of ways in which individuals build career interest and Mezirow's (1991) transformative learning theory's constructivist view of learner interpretation of experience. The next step is split and supports learning outcomes defining the task-oriented problem-solving relationship of learning instrumental and communicative learning processes (Landry-Meyer et al., 2019; Mezirow, 1991). The learning outcomes are coupled with support from social cognitive career theory's interest development to growing interest during the engagement process of academic program involvement (Lent, 2005; Lent & Brown, 2019, 2020; Lent et al., 1994). As the learning experience evolves and builds on the societal outcomes through expanded career interest and academic performance, peer relationships, and social interaction, the experience enables knowledge and career choice (Bandura, 2019). The process is cyclical, and, as defined within transformative learning theory, reinterpretation drives achievement and motivates the societal outcomes, furthering the learning experience through the impact of experiences. Critical career choices arise through a decision analysis process leveraging the interplay among the social cognitive career theory and transformative learning theory as applied to cybersecurity's career interest and occupational choice.

Figure 1*Conceptual Framework of Cybersecurity Career Decision-Making Development***Social Cognitive Career Theory**

Lent et al.'s (1994) social cognitive career theory expanded on Bandura's (1986) social cognitive theory and offered a framework for synthesis grounded in career decision-making theory. Offering a unification of fundamental theories, social cognitive career theory defines a systematized method into a study of career decision making (Lent & Brown, 2019). Social cognitive career theory is regarded as an influential method for the assessment of whether individual relations at an early stage influence the decision-making process and likely possess implications for the advancement of career-seeking traits (Akman, 2016; Carrico et al., 2019; Ehrhardt & Sharif, 2019). Lent et al. (1994) developed social cognitive career theory to assist in understanding the meaning of characteristics prompting the decision-making process. Social cognitive theory was expanded to include academic learning success with the introduction of social cognitive career theory (Bandura, 2019; Lent & Brown, 2019; Lent et al., 1994). In social cognitive career theory, the term *career* signifies the blending of academic interest, choice, and performance (Smith, 2002). The frameworks offered by social cognitive career theory are meant

to explain educational and occupational conduct. Akman's (2016) research of 160 participants examined the theory supporting academic advancement as a complement to social cognitive career theory's occupational meaning and decision-making processes when utilized in a classroom setting.

Social cognitive career theory highlights baseline social cognitive traits, presenting understanding into the associations among occupational interest, event choice, and insight (Carrico et al., 2019; Lent, 2005; Lent & Brown, 2019). Decision theory is rooted in the quantitative mathematical model used for evaluations in terms of truth and probability; social cognitive career theory furthers decision theory's quantitative model by introducing a career practitioner focus (Samson et al., 2018). Samson et al.'s (2018) study of 159 participants focused on social cognitive career theory's quantitative model leveraging practitioner explanations of an examination of questions, with a belief that decision makers can recognize the added factors influencing the decision-making process.

Social cognitive career theory as related to social cognitive theory offers a specific framework for research relating to the career decision-making processes (Lent, 2005; Lent & Brown, 2019). Social cognitive career theory unifies and organizes career decision-making factors (Lent, 2005). The factors are divided into clear focal areas allowing the examination of how cultures (a) mature vocational interest, (b) decide on and reconsider career selection, and (c) identify fluctuating levels of vocational success and fidelity (Lent & Brown, 2019).

Transformative Learning Theory

Mezirow's (1991) transformative learning theory was founded from a union of developmental and cognitive psychology (Landry-Meyer et al., 2019), facilitating a learning model concentrating on the features prompting career decision making (Coke et al., 2015).

Transformational outcomes are the result of learning how events experienced by a pupil, and an academic experience, are designed to nurture the academic process resulting in a reagent for a transformation to transpire (Landry-Meyer et al., 2019; Mezirow, 1991). Transformative learning theory describes how firsthand experiences shape career decision making among educational or corporate career prospects (Coke et al., 2015; Landry-Meyer et al., 2019; Mezirow, 1991).

Transformative learning theory was applicable to the study as personal experience shapes career decision making when choosing entry into postsecondary education-related cybersecurity academic roles. Individuals possessing an aptitude toward technology can be enticed by the cybersecurity field's study of digital crime activity and immersive computing experiences (Rosidin et al., 2019). Conversely, attitudes and experiences change perspective, triggering some to reject a career in the field (Fulmer, 2014; Rosidin et al., 2019). The change in mindset is grounded in beliefs and bias transforming the frame of reference. Adults change mindsets frequently as the type of experience shifts, leading to a change in faith, beliefs, bias, or knowledge (Shaw, 2019). Michael's (2019) study of 110 career-seeking participants suggested the struggles individuals encounter have a direct influence on the decision-making process and impact occupational choice.

Research Literature Review

A review of literature linked to cybersecurity occupational choice adds to the understanding of the problem addressed in the study. Themes related to the problem and research questions include a historical perspective of cybersecurity, an investigation of cybersecurity, the role information technology cybersecurity plays, and the influences impacting a student's occupational decision to enter the cybersecurity field. Broader categories of career-influencing factors were used to structure the research literature review.

Historical Perspective of Cybersecurity

Cybersecurity, previously known as information assurance and information security, evolved in response to technological digitization of information and information transfer (Grimes & Wirth, 2017; Peretti & Abbas, 2017). Cybersecurity involves the prevention and mitigation of unauthorized access or use of an organization's digital systems while including the protection of an organization's information assets (Patrascu, 2019). Increasingly, information and critical infrastructure have moved into the online arena, thus leading to increased cyberattacks (Cabaj et al., 2018). Traditionally, cybersecurity resides within the domain of an organization's information technology department; furthermore, as organizations steadily digitized operations, the information technology department gained a range of responsibilities in the implementation, administration, and security of technology operations (Grimes & Wirth, 2017). Cybersecurity is a complex area of study and lacks a succinct and accepted definition that encompasses the various disciplines comprising the growing field (Grimes & Wirth, 2017; Peretti & Abbas, 2017).

As the era of large-scale data breaches ensued, legal practices surrounding compliance, incident investigation, and response both matured and separated from traditional information technology responsibility (Mahbod et al., 2019; Patrascu, 2019). During the same timeline, the rate and size of cyber-related incidents expanded, capturing the national spotlight and focusing legislation and regulation on data security practices (Grimes & Wirth, 2017; Mahbod et al., 2019; Patrascu, 2019). As the number of cybersecurity incidents rises, government regulators expect a baseline level of digital security and preparedness within organizations, further complicated by the effects of the rising incidents of cybercrime needing further focus on defense efforts (Mahbod et al., 2019).

Cybersecurity Education

Cybersecurity, although an attractive field within the information technology spectrum, is complex and often intimidating due to the difficulty and breadth of areas covered in the coursework of the academic program (Kam & Katerattanakul, 2019; Nyinkeu et al., 2018; Ricci et al., 2019). Faculty need to devise a set of engaging experiences to generate excitement in the cybersecurity academic program. Ricci et al. (2019) emphasized educational programs are crucial to expand awareness of the need for cybersecurity, furthered by an approach suggested by Kam and Katerattanakul (2019) to leverage out-of-class learning methods for greater performance and achievement. Furthermore, the shortage of students entering the cybersecurity workforce and organizations demanding fully trained practitioners are not able to be fully addressed (Cabaj et al., 2018).

Cybersecurity education emphasizes application and implementation, while information technology emphasizes theory and conceptual frameworks (Saulnier et al., 2019). The primary goal of information technology is to create a faster and lower-cost mode of digital communication transfer referencing the open system interconnection model's standardized communication and computing systems functions (Uiphanit et al., 2019). The type of occupations categorized as cybersecurity includes risk management, network security, security planning activities, and improving communication among systems and networks in a secure and encrypted fashion. Cybersecurity technologists solve real-world problems using innovative techniques to create a secure boundary around companies' information assets (Uiphanit et al., 2019).

Impacting Extrinsic Influences

External influences impacting career decision making include cultural and societal

factors; pressures from peers, family, and faculty; and the mentoring process (Brooks, 2015; Kennedy et al., 2015; Onwuegbuzie & Hwang, 2019; Xu, 2018). The effects of a socially immersive experience and academic persistence rates influence students' interest in academic programs and have a greater impact on the choice to pursue a cybersecurity major (Brooks, 2015; Kennedy et al., 2015; Onwuegbuzie & Hwang, 2019; Xu, 2018). The extrinsic influences subsection explores peer, familial, institutional, faculty, and mentoring factors affecting occupational decision making.

Social Influences

Peer relations are critical for supporting student collaboration activities, facilitating academic completion, and self-efficacy during the academic journey. Peer and faculty interactions facilitate social integration preparing students for integration into the workplace (Inan et al., 2016). Social integration characteristics are integral for cybersecurity education graduates' success in the transition to the job market (Inan et al., 2016). Students expressed building a community of faculty and peers identified the importance of success and persistence of cybersecurity academic program achievement (Inan et al., 2016). Building a peer community and support system aids to lessen the sensation of isolation contributing to student attrition. Cybersecurity and college students, in general, seek out support structures in the educational setting to aid in defining the student from others in a field of study (Leenknecht et al., 2017). Thus, cybersecurity educational programs involve identifying the critical concepts within the cybersecurity discipline to build a practitioner-focused program (Inan et al., 2016). Cybersecurity is a maturing discipline, and contribution from practitioners in the community is critical to ensure the continued growth of the cyber discipline (Inan et al., 2016).

Familial Influences

Mwangi et al. (2017) examined the influential factors of 68 families and found familial influence is essential to understanding student experience, as the familial ethos defines the discipline of education emergent from the family unit. Education is often seen as a path out of poverty, and impoverished families tend to place high importance on labor and ambition vital to the pursuit of a degree program creating career opportunities (Brooks, 2015; Xu, 2018). For underrepresented students, the concept of higher educational pursuit is seen as a process of returning equity to the community and the option to act as a role model to others by leveraging skills learned during the educational process and within a career field (Brooks, 2015). Student involvement in collegiate activities is essential for academic and career success (Brooks, 2015).

Institutional Influences

Societal influential factors impact academic program persistence for students, yet the higher education institutional influential factors play a critical role in academic program achievement and persistence. The structure of the academic program can influence a student's program persistence. Academic program structure is expressed in terms of curricular assignments and resources pursuant to achievement (Onwuegbuzie & Hwang, 2019). Students enrolled in distance academic programs often maintain full-time employment and manage familial commitments, in addition to attendance and study commitments, influencing persistence and achievement (Onwuegbuzie & Hwang, 2019). Academic program convenience and a capacity to balance work, family, and academic program obligations are additional factors influencing student academic persistence. The instructional delivery method of an academic program—online, onsite, or cohort—can additionally influence student persistence (Onwuegbuzie & Hwang, 2019).

Students find solace in being provided clear rubrics, coursework guidelines, and a structured academic program of study. When the necessary provisions are lacking, students can become upset with the progression and likely not persist (Brooks, 2015). Akturk and Ozturk (2019) surveyed 78 students focusing on self-efficacy and academic achievement. Respondents shared a critical element of a need to be linked to the academic institution (Akturk & Ozturk, 2019). The link to the institution was not a derivative of a personal relationship with peers or faculty but an intrinsic feeling through the culture and atmosphere in the hallways and how interactions took place (Akturk & Ozturk, 2019). The program structure needs to create a welcoming environment, enabling the students to persist throughout the academic program.

Allowing for specific academic program models, a cohort-type model has been found to be effective for student academic persistence (Acosta et al., 2015; Al-Busaidi et al., 2019). Using a cohort model, students pursuing an academic program reside in the program together and proceed through the process together, allowing for a shared set of experiences in the context of the academic program, and persist to graduation together (Al-Busaidi et al., 2019). Students who completed an academic cohort-style program indicated the structure and layout of the program had a direct impact on the persistence of the students (Acosta et al., 2015; Al-Busaidi et al., 2019). Good faculty facilitators, who were easily accessible and approachable, contributed to student success and persistence in the academic program (Al-Busaidi et al., 2019). Institutional influences are contributing factors to student success and persistence within the contexts of departmental culture, institution policies, academic advising, and faculty relations (Onwuegbuzie & Hwang, 2019).

Institutional Departmental Cultural Influences

As students experienced academic programs, the students consistently expressed

institutional departmental culture as critically important to the overall student experience (McAndrew et al., 2019). The culture of the academic institution is particularly significant as many students perceive academic institutions as being inherently discriminatory (Soni & Govender, 2017). Students crave an equitable and interwoven culture in the academic setting and are not driven by specialized programs focusing on diversity needs (Soni & Govender, 2017). McAndrew et al.'s (2019) study of 814 students entering academic programs across various universities showed students being impacted by racial dominance, which bled into and impacted the academic departmental culture. Students attending racially unbalanced universities tend to be more apt to experience negative values driven by the cultural environment and student-held values (McAndrew et al., 2019). Underrepresented students tend to face higher stress levels and heftier challenges in the educational environment, and the research suggests students are marginalized (McAndrew et al., 2019). Gender imbalance impacts culture as students may be fearful to ask questions or seek out information (Conger & Dickson, 2017). Universities that show gender and racial bias intrinsically provide the dominant student population with the support and community needed in an academic setting to persist through the academic program of choice.

Faculty Influences

Faculty relationships are important influential factors as faculty members support the research agenda of the institution (Giles, 2016). Zagirova's (2018) study of graduate students from 36 higher education institutions found students' research topics tended to be aligned with topics of personal interest. Academic program faculty serve in roles as academic advisors and research mentors helping to facilitate research in the student's interest area, helping the student navigate the academic environment. Connections with college professors are an influential factor

for students in cybersecurity programs and critical to student academic persistence and success (Kennedy et al., 2015). A study of 148 students progressing through cybersecurity academic programs by Chen et al. (2020) revealed the students found waiting for feedback in online learning frustrating and preferred shorter response times. Students indicated positive, encouraging relations with faculty aid in the forward momentum of the students' academic journey (Kennedy et al., 2015). Deniz's (2020) study of 20 students' interactions with faculty found the interactions to produce positive results; the absence of a faculty-student relationship can drive academic attrition. Supporting faculty-student interactions allow faculty to serve as mentors to students, impacting academic program success and completion.

Mentoring Influences

Mentoring can be a powerful tool for assisting academic program students with differing stages of needed support to become successful in academia and life (Cannon & Morton, 2015; Lienard et al., 2018). Assistance of another who is aligned with the student's research interests and understands the dilemma a student faces can have a positive impact on the overall cybersecurity student experience (Bustard, 2018; Zagirova, 2018). The relationship helps to align academic and personal support, allowing for a more authentic student experience, leading to academic success (Lienard et al., 2018). Hands' (2018) research yielded evidence of a relationship between completing an academic degree program and mentorship of younger generations. Hands (2018) further stated mentorship is a viable way to illustrate to younger generations career dreams are obtainable and, as a result, students who complete academic degree programs become positive role models.

Impacting Intrinsic Influences

In contrast to extrinsic influences, intrinsic influences include personal goals and duties,

self-assurance of innate ability, and personal background playing into cybersecurity occupational interest. This kind of inner experience can enhance cybersecurity-related activities, forming the necessary elements needed for students considering a cybersecurity academic program and a career in higher education (Acosta et al., 2015; Bustard, 2018; Hands, 2018). Diekman et al. (2010) conducted a study of 333 students from technology and introductory psychology classes and requested the students rank the importance of occupational interests and occupational goals. Additionally, Diekman et al.'s study revealed shared goals inhibited technology-related occupational career interest. The challenge of recruiting students who embrace computer and information sciences with interests in cybersecurity continues unless influential factors can be mitigated.

Personal Influences

Personal influences are defined as traits intrinsic to the individual (Onwuegbuzie & Hwang, 2019). Cybersecurity students enrolled in doctoral programs identify with the level of difficulty to achieve a graduate degree and are motivated to attain the degree (Bustard, 2018; Hands, 2018). Graduate students can sustain and persist as the graduate or postgraduate degree is a personal goal and success is the only inherent option (Hands, 2018). Family support enables students to maintain persistence and drives academic achievement. Students may have a sense of motivation as a competing factor to student peers (Onwuegbuzie & Hwang, 2019). Graduate students' attitudes and self-awareness influence the ability to persist through the academic program. Parental influences consist of educational background and level of income, thus influencing the educational and professional goals of the student. Economically frustrated students do not possess such advantages and face obstacles in achieving educational and professional goals (Onwuegbuzie & Hwang, 2019). Cybersecurity postgraduate students indicate

completing a postgraduate doctoral degree is challenging and creates moments of self-doubt and fatigue, shaking the students' confidence to persist and complete the academic program (Acosta et al., 2015; Bustard, 2018; Onwuegbuzie & Hwang, 2019).

Higher education can often be viewed as a duty to lift the community and provide a give-back mentality. Students indicate the motivation to persist through an academic program aligns with the idea of uplifting the community through academic degree completion (Bustard, 2018; Onwuegbuzie & Hwang, 2019). According to Acosta et al. (2015), students possess an intrinsic need to persist throughout an academic program so as not to disappoint family and peers. Students facing adversity during an academic program and possessing the intrinsic need to please family continue to persist (Acosta et al., 2015). Students without the need to not disappoint families are likely to withdraw from the academic program (Acosta et al., 2015; Hands, 2018).

Cybersecurity students assert program persistence is rooted in cultural identity and is believed to lay the foundation for future generations of scholars (Acosta et al., 2015; Bustard, 2018), while students in other academic programs view program persistence as being emancipated from familial support, expressing to future generations the success connected with academic program completion (Acosta et al., 2015). Shavers and Moore's (2019) study did not include inherent motivational factors and the impacts to self-efficacy relating to academic program and professional success. Shavers and Moore instead examined participants' shared perceptions relating self-efficacy and drive to persistence throughout an academic program. The influence and impact of cultural and racial identity can serve as a motivational factor for persistence in the chosen academic field.

As outlined in the context of social cognitive career theory, the concepts of self-efficacy and self-esteem are found to be highly motivational and influential factors leading to the

persistence of academic study (Bandura, 2019). Self-efficacy comprises self-reflected attitude, self-evaluation of ability to succeed in a specified field, and a sense of calling (Bandura, 2019; Cannon & Morton, 2015). Self-efficacy directly contributes to the pursuit of an academic degree and parlay into vocational choice (Bandura, 1986, 2019; Bustard, 2018). Cybersecurity students indicate self-belief of degree persistence elevates the potential for degree completion (Bustard, 2018; Shavers & Moore, 2019). Student academic persistence is impacted by gender representation, a diverse racial presence, and a lacking sense of comfort (Bustard, 2018). As academic progress is being made, underrepresented students battle internally to muster the strength to persist through the already difficult academic program and rise above the challenges to complete the academic degree (Shavers & Moore, 2019). Numerous cybersecurity students relate continued academic program persistence to positive feedback from faculty and peers generating continued motivation (Shavers & Moore, 2019). Positive appraisal serves as a critical motivational trait to flow into self-efficacy and persistence in an educational setting.

The Religious Influence

Issues of religious influence are likely associated with the computer science and artificial intelligence aspects of the information security field. Correspondingly, the level of religious belief may influence career decision-making processes and long-term academic and career goals (Cannon & Morton, 2015). Cannon and Morton's (2015) study examined the career decision-making process and the impacts strong religious connections have on career choice. Religious undertones impact the context of meaning and can impact career choice as opposed to traditional influential factors based on decisions from familial and peer pressures (Cannon & Morton, 2015).

Cybersecurity Occupation

Guth (2019) indicated a demand for skilled cybersecurity professionals continues to increase, and newly educated cybersecurity technologists are required to fill the increased demand. The growth in employment in both cybersecurity professional and academic occupations began to increase in the mid-1990s and expanded dramatically in the early 2000s. A survey conducted by the Center for Strategic & International Studies showed approximately 314,000 unfilled cybersecurity-related jobs in the United States (Akman, 2016; Crumpler & Lewis, 2019; Roy, 2019). Venter et al. (2019) focused on earnings and identified cybersecurity technologists, on average, earn more money than many other information technology occupations, even with a lack of graduate-level education. Even in a climate of economic downturn, cybersecurity technologists are less likely to experience job loss (Venter et al., 2019). The future of information security may depend on the skills of technologists and the creation of new opportunities. Additionally, organizations need to attract and retain skilled cybersecurity technologists as the rewards outweigh the challenges of becoming proficient in cybersecurity (Akman, 2016).

Educational initiatives need to concentrate on increasing the number of students who declare cybersecurity, information security, or information assurance as a major (Leslie et al., 2015). Students heading to college with aspirations of majoring in cybersecurity can compete in the narrow information technology job market (Wynne et al., 2019). Career possibilities are immense with a vast number of technological and cyber-related roles. Wynne et al. (2019) examined 953 students' motivational factors that directly impact academic program decision making in technology-related degree programs and further examined student backgrounds, perceptions, concerns, and aspirations affecting student academic experience; the factors had a

direct impact on how higher education administration and professors develop policy and curriculum supporting technology-related programs. A mentor in the cybersecurity field can influence the protégé to enter a cybersecurity-related field of study. Shi and Cui (2020) examined 645 underrepresented students and focused on the lack of advantage and the continuance of encountering obstacles in achieving academic and professional success. Wynne et al. suggested the socioeconomic advantage is present for certain populations of students, consequently impacting both academic and professional decision making.

Impacts on Career Choice

Cybersecurity professionals need to sustain current and relevant knowledge of the latest technological and cybersecurity advances (Sarker et al., 2020). As organizational conditions continue, cybersecurity technologists, need to maintain decision-making abilities in the cutting-edge technological arena, where partial information on a technology or subject may exist (Linde & Miller, 2019). This basic framework is critical to possess a clear understanding of the cybersecurity paradigm, aligning with individual self-identification (Bandura, 2019).

Social Cognitive Theory's Impact

Decision theorists approach decision making using mathematical techniques for explaining decision processes when resources are subject to limitations (Tenan et al., 2018). Decision making is driven using the least cost or highest profit potential. The cost-profit model adjusts for limitations with capacity and variables. Social cognitive theory is grounded in quantitative study and focuses on an interaction among cognition, behavior, and environmental factors driving self-efficacy (Bandura, 2019; Khudzari et al., 2019). Social cognitive theory's use of cognition, behavior, and environmental factors focuses on the concept of self-efficacy (Bandura, 2019). Social cognitive theory additionally includes external influences focusing on

career and academic decision making, personal performance in a designated subject area, learning processes, and social influences (Bandura, 2019). Corroboration of perceived self-efficacy research indicates self-efficacy measures contain direct influence over career choice (Bandura, 2019). Ghazzawi et al.'s (2020) study of 591 participants indicated a person's disposition can influence and drive work-related feelings and career choice. Furthermore, the study found underlying factors and inherent values confer professional satisfaction, influencing an individual's career decision-making process (Ghazzawi et al., 2020).

Social influence is a component of career self-realization, permitting peer and familial pressures to sway career selection (Singh et al., 2019). Singh et al.'s (2019) research on occupational decision-making identified decision making cannot be performed in isolation, and social cognitive behaviors, like self-efficacy, do not function independently of a social and environmental setting. McMahon and Patton's (2018) study of occupational choice examined the influences by actions surrounding the events in academic learning, professional training seminars, and retirement opportunities, while influential factors of family, peers, and job marketplace are recognized. The influencing factors have rarely been examined in association with career decision making (McMahon & Patton, 2018). When considering career choice, the subject of perceived vocational efficacy is a critical component of academic achievement in the subject area. Bandura (1986, 2019) identified self-efficacy as a vital component of the career decision-making process.

Decision Sciences Impact

Social cognitive career theory is supported by the decision sciences, rooted in Savage's (1954) decision theory and von Neumann and Morgenstern's (1944) game theory. Decision theory involves added action elements over just computing data as driven by game theory. Game

theory involves the utility of specific decision processes, and, if paused during the simulation, decision makers are likely not reap the data's full utility and meaning (Mosleh et al., 2020). The decision maker is required to scrutinize the outcome in a subjective way to determine the value for key probabilities (Mosleh et al., 2020); furthermore, the outcomes and risks contain predisposed constraints (Resnik, 1987). Computational significance of data can derive fears and be guardedly modeled as a component of the analysis process.

With the complexity of the contemporary world, surrounded by data, indecision, and risk, game theory offers a cogent decision-making methodology. Rapoport and Fuller (1995) suggested game theory's use of strategic decision making in simulated scenarios is focused on a player's ability to reason critically and carefully assess the game's decision-making patterns. The purpose decision theory exerts on science is to harvest a path, deliver information, look past the visible, and organize the decision-making process to deliver a clear, lucid decision (Mosleh et al., 2020; Rapoport & Fuller, 1995; Resnik, 1987).

Savage's Decision Theory's Impact. Savage's (1954) decision theory supports social cognitive career theory through the use of rational analysis interpretation focused on key human decision-making processes' deviation from normative decisions. Using the lens of decision theory, varying streams of literature were integrated into the concept of behavioral bias when applied to the decision-making process (Takahashi et al., 2020). Conflict and uncertainty are inherent in organizational collaborations. Decision theory conventionally concentrates on practitioners' explanations of rational analysis-based questions, with decision makers identifying the supplementary elements necessary for interpretation (Savage, 1954). Takahashi et al. (2020) examined conference as related to decision theory's science of assessing varied elections in terms of truth and probability. Bradley and Stefansson (2017) further supported decision theory's

truth and probability as indicating the core components being expressed monetarily leveraged for management's sake when reporting results. Decision theory bestows understanding into defining characteristics differing among results and facilitating alternative interpretations being groundbreaking and new (Bradley & Stefansson, 2017; Takahashi et al., 2020). Arithmetic data enumerate uncertain data sets enabling meaning of the decisional condition. The results are translated into mathematical expressions to yield qualitative meaning.

Practitioner experiences show not all decisions made are the correct decisions during the time of crisis and decisional mistakes are repeated, compounding the complexity of incident response reporting (Bradley & Stefansson, 2017). Practitioners of decision theory have seen the impact of decision-making processes in response to external pressures and other soft costs beyond practitioner awareness (Takahashi et al., 2020). The ethos of systems and policy analysis is to present a clear, logical viewpoint so decision makers can understand fully the depth of an event, deprived of adulteration by outside factors (Bradley & Stefansson, 2017; Takahashi et al., 2020). Additional factors may be genuine and significant to the decision makers in finalizing longitudinal decisions (Bradley & Stefansson, 2017).

Von Neumann and Morgenstern's Game Theory's Impact. Von Neumann and Morgenstern's (1944) game theory supports social cognitive career theory's framework through use of mathematically based decision-making processes. Game theory's development is derived to complement the notion of decision-making processes (Basarkar, 2020; Resnik, 1987; von Neumann & Morgenstern, 1944). The *prisoner's dilemma* is often referenced in television crime shows, where two suspects are apprehended for a crime and held in separate rooms unable to communicate with one another (Basarkar, 2020). The prisoner's dilemma occurs when an officer informs both suspects independently that if the suspect testifies against the other suspect,

criminal charges will not be brought against the testifying party. Alternately, if one subject does not cooperate and the other does, the uncooperative suspect will suffer a 3-year prison sentence. If both suspects confess, both will suffer a 2-year sentence, yet if neither suspect confesses, both will suffer a single year in prison. Cooperation would be the most advantageous strategy for suspects, yet when met with such a dilemma, research indicates rational persons desire to confess and testify against the opposing subject over remaining silent, chancing the other party confesses (Basarkar, 2020). The ideas of the prisoner's dilemma, Nash equilibria, and Pareto equilibria derived from the concepts of economists; game theory's application permits for significant development in recurrent and sequential game theory (Basarkar, 2020). Gamification allows faculty to present materials to students in ways to allow for greater understanding and clearer interaction during the learning process (Liu et al., 2020). Students lacking motivation is common for instructional staff, and the use of gamification provides the opportunity to overcome the issue and allows for increased student motivation and excitement (Basarkar, 2020).

Game theory is grounded in the ability to comprehend, assess, and manipulate arithmetic facts, to compose a decision-making model (Liu et al., 2020; Resnik, 1987). The decision-making model is essential to shape the model's makeup and assign probabilities and scientific values for computation (Edsall, 2019). Cybersecurity is a complex subject to instruct compared to mathematical foundations as cybersecurity technology is ever-evolving (Bradley & Stefansson, 2017; Takahashi et al., 2020). "Simple matching methods do not adequately consider rapid changes in technology and in the global economy that can destabilize initial career choices" (Lent & Brown, 2020, p. 16).

Gap in Literature

Guth (2019) stated cybersecurity is constantly evolving, thus creating challenges for

institutions of higher education to keep curriculum current. Guth further described the challenges are further worsened by a lack of cybersecurity educators. Dark and Mirkovic (2015) stressed the need to provide cybersecurity academic programs to address the cybersecurity industry needs. Anderson (2016) and Castro (2018) indicated unfilled cybersecurity positions are growing in number, driving secondary schools to provide cyber-related programs to grow interest in students. Dawson (2020) indicated a focused educational framework to address the ever-changing state of the cybersecurity landscape is needed.

Nagarajan et al. (2012) found cybersecurity learning using simulation software can drive understanding of incident response learning, a critical skill needed in cybersecurity. Kam and Katerattanakul (2019) and Tobey et al. (2014) described the impact of cybersecurity competition experiences within academic program coursework expands the learning process. As humanity progressively turns to technology for social and professional assignments, the status of computing education rises, facilitating the securing of information assets. Researchers have investigated predictors of cybersecurity-focused academic programs and performance in a single course, which then may not fully assimilate and immerse the students with the needed information to be successful in the cybersecurity field (Dawson, 2020). Smith's (2002) examination of 193 participants identified a lack of an appropriate model for exploring the problem solving of occupational choice in the information technology field of study. Bustard (2018) investigated the shift in perceived self-efficacy of technology to the pursuit of cybersecurity technology academic programs away from the professional setting. Bustard's study was deficient in longitudinal corroboration with the cybersecurity respondents to derive full meaning to illustrate the shift in perceived computing efficacy impacts in the academic context.

Numerous studies have been conducted within the context of social cognitive career

theory and are grounded in the quantitative method. Bandura (1986, 2019) influenced the field of social cognitive career theory by presenting longitudinal studies determining perceived self-efficacy as related to occupational choice. Lent and Brown (2019, 2020) and Olson (2014) examined key predictors concerning the self-efficacy belief and impacts associated with self-efficacy concerning career determination. Ghazzawi et al. (2016) substantiated Bandura's (2019) study referencing the sense of vocation driven by self-efficacy as contributing to the influencing of occupational choice. Groah et al. (2017) indicated perceived barriers have a direct relationship to perceived vocational-related barriers and can negatively influence career development and choice. Dawson (2020) suggested further research is needed to create an effective academic model to determine what factors influence cybersecurity career choice.

Chapter Summary

The literature suggested a gap exists in cybersecurity postsecondary graduates entering academic roles as opposed to corporate careers. Descriptions include the inequities (McAndrew et al., 2019), the societal effects or lack of community within the academic institution (Chen et al., 2020; Kennedy et al., 2015), and the motivational factors spawning cybersecurity academic and career interest (Mezirow, 1991). Students who persist and complete a rigorous cybersecurity academic program can rise to success in a professional or academic setting (Shavers & Moore, 2019). Job-related self-confidence is grounded in the experiences during the academic journey, being a requisite of evolving intrinsic and extrinsic motivational factors. With intrinsic and extrinsic motivational factors, cybersecurity students are poised to possess the inimitable ability to choose between a professional or academic path suiting the intellectual and moral capacity of the student (Deniz, 2020; Onwuegbuzie & Hwang, 2019).

The two steering theories, social cognitive career theory (Lent et al., 1994) and

transformative learning theory (Mezirow, 1991), give rise to the development of intrinsic and extrinsic motivational and experiential factors. Student views and motivational factors transform and evolve as a byproduct of events encountered and observed over time (Mezirow, 1991).

Although research comprises the exploration of the topic of retaining cybersecurity in the academic field, the results are diverse, creating a blurred picture. A rich account of the factors influencing career choice of cybersecurity graduates is crucial to understanding the underlying meaning of postsecondary educational career choice. The choice can be a task of religious beliefs, academic achievement, lived experience, or a combination of events; the individual needs to sort out what is most appropriate for the long term. The study's examining, classifying, and describing the lived experiences influencing cybersecurity majors to become postsecondary educators rather than enter a cybersecurity-related corporate environment was critical to extending the literature. An examination of the qualitative phenomenological study's methodology is introduced in the next chapter and addresses the qualitative research design, methodology, data collection, and reliability and validity procedures used to conduct the study.

Chapter 3: Methodology

Organizations rely on digital technology to enable information and assess artifacts to meet organizational decision making (Esposito et al., 2011; Williams, 1993, 1994, 1995, 1996, 2002). Organizations grapple to hire capable and skilled cybersecurity personnel to protect the organizations' digital assets (Crumpler & Lewis, 2019). A survey by Crumpler and Lewis (2019) on behalf of the Center for Strategic & International Studies, noted the United States is confronting a deficit of educated cybersecurity individuals to meet the requirements of the country. The problem is a shortage of graduates in the field of cybersecurity who choose to enter higher education over corporate roles (Executive Order No. 13800, 2017; Guth, 2019). Students enrolled in cybersecurity-degree programs are motivated by a choice to become educators or enter the corporate professional marketplace.

The purpose of the phenomenological qualitative research study was to explore how lived experiences influence cybersecurity persons to enter postsecondary education (Guth, 2019; Nakama & Pullet, 2018). The basis for the inquiry was to explore the essence of lived experiences (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994) of cybersecurity persons creating the blueprints and connections of authentic significance. Cybersecurity career specialization lends itself to a phenomenological research method. The phenomenological method provides an opportunity to explore the relationship between higher education academic training and the lived experiences associated with cybersecurity education professionals (Chipidza et al., 2019; Guth, 2019; Nakama & Pullet, 2018). The following research questions guided the study:

Research Question 1: What personal experiential factors prompt cybersecurity technologists to enter the field of postsecondary education rather than corporate employment?

Research Question 2: How does the experience of cybersecurity technologists pursuing academic degree programs influence the career choice to enter postsecondary education?

The framework of the research design and rationale for the qualitative research study are presented in this chapter. The role of the researcher, research procedures, data analysis processes, and reliability and validity are discussed. Chapter 3 also includes the ethical practices used during the research inquiry.

Research Design and Rationale

The phenomenological research methodology is a philosophical method to qualitative design seeking to further understand the human experience, making for an ideal approach to help answer the research questions posed (Drummond, 2019; Moustakas, 1994; Sheehan, 2014). The qualitative method was appropriate for the research questions as the method allowed for a rich description and exploration of a variety of perspectives of multiple cybersecurity educators and the career decision-making process. The phenomenological design was selected to understand the lived experiences of cybersecurity educators who experienced the shared phenomenon and met the criteria for the study. Phenomenology carries additional aspects to study human experience through qualitative inquiry (Creswell & Creswell, 2018; Moustakas, 1994; Singh et al., 2019). Exploiting phenomenology's philosophical tenets of noema, noesis, noetic–noematic, and epoche in a telling way presents challenges, given abstraction and complexity (Moustakas, 1994; Sheehan, 2014). Yet noema, noesis, and noetic–noematic relationships are critical concepts in phenomenology (Moustakas, 1994; Sheehan, 2014).

Phenomenology is a philosophical method, within the qualitative method seeking to contextualize the lived experience of the study participants (Drummond, 2019; Moustakas, 1994; Singh et al., 2019). Phenomenology is based on disposing of all preconceived ideas to view a

phenomenon through an impartial lens, thereby enabling the true meaning to surface (Drummond, 2019; Moustakas, 1994). The richness of human behavior enlightens and draws out the central meanings and presents any emerging themes in the context of individual lived experiences founded on the phenomenon studied (Moustakas, 1994).

Role of the Researcher

The role of the researcher was an observer-participant. In the study, the researcher's role was as the human instrument and recorder of the pertinent information provided by the participants (Creswell & Poth, 2017; Moustakas, 1994). The investigator conducted in-depth semi-structured interviews individually with every participant to describe the participants' experiences. The researcher's primary role is to underscore the human experience without a claim of generalizability (Moustakas, 1994).

As a postsecondary faculty member and cybersecurity professional, the researcher was a colleague of several cybersecurity educators in a participating organization identified in the study. Alternatively, several participants were known due to a working environment, yet maintaining reverence, confidence, responsibility, and privacy of each participant was critical. The participant–researcher relationship lacks any organizational power and authority, including supervisory or administrative roles in the university or professional setting. To eliminate all prejudices, judgments, or preconceptions of a specific topic and to produce an impartial analysis of emergent evidence brought about during the investigation, reflective journaling was used (Moustakas, 1994; Padilla-Diaz, 2015). Reflective journaling was employed to separate researcher prejudice and judgment throughout the interview process and data analysis (Cain et al., 2019).

Research Procedures

The research procedures section describes the practices used to facilitate the phenomenological research inquiry. In the following subsection, the population and sample selection procedures are defined. The instrumentation subsection details data collection instruments of the study. The data collection subsection defines procedures for interviewing. The concluding subsection, data preparation, specifies how data were prepared and analyzed during the study.

Population and Sample Selection

The phenomenological research approach used for the study was to advance understanding from emergent themes of career choice of cybersecurity educators. Seventeen cybersecurity individuals in Texas functioned as the participant group for individual in-depth interviews. The inquiry made use of purposive sampling to define selection criteria for the participant group (Creswell & Creswell, 2018; Moustakas, 1994). The criteria for qualifying participants were as follows:

1. The participant should have completed an academic degree program in cybersecurity or related field.
2. The participant ought to be functioning in the role of a cybersecurity educator.
3. The participant should have a minimum of 3 years of employment.

Failure to maintain each criterion was a reason for non-selection. The 17 participants were associated with North Texas regional user groups dedicated to the cybersecurity trade. The purposeful sampling technique is beneficial for phenomenological research as the importance is on meeting defined criteria (Creswell & Creswell, 2018). This tenet was vital to maintain a high standard of quality in qualitative research (Creswell & Creswell, 2018; Creswell & Poth, 2017;

Moustakas, 1994).

A key tenet pertaining to phenomenological inquiry is the aptitude to derive the spirit of individual behavior of research participants (Creswell & Creswell, 2018; Drummond, 2019; Moustakas, 1994). The phenomenological research approach was used to supplement interpretation of developing themes of cybersecurity educators having successfully navigated the career selection process. The guidelines served to maintain consistency and quality of the occupational development of each participant whose experiences are entrenched in cybersecurity (Creswell & Creswell, 2018).

An electronic PDF signed version of a letter of permission was received by the chapter's residing point of contact (see Appendix A). The letter of permission is used to allow recruiting of participants from the granting organization, and aids in safeguarding participant personally identifiable information. Safeguarding all participants is a critical goal. To safeguard participants from harm, an informed consent agreement was emailed to the participant and discussed prior to the interview (Creswell & Creswell, 2018; Creswell & Poth, 2017; National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Each participant was required to electronically sign and return a PDF copy of the informed consent agreement prior to the start of data collection (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994). Appendix B contains the informed consent agreement and explains the research design, research objectives, data collection procedures, rights of the research participants, and procedure to withdraw from participation in the study.

Instrumentation

The goal of the study was to discover participants' lived experiences of the phenomenon of career choice. The participants resided in Texas and had experiences immersed in the field of

cybersecurity education. To accomplish the goal, a set of semi-structured interview questions (see Appendix C) was prepared as the data collection instrument (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994). Inspiring literature from past research executed by authorities in the field of cybersecurity was the foundation for the interview questions. The interview questions were designed in a way to aid in answering the study's research questions. Four cybersecurity advisors who hold academic degrees and industry-specific certifications reviewed the semi-structured interview questions through a field study process to ensure content validity. The video-conferencing technology GoToMeeting was used as the medium which permits communication among researcher and participant, permitting the researcher to pursue and witness both verbal and nonverbal cues (Moustakas, 1994). A critical tenet of quality versus quantity applied to the interviewing method. The tenet produced a robust method of soliciting responses and probing more deeply (Creswell & Creswell, 2018; Moustakas, 1994).

Individual video-conferencing interviews permit the study to describe and expound on data revealed while the data are still fresh in the mind of the participant (Drummond, 2019; Moustakas, 1994). A systematic procedure was utilized during the interview process to facilitate reliability and minimize prejudice or error that could arise without a standardized structure in place. The semi-structured interview methodology allowed for any variances between participants to be explored further via additional investigative questions necessary to hone and clarify meaning (Moustakas, 1994). The semi-structured interview questions (see Appendix C) were developed via a thematic analysis grounded in literature diametrically connected to the research questions (Cengiz, 2020). Fifteen interview questions aided in probing memory and experience describing the participants' occupational choices.

Field Testing the Instrument

The validity of interview questions was ensured by enacting four subject matter experts in the field of cybersecurity to validate the utility of the semi-structured questions and the questions facilitating rich descriptions (Korstjens, 2017; Zamanzadeh et al., 2015). The interview questions were adjusted based on content-specific feedback from the subject matter experts. Content was reaffirmed using the member-checking process with the subject matter experts to affirm updates were contextual with respect to expert intent. The subject matter expert feedback to the interview questions is shown in Appendix D.

Data Collection

The fundamental characteristic of the phenomenological research method is discovering the essence of lived experiences of each research participant (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994). The most suitable form of data collection for the research study was to conduct a short interview with each participant. Exploring participants' experiences through the interview process provided a richer description as compared to other approaches (Creswell & Creswell, 2018; Moustakas, 1994). The structure of interviews encouraged storytelling by participants to create a rich description of events. Interviews were conducted and recorded using online video-conferencing technology. Critical factors were noted by the participants through the interviews.

The data gathered during research-related events are considered highly confidential, and any unprocessed data are stored securely and encrypted. Concluding the research study, all electronic information was removed securely from all computing devices and archived for 3 years on an encrypted backup device, observing current data security best practices offered by ISACA's (2018) COBIT 2019 framework. Confidentiality and privacy of participant data and

personally identifiable information were safeguarded by means of fictional participant identifiers (Creswell & Creswell, 2018).

Interview Collection Methodology

During the recruitment process, the initial communication with potential study participants (see Appendix E) noted the interviewing would be completed through online video-conferencing technology, GoToMeeting (Salmons, 2010). Participants were alerted to the basic requirements of technological equipment to join in the video-conferencing interview process (Nehls et al., 2015). The requirements included possession of a computer with Internet access, a webcam, audio speakers, and a microphone, or a smartphone containing these capabilities. The recruiting process for research participants naturally aligned with video-conferencing interviews as the participants maintain technical skillsets to support cybersecurity. Scheduling online interviews were less complicated than scheduling in-person interviews (Nehls et al., 2015). Video-conferencing was a more convenient medium for participants, with interviews being held at times agreeable to researcher and participant. GoToMeeting supplied a medium for recording the video-conferencing interview and prepared a draft recording transcription. The transcription was reviewed for accuracy and shared with the participants in a member checking process for transcription review and correction. Each transcription reviewed during the member checking process providing the participants an opportunity to correct and expand upon the details of participant experiences. Member checking was engaged by an email to the participant for validation and correction. All participants replied to the email with updates and affirmation of the interview transcript. The video-conferencing interview was convenient for each participant as the interview was conducted in a location with which the participant is acquainted and comfortable (Nehls et al., 2015). Participants maintained regular workday schedules, so

flexibility was critical to accommodate participant availability (Creswell & Creswell, 2018).

Data Preparation

Preparation for the data analysis phase began with data labeling for each participant (Creswell & Creswell, 2018; Saldaña, 2016). Interview responses were divided into meaning units instead of question responses. Transcript preparation and presentation occurred after each participant interview. Participant responses were subsequently transcribed into a Microsoft Word document using electronic voice analysis taken from the audio-recorded video-conferencing interview session.

Data Analysis

The qualitative phenomenological research study used Moustakas's (1994) modified van Kaam method of data analysis to acquire meaning from collected data (Creswell & Creswell, 2018). The challenge of phenomenological analysis rests in making sense of the immense amount of data collected during the interview process (Patton, 2002, 2015). The data analysis process involved a seven-step approach: (a) reading and deleting irrelevant data, (b) preliminary meaning units, (c) bracketing, (d) final meaning units, (e) situated narratives, (f) general narratives, and (g) general description (Peoples, 2020).

The first step in the data analysis process was to read each participant's transcript to determine the participant's whole story (Moustakas, 1994; Peoples, 2020). This step entailed eliminating any irrelevant or unnecessary information, such as repetitive accounts or filler statements such as "um" or "you know" (Peoples, 2020). The second step focused on creating preliminary units of meaning while focusing on the research topic (Giorgi, 2017; Moustakas, 1994; Peoples, 2020). A meaning unit is the portion of data exposed to a characteristic or feature of the phenomenon being studied (Giorgi, 2017).

Step 3 entailed bracketing or *epoche*, the process of systematically peeling away the symbolic meanings until only the core essences and experiences remain. Bracketing is accomplished by means of setting aside preconceived judgments, perceptions, and ideas (Moustakas, 1994). Controlling any prejudice or preconception was enacted through journaling and bracketing of firsthand experiences throughout the research process (Moustakas, 1994). The next step in the data analysis process was to deconstruct the preliminary meaning units into finalized meaning units or themes (Moustakas, 1994; Peoples, 2020). The final meaning units were expressed by a strengthened understanding of each participant's description and experience (Peoples, 2020).

Situated narratives are the restatement of each participant's account whereby the specifics and experiences are organized thematically under specific interview questions (Peoples, 2020). The meanings of participant experiences were emphasized thematically by means of direct quotes from interview transcripts (Moustakas, 1994; Peoples, 2020). The next step was to create common narratives from the situated narratives, unifying each participant's descriptions into a generalized account of all participants' narratives. The intent was to unify the data from the situated narratives while emphasizing each participant's meaning based on firsthand experiences cataloged by interview questions (Peoples, 2020).

The final step of the data analysis process was the general description. The general description diverged from the participants' common perspectives (Moustakas, 1994). The aim was to discuss the emergent themes identified as implicit in all or most of the participants' descriptions of individual experiences (Moustakas, 1994; Peoples, 2020). The end goal was to unite the major emergent themes into a cohesive general description.

Video-conferencing interview recordings were transcribed and processed by the

qualitative analysis application ATLAS.ti for data analysis. ATLAS.ti coded and analyzed the data (Frieze, 2014). ATLAS.ti is a qualitative data analysis software application that supported the study in identifying, coding, interpreting, and annotating the results (Hwang, 2008). Even though ATLAS.ti is a qualitative analysis application, ATLAS.ti did not carry out any data interpretation or contextual associations; the application was useful in allowing the analyst to manipulate, compare, and sort the data (Creswell & Creswell, 2018).

Reliability and Validity

Reliability and validity in qualitative research are crucial to substantiate the integrity of the research study results and to dispel criticism related to qualitative research (Hadi & Closs, 2016). Reliability focuses on the consistency of a measure, whereas validity focuses on the accuracy of a measure. In the following subsections, trustworthiness in the form of credibility, dependability, transferability, and trustworthiness is addressed (Patton, 2015).

Credibility and Dependability

Credibility confirms a research study measures what the study was intended to measure and the research study is a true reflection of participant descriptions (Creswell & Creswell, 2018; Patton, 2015). Credibility was ensured through member checking, explanation of researcher bias, and rich descriptions of the data (Creswell & Creswell, 2018). Study participants had the opportunity to review and correct respective transcripts (Peoples, 2020). By using a reflective journal, the study maintained trustworthiness to support the study's results (Creswell & Creswell, 2018; Patton, 2015; Peoples, 2020). Rich descriptions were used to provide a detailed account of each participant's experiences in the context of the lived world (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994; Patton, 2015).

Dependability in qualitative research denotes the ability of the study's results to be

replicated if the study were to be repeated in the same context with different participants (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994; Patton, 2015). To ensure dependability, an audit trail was incorporated throughout the research process (Moustakas, 1994). To ensure dependability of the raw data, triangulation of the data was provided through member checking interview transcripts.

Transferability

Transferability denotes the ability of the findings of a study to be amended in supplementary situations and settings (Noble & Smith, 2015). Transferability can occur due to the use of rich, thick descriptions of the study's participants, setting, and data collection and analysis method (Creswell & Creswell, 2018). Providing the level of detail can allow future researchers to model additional research after the study in order to achieve similar results.

Trustworthiness

The research findings delivered an accurate depiction of the participants' lived experiences. Dependability was provided through the assurance of the research protocol by being organized, documented, and auditable; and transferability can allow reviewers of the study to evaluate the results with similar studies (Patton, 2015). Confirmability ensures the research truthfully represents the study's findings and connects various interpretations of the findings (Patton, 2015).

Ethical Procedures

Safeguarding the welfare and safety of study participants in qualitative research is crucial (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Phenomenological data by nature is an extensive narrative with thick descriptions (Patton, 2015). Participants have the potential to be vulnerable when expressing

details of the lived experiences. As a result, the data collected during the research study are kept strictly confidential with highly restricted access to those associated with the research study (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994; Patton, 2015).

The Office for Human Research Protections within the Department of Health and Human resources governs research and the protection of human rights (hhs.gov, nd). The Institutional Review Board governs academic research involving the study of human subjects (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994; Patton, 2015). The protocol for research study submission and receiving approval from the Institutional Review Board to conduct the study follows university research standards. Each research participant was made aware of the purpose of the study and received a consent document detailing the research study, participant expectations, and participant rights. At any time, participants had the right to discontinue the interviews and discontinue participation in the study altogether. The research process created a potential to trigger distress for participants (Patton, 2015). Participants in the study were provided the opportunity to participate in the member checking process and the opportunity to dialog further about the results to express any further details or to correct any misstated recalls of the experience (Peoples, 2020).

Data collected during the research study were electronically stored in ATLAS.ti, a reflective journal in Microsoft Word, and a recording file via GoToMeeting, the video-conferencing application used to record interviews. Data collected for the research study were treated as both anonymous and confidential. The confidentiality of each participant was honored, and each participant was provided a pseudonym as a method to help protect the participant's identity (Moustakas, 1994; Patton, 2002). Any reports of the study will not share personally identifiable information of any participants. Research results were published in the form of a

doctoral dissertation. As part of the informed consent process, participants were made aware the research results would be published.

Trustworthiness of the phenomenological research study was defined by the incorporation of the processes for credibility, dependability, and transferability. Each element was essential to determine rigor and trustworthiness of the research data (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994; Nehls et al., 2015). The ethical procedures were applied and strictly followed in the research study to ensure the protection of the participants' rights.

Chapter Summary

A phenomenological research methodology was used to address the research questions of cybersecurity educators' lived experiences influencing career choice to become educators. The qualitative method permitted for the discovery of the core essence and description of the phenomenon through interviewing participants via semi-structured interviews over video-conferencing technology (Moustakas, 1994). Interviews were conducted and recorded via the video-conferencing technology GoToMeeting. The study's findings were described and discussed, providing additional details on the data analysis and results as well as the reliability and validity of the phenomenological research.

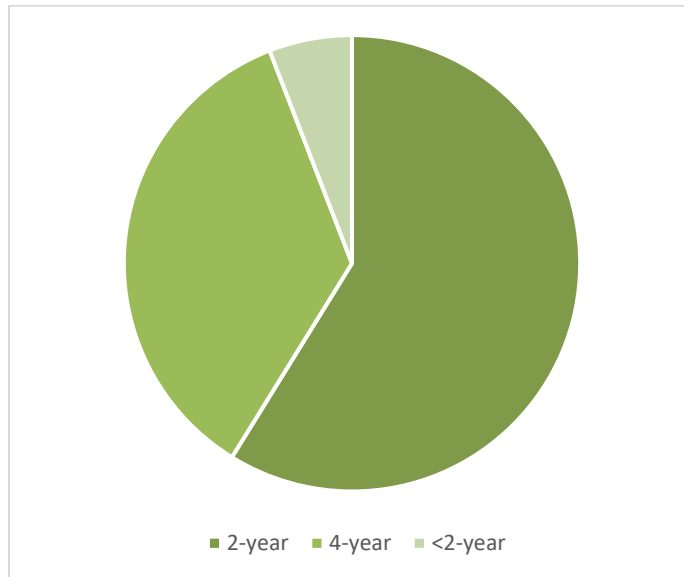
Chapter 4: Research Findings and Data Analysis Results

The number of cybersecurity individuals entering the field is insufficient, presenting challenges for educational institutions to find qualified educators (Crumpler & Lewis, 2019). The critical role of educators is to train the next generation of cybersecurity professionals, yet a lack of adequately trained cybersecurity academics exists (Freeze, 2019; Prescod et al., 2019). Undergraduates registered in cybersecurity-related academic programs are driven by occupation choice. The occupational choice process is associated with the student's degree program of interest, guiding the student in becoming either an educator or a professional (Crumpler & Lewis, 2019).

The purpose of the qualitative phenomenological research study was to explore how lived experiences influence the career decision making of 17 cybersecurity persons in Texas who enter a higher education setting (Guth, 2019; Nakama & Paullet, 2018). The problem is a shortage of graduates in the field of cybersecurity who choose to enter higher education over corporate roles (Anderson, 2016; Castro, 2018; Guth, 2019). The phenomenological qualitative study explored the lived experiences of cybersecurity educators' decision to become educators, described as follows through the study setting, participant demographics, data collection process, research findings, research question responses, reliability and validity, and summary.

Participant Demographics

Participants consisted of 16 male and one female postsecondary instructor. Participants are instructors at various postsecondary school types (see Figure 2) in Texas and have been teaching cybersecurity-related classes for at least 3 years. Participants are identified using pseudonyms (P1, P2, etc.).

Figure 2*Demographics: Teaching at College Type*

As Alase (2017) suggested, to maintain thematic saturation, a qualitative study should collect data from between two and 25 participants. The data were collected from 17 participants; three of 20 participants chose to withdraw participation due to personal issues. Data were collected using individual interviews conducted using GoToMeeting's video-conferencing technology. Each participant also engaged in a member-checking process to validate transcript accuracy.

Regarding participants' citizenship status, 13 participants identified as citizens of the United States, and four identified as foreign-born nationals. The study participant mix included one female and 16 males within the geographical region of North Texas. Each participant actively teaches in an area of cybersecurity, with 10 participants teaching at public community colleges, five at public universities, one at a private university, and one at a for-profit technical institute (see Table 1).

Table 1*Demographic Data*

Participant	Gender	College type	2- or 4-year	Degree	Citizen
P1	Male	Public community college	2-year	Master	Domestic
P2	Male	Public community college	2-year	PhD	Foreign
P3	Male	Public community college	2-year	Associate	Domestic
P4	Male	Public community college	2-year	Bachelor	Foreign
P5	Male	Public university	4-year	PhD	Domestic
P6	Male	Public university	4-year	PhD	Foreign
P7	Male	For-profit institute	N/A	Bachelor	Domestic
P8	Male	Public community college	2-year	Associate	Domestic
P9	Male	Public community college	2-year	PhD	Domestic
P10	Male	Public community college	2-year	Master	Domestic
P11	Male	Public community college	2-year	PhD	Domestic
P12	Male	Public community college	2-year	JD	Domestic
P13	Male	Private university	4-year	Master	Domestic
P14	Female	Public university	4-year	PhD	Foreign
P15	Male	Public community college	2-year	Master	Domestic
P16	Male	Public university	4-year	Master	Domestic
P17	Male	Public university	4-year	Master	Domestic

Data Collection

Data collection was performed using individual semi-structured interviews of 10

professors at 2-year community colleges, six professors at 4-year universities, and one instructor at a technical institute, who focus on cybersecurity-related courses. After the completion of all interviews, a transcription follow-up was completed using the member-checking process. Before beginning any data collection, each participant meeting the criteria of (a) being employed in a cybersecurity-related degree field, (b) being an active cybersecurity instructor, and (c) being employed for a minimum of 3 years and received an email that included a copy of the recruitment letter (see Appendix E). The email outlined the data collection procedure and incorporated the informed consent letter (see Appendix B).

Each prospective participant electronically signed and returned the informed consent letter prior to February 12, 2021. Three prospective participants withdrew participation prior to February 5, 2021, due to circumstances related to the COVID-19 pandemic. Each participant scheduled a video-conferencing interview session upon returning the signed informed consent letter. All video-conferencing interviews were recorded and completed by February 24, 2021, and member-checked transcripts by February 26, 2021.

Each interview was conducted virtually through GoToMeeting video-conferencing technology. Each participant was interviewed individually for 30–60 minutes. Each interview was recorded using the technology provided by GoToMeeting. GoToMeeting also provided automated verbatim transcription services. After the interview transcription was completed, each participant received the transcript of the interview via email for member checking. Each email included a request to review and supply comments on errors in the transcript. All participants responded in the affirmative and corrected any errors in the respective transcript.

Informed Consent Collection

Informed consent agreements were delivered electronically using the Citrix Systems

RightSignature e-signature service for electronic document delivery and signature collection, safeguarding each participant from harm (Creswell & Poth, 2017; National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). All participants who took part in an individual interview had to electronically sign the informed consent agreement. Each signed informed consent agreement was collected and saved to an encrypted drive as a PDF (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994) prior to interview commencement. Each informed consent agreement was electronically signed within the first 6 weeks of the research study.

Deviation From Data Collection Plan

Two deviations from the original data collection plan occurred. The first deviation was a variation to the total number of participants used in the study. While 20 persons were scheduled, three withdrew, lowering the total to 17 participants. The second deviation was three participants lacked video capability, so audio-only recordings were made instead.

Data Analysis

The qualitative phenomenological research study used Moustakas's (1994) modified van Kaam method to reveal meaning from interview responses (Creswell & Creswell, 2018). The participants' lived experiences and common characteristics are depicted as follows. The themes derived from the data are depicted and supported by a description of how each theme answered each research question.

Data Analysis Stages

The data analysis method involved seven steps: (a) reading and removing immaterial data, (b) defining initial coding elements, (c) bracketing, (d) completing coding elements, (e) naming situated narratives, (f) naming general narratives, and (g) creating a general description

(Peoples, 2020). The first step in the data analysis procedure was to read each transcript to find the participant's narrative (Moustakas, 1994; Peoples, 2020). The first step also entailed the removal of any immaterial or superfluous data. The immaterial data included repetitions and filler words such as "um" and "you know" (Peoples, 2020). The second step focused on generating initial data code elements while staying focused on the research questions (Moustakas, 1994; Peoples, 2020). In Step 3, bracketing was used to systematically peel back the symbolic meanings until just the core essences and encounters remained. Bracketing was carried out by placing aside bias, feelings, and ideas (Moustakas, 1994). The next step in the analysis method was to deconstruct the initial data coding elements to finalized code categories or themes (Moustakas, 1994; Peoples, 2020). Each theme was developed through the restatement of the participant's account, whereby the details and events were arranged to align with each interview question (Peoples, 2020). The next step was to develop a common narrative base framed within each theme, merging each participant's account to create a common description. The last step of the data analysis process was to create a general description that showed the divergence from common participant views (Moustakas, 1994). The end goal was to connect the major emergent themes into a cohesive general description.

Data Preparation

Data preparation began by transcribing the GoToMeeting recorded interviews into a text file organized by using a question response format; taking the added step supplied a clear connection between each question and response, aiding in later analysis. The text file was then prepped by being passed into an application that compressed and encrypted the file for transmission to each participant. Each participant then received an email including the interview transcript as an attachment for member checking as well as a request to examine and offer

comments on any possible transcription errors within 1 week. Two participants corrected transcription errors; all other participants indicated no changes were necessary.

Coding and Theme Identification

After the conclusion of the data collection process and data preparation steps, a procedure was used to identify the raw data interview responses and construct qualitative data codes, data code categories, and themes (Creswell & Creswell, 2018; Creswell & Poth, 2017; Moustakas, 1994; Saldaña, 2016). Saldaña (2016) suggested following a procedure to read each participant interview transcript to understand the experience, then create a rich description through summarization, and finally to draw conclusions. After reading the transcript, preliminary data coding units were created from the elements in the transcript and focused on the topic of investigation. A data coding unit is a demarcated part of the raw interview data that reveals a feature of the phenomenon being investigated. Assessment of data code categories leading into themes happened among all participant responses to find alignment. Each theme was aligned with other similar themes, narrowing down the emerging key themes (Creswell & Creswell, 2018; Creswell & Poth, 2017).

Saldaña (2016) described the first step to examine raw data as synthesizing interview responses, then connecting the responses to deduce response associations. The coded data revealed specific themes to answer each research question. The frequencies of keywords and concepts were categorized by theme type (Saldaña, 2016). Through the analysis of the raw interview data and qualitative data codes, cybersecurity educators' emergent themes of decision making naturally appeared. Several themes arose from the interview question responses, including having a sense of calling, influences from early adulthood, and the time nearing deciding on occupation. Yet several subthemes emerged from the emergent themes, used to

further explain the qualities of cybersecurity educators' decision to enter higher education.

The data analysis included analyzing data from member-checked transcripts, followed by the qualitative data coding of the transcripts; additionally, several data code categorizations were performed, grounded in the raw interview data responses. The analysis included integrating common codes into code categories to allow for an assessment of the unique perspectives to reveal common perceptions. Participant data then showed the semantics relevant to each theme. Processed interview data were further analyzed to thoroughly describe how each theme was distributed across the participant responses. Data analyzed were additionally grounded in the innate language of each participant to show any relationship to the identified themes (Creswell & Creswell, 2018). No basis was found for using any preset data coding; instead, grounded theory was used to uncover naturally occurring relationships between data codes (Saldaña, 2016). Discrepant data were addressed as the data did not fit into any preconceived theory (Moustakas, 1994). The study and data collection were approached in an unbiased fashion.

Results

Participant responses to the interview questions were coded and analyzed through ATLAS.ti qualitative data analysis software (Hwang, 2008). The qualitative data coding process was consistent across each interview question response. The resultant themes were based on the data code categories that appeared most often. Table 2 displays the set of code groups and themes based on responses to interview questions (see Appendix C), specific data code groups found, and emergent themes from the data, referencing the response frequency across data sets to highlight the significance.

Table 2*Code Groups and Themes*

Code group	<i>f</i>	Theme
Career trajectory changing during college	16	Sense of calling
Interested in technology	14	Sense of calling
Desire to give back	17	Sense of calling
Need to inspire future generations	14	Sense of calling
Influences by the armed forces	10	Early adulthood influences
Courses inspiring teaching practice	16	Early adulthood influences
Internship	15	Approaching occupation
Excitement to teach	17	Approaching occupation

The qualitative data code groups were developed and adjusted repeatedly throughout the data coding process, and mostly employed throughout the stages of the data coding process, as the data codes and code groups emerged naturally (Saldaña, 2016). Exact language from the raw interview data was used to code, triggering natural codes to appear. The emergent natural codes offered the ability to further explore meaningful words and phrases, minimizing any attempt to put the codes into abstract categories (Saldaña, 2016). The natural coding process allowed for emergent code groups to develop out of the natural language codes.

Situated Narrative 1: Sense of Calling

The first situated narrative or theme supplied insight into the first research question, What personal experiential factors prompt cybersecurity technologists to enter the field of postsecondary education rather than corporate employment? The analysis of the data exposed

many experiences were formed out of participant interest in technology fields in a general sense occurring during each participant's earlier years. The influences supporting general interest in technology were referenced by each participant to illustrate aspects of each individual's background having influenced a change in occupational trajectory from previously decided career pursuits. The sense of calling then naturally appeared as the subthemes of career trajectory changing during college, interest in technology, desire to give back, and the need to inspire future generations.

Subtheme: Career Trajectory Changing During College

The first subtheme in the situated narrative of sense of calling was career trajectory changing during college. Anxieties were noted in the ability to secure a position in the field of study after college. Table 3 shows all 17 participants revealed reflections and emotions about deviating from the aspiration of securing a professional corporate position. The data analysis process uncovered the foundational motives of each participant's initial occupational decision. Participants also reported experiences during the educational process triggering shifts in occupational decision making.

Each participant offered individual instances of experiences heading to a cybersecurity role in higher education; many participants reported influences due to immigration, being encouraged and inspired by professors, and interactions among peers. When asked about experiences during the college education journey, P6 stated,

I think definitely my path began with undershooting. My first approach to this was to retire from IT and just teach certification training in community college. The influence that's had on me is probably what most people experience with the immigrant experience: wanting to achieve, wanting to succeed, wanting to validate the reason you

did immigrate.

Table 3

Career Trajectory Changing During College

Code	<i>f</i>
Tutoring	11
Societal interactions	12
Parental encouragement	7
Inspiring professor	8
Immigration to the United States	5

P9 reported an inquisitive desire for knowledge and being inspired by others:

My original interest in college was aerospace engineering, that I was interested in becoming a naval aviator. As I was working with stuff, I realized that other people observed I was great with working with computers. They suggested several times that I should go back and get a degree, so where I could apply it, and that's what I ended up doing was, and then it just flowed very easily from there. Throughout my master's program, I was always helping other students and professors with various aspects of technology. It was highly suggested several times, that I should consider a career in teaching.

P5 reported a dissonance with becoming an academic: "I didn't like the academic process, but I ended up teaching, which surprised me, and teaching can be challenging. I like helping the students."

In each response, professors defined what greater impact meant by shifting occupational

course and becoming a higher education instructor. P8 stated an inspiring reason for altering the occupational course: “I was fascinated with the instructor there. I was excited. And I thought, wouldn’t it be so cool to be able to do something like this. I’d just, like, admired the role of the instructor.”

Subtheme: Interested in Technology

The second subtheme in the situated narrative of sense of calling was focused on the interest in technology (see Table 4). Cybersecurity professors reported sharing similar experiences leading up to the interest in technology spearheading participant transition to an educational setting. Data analysis exposed a foundational interest in technology-related concepts. Participants recounted experiences triggering a passion and excitement for cybersecurity supporting participant occupational choice.

Table 4

Interested in Technology

Code	<i>f</i>
Career search	14
Passionate about technology	8
Parental influences	9
Teacher encouragement	8

P14, with vast information security and cryptography experience, shared:

Cybersecurity has room for everybody, for legal and compliance, people who love tinkering with devices, people who love to code, and people who love neither. And as someone who is very interested in the applied math side of things, cryptography was the

natural draw for me in coming to cybersecurity.

P3 reported a distinct early acquaintance with technology access developing computer-related interest:

So there were computers at school, but no one really was looking at IT as a career field.

There were some people who probably knew about it, but it was really not that well known. It was not an option presented to me in school.

P17 reported enjoying technology-related products from childhood, indicating the following experience:

Overall, I got into technology because, back when I was a kid, I was very much into technology. It was always around the house, and that wasn't something that was very common when I grew up. It wasn't common for kids to have a lot of, like, a TRS 80 or Radio Shack and a Commodore 64, the Commodore 128 around the house. So I got into that at an early age. So more than anything, it really shaped, call it a love for technology and aptitude for technology.

P2 had an extremely emotional connection to being introduced to cybersecurity through the 9/11 attacks on the World Trade Center:

I discovered that the cybercrime is becoming more sophisticated. We saw that after 9/11. One of the recommendations of the commission was that we feel, because of lack of imagination, that some people would turn an aircraft into a bomb. So the scholars started thinking about what is going to be the next surprise. Lots of researchers come out indicating the next surprise will probably be in cyberspace.

Each participant response identified encouragement as an underlying component to enter the cybersecurity work environment. P13 stated the interconnectivity of dueling encouragement

from corporate and academic support, declaring, “Technology I didn’t know when I got to college. I think some of the events will be the encouragement from my employer to encourage and then fund some of the cybersecurity education.”

Subtheme: Desire to Give Back

The third subtheme in the situated narrative of sense of calling was focused on a desire to give back (see Table 5). Cybersecurity professors reporting similar experiences had an inherent desire to return the knowledge and encouragement each participant had experienced. The data analysis process exposed a desire to share experiences in cybersecurity in both a corporate and academic setting with others, to help guide and encourage the advancement of cybersecurity.

Table 5

Desire to Give Back

Code	<i>f</i>
Helping others	17
Encouragement	12
People aspect	8
Relationship building	12
Student success	14

P9 clearly illustrated the concept of giving back by saying:

Being a cybersecurity engineer at one organization only provides me the opportunity to protect a single organization. Being a cybersecurity instructor at an institution of higher education allows me to give insight to my students and thus help protect their organizations. It also goes along with my desire to help, and through being a higher

education instructor, I can help more.

P13 shared a similar aspect with extending relationships and seeing students succeed:

I wanted to have a deeper relationship with students and kind of see them along their journey. People that are participating in the talks are in the education that I was providing. I enjoyed the students that I had. The students are coming from varied backgrounds and some of them work, did not have an education, or had a history of education in their family, and some of them actually were even dropouts at 4-year colleges that were just looking for a chance. So that really motivated me to do well and to continue to teach them, to see them succeed.

P5 had a differing view yet still finds enjoyment in helping students succeed:

I didn't think I would teach, because I didn't like the academic process. But I ended up teaching, which surprised me, and teaching can be challenging. I don't always like it, but I like to help the students. I enjoy talking to people that have that background.

P17 had a unique view on the effects of helping others and how teaching provides this effect:

I'm very happy with where I am now. From a philosophical perspective, if I was to change anything in life, there's no guarantee that I would be where I am right now. And so I never look back and say, what if I change this one little thing, kind of the butterfly effect? Yep, you have no idea what the flap of a wing can do. And so I just have never had that mindset of looking back and worrying about tweaking any one particular thing. There was also a sense of that kind of excitement that comes with something new because I want you to be successful.

Each participant response identified a natural progression as an underlying component to

enter cybersecurity instruction. P7 and P12 shared a common thought of natural progression. P7 stated, “It was a natural progression because now, then I’m kind of semiretired. It’s a way that I can do more of an influence and it’s not only students but fellow instructors,” while P12 shared, “It just seemed like a natural progression.”

Subtheme: Need to Inspire Future Generations

The fourth subtheme in the situated narrative of sense of calling was focused on the need to inspire future generations (see Table 6). Participants reported similar experiences that fundamentally showed the need to inspire and educate future generations of cybersecurity leaders and scholars. All participants revealed an underlying aspiration to affect the lives of students motivating each participant to remain in instruction.

Table 6

Need to Inspire Future Generations

Code	<i>f</i>
Mentoring	6
Sharing knowledge/experience	8
Student success	14
Preparing future generations	6

Mentoring was identified as a clear role faculty are to play, as P3 supported by stating, Being more of a coach and a mentor/teacher and that kind of thing. I really enjoy the success of students. But when you’re a teacher, you can enjoy the mentor aspects. You can just enjoy it. So there’s so much more success that you have the opportunity to enjoy. I’ve referred people for jobs; I did it all the time for my students.

P1 furthered mentorship by sharing an experience from being a student that motivated the participant to enter an academic setting:

So I was relegated to the back of the classroom. So what turns up happening was, the students who were in the back, who didn't understand things, so a lot of times I would just sit there and help them with their stuff and actually kind of act as a mentor, actually a tutor or mentor thing. So she [the teacher] enjoyed having me in the class, just because a lot of students who wouldn't have actually made it through the class made it through. And that was kind of one of those things.

P2 shared thoughts on being a teacher leader and knowledge generation by shaping youth:

That's one of the key things you need to do to when you become a leader: You should give back, and one of the way to give back, you should be able to generate knowledge and shape the younger generation for them to continue. I don't regret about that, because one will sure be happy to be able to see one of your students do fairly well. So for me, when I made that decision, it's out of passion, and I feel good about it. I do not have any regrets about that. I made a good decision and made the right decision going into higher education.

During the interview process, each participant showed the intensity of the notion of a calling to higher education and cybersecurity instruction. Exhibiting the idea of being intended to teach, P6 declared,

I remember thinking to myself, I'm really exhausted. I'm tired. This is a Thursday night, and I've never been happier or more full of energy. Really pulling the energy from the students and feeling like this is kind of what I was meant to do at this stage in my life.

Participants expressed career choice occurred through a series of events, which included the honing of required teaching skills and a need to help others succeed.

Situated Narrative 2: Early Adulthood Influences

The second situated narrative or theme offered insight into the experiences of early adulthood influences, through the second research question, How does the experience of cybersecurity technologists pursuing academic degree programs influence the career choice to enter postsecondary education? During data collection, individual participants referred to aspects, views, and feelings resulting from lived experiences that affected the occupational pursuit of academic roles. The early adulthood influences then naturally appeared as the subthemes of influences facilitated by serving in the armed forces and college courses inspiring teaching practice.

Subtheme: Influences by the Armed Forces

The first subtheme in the situated narrative of early adulthood influences was focused on influences by the armed forces (see Table 7). Participants reported similar experiences that found consistency in the structure of differing branches, as each participant additionally served as an instructor as part of the process of promotion. Each participant recounted experiences with serving and how the role of the instructor influenced entry into academic roles outside of the armed forces.

Table 7*Influences by the Armed Forces*

	Code	<i>f</i>
Joined		9
Instructor		6
Encouragement		8
CyberOps		9

P7 revealed providing firearms training as part of serving was an initial foray into teaching:

So I taught firearms instruction at basic. So you've got to go to the range four times a year and continue to qualify. So I ran the range and I was teaching people there, and I also taught at the Basic Academy. So that's where I really started to get into teaching, and then when I went through the Empire College Program, they were like, "You're really good at this." So I started teaching through Empire.

P15 shared a story of training and becoming connected to cybersecurity in the military:

So I started doing cyber when I was in the Army. I did, I worked for the Army Space Command, and I was doing there. This was certifications on the tactical, so it's not always functioning on, at the time. I can't speak too much as to the program because it is a classified level, but I kind of fell in love with the, I've always enjoyed computers and working on computers and stuff. When I was in the military, I've always been an instructor of some sort, CPR [cardiopulmonary resuscitation] instructor, basic combat lifesaver, instructor. I enjoy teaching. It's very easy and comforting to see your students

graduate. I was the chief instructor for Army Space School. We taught roughly 500 students a year on space operations.

P1 shared a story connecting a generational opportunity to serve and how serving shifted to intelligence work and landed with teaching cybersecurity:

I'm a multigenerational military individual, which kind of tends to lead back toward security and defensive measures. I went back into interrogation because that's what I really wanted to do. Was then sent to Fort Devens, Massachusetts, where I attended a special work with a special operations unit. Was cross-trained in multiple disciplines, intelligence, and counterintelligence. But they've discovered I had a knack for electronics. I discovered working on computers was okay, but I really preferred to secure and to safeguard them. I actually started teaching classes, which was Microsoft Certified Systems Engineering. I actually went full-time with the local community college and have stayed working with the community college ever since.

Each participant's response showed an underlying connection to the armed forces as a pathway to enter the academic and cybersecurity setting. P11 highlighted the pathway clearly by saying,

So I at least had some experience to draw on stories to tell my students. Of course, when I was in the Foreign Service, that's a classified environment. Although I needed a position and started teaching. And I discovered that I liked teaching once I started adjunct teaching.

Subtheme: Courses Inspiring Teaching Practice

The second subtheme in the situated narrative of early adulthood influences was focused on the participants who encountered courses that inspired entering the teaching practice (see

Table 8). Each participant described experiences with courses and faculty influencing entry into a higher education instructional academic role.

Table 8

Courses Inspiring Teaching Practice

Code	<i>f</i>
Computer science	15
Mathematics	3
Engineering	7
Other	5

P10 recalled a course in graduate school and how the professor illustrated the exact opposite of what to do as a teacher:

So I took a few forensics courses when I was in graduate school. And the course really kind of prepared me for what not to do as a professor, because my teacher at the time wasn't the greatest at communicating or with conveying what he wanted us to do. So I think that was something that kind of shaped my teaching style.

P3 recalled the transition from high school to college and connecting courses to instructional preparation:

We're seeing people's teaching styles and that sort of thing. That, I would say, prepared me most. The most valuable course I took was my English composition course. Because when I was in high school, I really didn't try. I was really distracted. I really needed that English composition class; we did a lot of writing. So learning proper grammar and proper sentence structure, and all that was very valuable. So I would say the writing

aspect was what helped me the most as a teacher.

P12 told a story of graduate studies and how professors in the field would shape teaching practice:

So there, cryptography became one of those elements. And what struck me is that one of the core courses part, my master's program, was cryptography. And the reason why was the two instructors. One of them had a Ph.D. in mathematics; he was also an Army captain, he was a cryptology specialist at the NSA [National Security Agency]. And the other instructor, a Ph.D. in computer science was also a cryptography specialist; he was also a consultant; he was a full-time professor, but he consulted on cryptography at the NSA. So here you had two teaching cryptography, and it was very much an early, discrete mathematics course. So the master's program was very much an atypical computer science degree, very much with an information assurance side. And even in a class, my teacher said, "Your education starts when you graduate. When you [the student] are in this class, your education just started. And it will continue through their whole career." And I'd tell people that even today I take short courses, I read, I research, my education continues until I die.

Events such as experiences with earlier faculty and opportunities in the service supplied a look into the personal history of each participant. Participant experiences of internal versus external influential factors generate direct connections to events shaping occupational decision making. P10 recounted first looking to move into higher education and what surprised the participant:

I was talking to this guy. He was a partner with Microsoft, asked to develop a program that would teach professors at college, teach the necessary skills to teach cybersecurity.

And so I did a random search online for “professor for cybersecurity” one day, and tons of jobs came.

P10 was amazed by the number of opportunities for teaching cybersecurity, spawning his interest in pursuing an academic role. As illustrated, events influence occupation choice.

Situated Narrative 3: Approaching Occupational Choice

The third situated narrative or theme gave insight into both research questions, What personal experiential factors prompt cybersecurity technologists to enter the field of postsecondary education rather than corporate employment? and How does the experience of cybersecurity technologists pursuing academic degree programs influence the career choice to enter postsecondary education? During data collection, participants discussed thoughts and feelings resulting from lived experiences aiding to solidify each participant’s decision to enter a cybersecurity-related academic occupation. The influences then naturally appeared as the subthemes of internship and producing excitement to teach.

Subtheme: Internship

The first subtheme within the overarching theme of approaching occupational choice was internship opportunities during the collegiate experience. Internships are a developmental tool that can aid in training to achieve the goals and job aspirations of internship participants. Twelve of the 17 participants discussed having an opportunity for an internship in both an academic setting as a teacher assistant or in the corporate setting, whether paid or unpaid, may have supplied more context and applicability of the subject to real-world occupational experience. P13 considered how a lab coordinator may have helped spearhead a direction in occupational choice:

I will most likely be teaching as a lecturer or senior lecturer, or possibly working at a university, and then being able to teach either as an adjunct lecturer on the side, so maybe

working as a lab coordinator or an institute coordinator at a 4-year university. I think that's something that my background, you would, would it work well? I think another option would be working at something with a joint appointment.

P6 furthered this sentiment by mentioning precollegiate involvement:

If, when I was a graduate student or an undergraduate student, if someone had given me an internship, no, wait. I think if you get, if you catch people really, really young and say, "Hey, you've got ability, you've got talent, let us bring you in for 6 months, 5 months, and work with us," I think an internship with hands-on applicability would have had a big influence.

P17 outlined helping a student gain access to internships and added the idea of success by helping students be successful contributors:

There's just not the same individual reward from it in terms of that feeling. You get it working with students and helping them get an internship or working with them on their résumé or seeing them be successful and starting to move forward on a path that they dreamed about. Those are things you just don't get from the business world.

While considering an occupational direction, the anxiety of knowing the decision may affect the rest of one's life can be a daunting task, and being provided an opportunity for an internship may lessen the stress. P14 helped hone the concept of internship by stating,

If I had pursued internships during my graduate school, during the summers in industry, that might have influenced my decision to move to industry because it's all based on the law of familiarity. I think once you are familiar with an environment, you feel like, okay, why not this?

Subtheme: Excitement to Teach

The second subtheme within the overarching theme of approaching occupational choice is the underlying excitement that comes with teaching others (see Table 9). All 17 participants shared the excitement as each semester starts and a new group of students enters. Data analysis revealed why participants were excited about the opportunity to educate the next generation of cybersecurity professionals. All participants discussed directly having experienced enjoyment and connections to students. P8 explained how student opportunity stirs excitement:

It's exciting. I hear about an opportunity and I get excited about it, and it's like, one of the things, it's like, well, I used to pay for these classes to take home and to learn stuff, and now people are paying me to teach the classes. I mean, it's just something I enjoy, I'm passionate about.

Table 9*Excitement to Teach*

Code	<i>f</i>
Enjoyment	17
Keeping mind occupied	12
Like student interaction	14
Gravitas	6

P13 explained enthusiastically the experience of being provided an opportunity to teach: I was excited. I had known for some time that I wanted to participate in that. I think I had some background for my undergraduate education as well, being a lab assistant or someone who would work as a student assistant or TA [teaching assistant]. Getting to do

that and have my own classroom, have my own curriculum, make my own decisions within the confines of the syllabus, and things like that. I was encouraged to start, and the feedback that I had received from the students and the institution, encouraged me to continue teaching for many years after that.

P15 shared a similar experience when starting as an adjunct instructor:

It was excitement. I was excited about being able to teach and mentor young cybersecurity professionals. There was no struggle. The biggest thing was working a full day a couple of days a week and then teaching until 10:00 at night, that was the biggest struggle. It takes a lot out of somebody, but nonetheless, I still stuck with it.

P3 shared a similar experience when teaching the first class:

The first class I taught, that might have been the only one I taught, but after getting that first semester is a great feeling, be able to help people out, and just to be able to share my passion with them [students].

The story each participant returned to was the excitement of teaching; each semester brings in a new perspective. Teaching can be a struggle, yet, as shown by P1, “I’ve found that it when I’m teaching, if I’m not having fun, I’m in the wrong class”—clearly indicating the complexities and passion for teaching. P1 summed up the idea of excitement to teach by describing the feeling as “It’s absolutely engaging. It’s relaxing. It gives me a reason to get out of bed.”

Choosing an occupation can cause anxiety, yet, as the participants illustrated, finding the right career path produces the feeling of excitement and passion, easing anxiety. Each of the participants was dedicated to a certain occupation and pondered if regret would surface, as the decision marks a turning point; P17 recalled having a “sense of relief, recognizing what I needed

to do with the rest of my career.”

Results by Research Question

Research Question 1 was, What personal experiential factors prompt cybersecurity technologists to enter the field of postsecondary education rather than corporate employment? The first research question explored the background factors that influenced occupational choice of the field of instruction in higher education over a corporate role. The emergent theme of early adulthood influences supplied further insight into the first research question. Two subthemes were revealed from the main theme of early adulthood influences as participants expressed individual experiences through courses that inspired teaching and the influences derived from serving in the armed forces. The ability to be inspired and encouraged while having the ability to create meaningful relationships with students was a main concern when making an occupational choice. P2 said, “So, irrespective of the composition, irrespective of the stress, irrespective of benefits, what comes first is what you see joy in.” P6 also revealed the joys in helping students succeed:

I really enjoy teaching. And if I didn’t have that, that would be something that would change my mind. As far as something that would support or validate my decision is, I think you, I think definitely you feel like you’re making a bigger difference in the world.

Experiences during college or serving in the armed forces directly exposed participants to the idea of becoming teachers. P15 noted the impact of the armed forces by stating, “Since back when I was in the military, I’ve always been an instructor of some sort . . . I always enjoyed teaching.” When participants began teaching, each experienced an internal sense of returning knowledge and sharing individual experiences that affected any yearning to continue the quest of a professional corporate role.

Research Question 2 was, How does the experience of cybersecurity technologists pursuing academic degree programs influence the career choice to enter postsecondary education? The second research question explored the major experiences that triggered cybersecurity degree holders to move into the field of higher education over a corporate profession. The main themes included a sense of calling and approaching occupational choice, which supplied insight into the question. Six subthemes appeared from two main themes described by participant events and experiences that impacted the decision-making process of occupational choice. During the academic experience, 10 of the 17 participants revealed having had alternative degree paths before entering cybersecurity. P9 indicated an original degree path: “My original interest in college was aerospace engineering,” and P16 shared initial studies of accounting and transitioning to cybersecurity through auditing: “I kinda came more from the public accounting side into the client service role on the technology side.”

Additionally, a strong internal desire to give back and make a difference in students’ lives added to the sense each participant was called into the field of education to become cybersecurity educators. Regardless of originating field, each participant found passion for educating others, which extends beyond four walls and, as P14 stated, “Choosing to enter and stay in academia has been one of the most important decisions in my life—one that has had ripple effects on the rest of my life.”

Connection to the Theoretical Framework

The learning experience changes and develops through societal interactions, further aiding in academic and occupational decision making (Bandura, 2019). The progression was recurrent and characterized within transformative learning theory’s demystification method, furthering the learning experience through the influence of experiences and events. Essential

occupational choices arose through the process of decision analysis, creating connections between social cognitive career theory and transformative learning theory employed by cybersecurity occupational choice. The bracketing process then was used to systematically peel away any symbolism to reveal the core essences and experiences. Bracketing was achieved by setting aside preconceived notions and opinions by controlling any prejudice through journaling of personal experience throughout the research process (Moustakas, 1994).

Social cognitive career theory was influential for the assessment of whether individual experiences influenced the process of decision making and consequences for occupational seeking (Akman, 2016; Carrico et al., 2019; Ehrhardt & Sharif, 2019). Social cognitive theory expanded by including academic success as an underpinning of the study's success (Bandura, 2019; Lent & Brown, 2020). Transformative learning theory was used to describe how individual experiences shaped the career decision-making process (Landry-Meyer et al., 2019). Using transformative learning theory to further study individual experience aided in shaping occupational decisions in cybersecurity education.

Reliability and Validity

Reliability and validity define how threats to dependability and credibility were controlled or eliminated during the study. The control and elimination of threats are indispensable to confirm the integrity of the research results and to dissipate denigration (Hadi & Closs, 2016). The reliability of the study focused on the consistency of results, while validity focused on the exactness of results. The following subsections describe how trustworthiness was defined in the forms of credibility, dependability, transferability, and confirmability to address the research study (Patton, 2015).

Credibility and Dependability

Credibility substantiates a research study's results by framing what is to be studied supported by the genuine expression of participant depictions (Creswell & Creswell, 2018; Patton, 2015). Credibility was guaranteed using member checking of participant descriptions (Creswell & Creswell, 2018). The study participants reviewed and corrected transcripts of interviews within 96 hours of the respectively conducted interview (Peoples, 2020). Maintaining a consistent strategy, member checks were performed, boosting the dependability of the study (Creswell & Creswell, 2018). Each participant accepted the interview transcript as accurate. The member-checking process functioned to improve data analysis credibility as well as the impact of the participants (Creswell & Creswell, 2018; Peoples, 2020). Using direct quotes from the collected data strengthened and enhanced credibility by having the participants' review interview transcripts to guarantee accuracy (Peoples, 2020). Additionally, performing the member checks of interview transcripts improved the dependability of data (Creswell & Creswell, 2018).

Transferability

The results found in the research study may be transferable when grounded in participant selection criteria through variation in selection. The study's results may share applicable similarities in setting. Qualitative researchers hesitantly generalize research results from one case to another as the context of each case varies (Creswell & Creswell, 2018). The study furthered the research on the topic of cybersecurity persons' desire to enter the field of higher education instruction.

Confirmability

Confirmability permitted the data to reveal the authentic descriptions of the research study. No adjustments to the consistency strategies as stated in Chapter 3 were needed. Using

reflexivity to support confirmability was one strategy employed (Carminati, 2018). The process enabled contemplation of individual opinions and feelings and the impact on the study (Creswell & Creswell, 2018). As noted in Chapter 3, a strategy to manage researcher bias through reflective journaling aided to remove any potential biases.

Trustworthiness

Carminati (2018) noted the findings of qualitative research are not as generalizable to other research methods. The study's trustworthiness strategy was aided by two actions: to include a sample of participants who live in Texas where data collection was performed and to affirm the accuracy of statements using member checking as part of the qualitative phenomenological study. Member checking was used to ensure accuracy of interview transcripts and to increase the study's credibility and dependability (Peoples, 2020), also adding to the trustworthiness of the research study.

Chapter Summary

A rich description of 17 participants' experiences was presented through data analysis, and the participants' associated details were presented. The data were analyzed using responses from individual interviews, resulting in the identification of three themes: sense of calling, early adulthood influences, and approaching occupational choice. The results offered answers to the research questions: (a) What personal experiential factors prompt cybersecurity technologists to enter the field of postsecondary education rather than corporate employment? and (b) How does the experience of cybersecurity technologists pursuing academic degree programs influence the career choice to enter postsecondary education?

Deep descriptions supplying insight into participants' experiences guiding the career decisions of cybersecurity educators were revealed during the study. Participants decided to

pursue academic positions for several reasons, including admiration for the participant's teachers, excitement about the opportunity to teach future leaders and scholars, and having a sense of being called into education. Most of the participants also revealed the decision would be easily made again if the chance were provided.

The analysis also uncovered three overarching reasons why cybersecurity educators decided to enter the teaching profession as an alternative to seeking roles in a corporate setting. The experiences of each participant were formidable, being driven by a sense of being called to teach, influential events in early adulthood, and hard opportunities that may have affected the time approaching occupational choice. A discussion and interpretation of findings, limitations, recommendations, and implications for leadership are presented in the next chapter.

Chapter 5: Discussion and Conclusion

The purpose of the qualitative phenomenological research study was to explore how lived experiences influence the career decision-making process of cybersecurity persons who become educators. The study sought to establish a groundwork for additional research by investigating the experiences of educators in Texas who have become cybersecurity college and university instructors. The nature of the study was to investigate participants affiliated with cybersecurity education in a higher education setting to contribute to the limited research in the field of cybersecurity education. The purpose of the study was to advance knowledge about the research problem by supplying insights into the qualities of cybersecurity-degree program graduate students who enter higher education.

The approach of phenomenology was used to examine the perceptions of cybersecurity educators regarding the decision-making process to enter into postsecondary education. Three main themes of early adulthood influences, a sense of calling, and approaching occupational choice naturally emerged from the data. The three main themes and eight subthemes appeared from the participant responses to interview questions that were led by the study's two research questions.

The first research question examined the experiences that prompted cybersecurity-degree graduates to enter postsecondary education rather than a corporate profession. Early adulthood influences appeared as the main theme, with two supporting subthemes surfacing from the data. The first of two subthemes were expressed through courses taken during college in which the professor inspired teaching as an occupation. Fifteen participants cited inspiration and encouragement from student and faculty relationships as a critical factor in choosing a career in education. The second subtheme was exposure to the idea of becoming an educator from holding

instructional roles during armed forces service.

The second research question was designed to identify major academic experiences triggering participants to the field of higher education over a corporate profession. Two themes emerged: a sense of calling and approaching occupational choice. Six subthemes became visible from the main themes through participant experiences that affected the occupational decision-making process. Ten participants revealed pursuit of alternative degrees before entering the study of cybersecurity. Possessing a desire to contribute to society and positively affect learners' lives added to participants' calling to become cybersecurity educators. Through a phenomenological approach, a description is provided of the lived experiences of cybersecurity persons' decision to become educators, through a description of findings and conclusions, limitations, recommendations, implications for leadership, and summary.

Findings, Interpretations, Conclusions

The results, guided by the research questions, uncovered characteristics of cybersecurity educators that enable persons to successfully transition into the higher education field. The qualities that naturally emerged as themes are early adulthood influences, approach to occupational choice, and a sense of calling to enter the field of higher education. From the themes emerged a series of subthemes through the analysis of participant responses, supplying additional characteristics of internship, the excitement to teach, courses inspiring teaching practice, influences by service in the armed forces, the need to inspire future generations, the desire to give back, an interest in technology, and changes in career trajectory over the collegiate journey.

The study's findings corroborate and broaden knowledge in the field. The goal of examining, detecting, and recounting the lived experiences that prompted cybersecurity

educators to enter the field of higher education was achieved by addressing two research questions. To connect and produce associations between the literature and the research, specific literature identified in Chapter 2 is detailed as follows and linked to the data collected for the research study.

Findings Compared to the Literature

Each participant expressed external influences affecting occupational decision-making processes from various cultural and societal factors (Brooks, 2015; Kennedy et al., 2015; Onwuegbuzie & Hwang, 2019; Xu, 2018). Academic program suitability and a capability to balance work, family, and academic commitments were described by each participant as key components during the collegiate experience. As Chan et al. (2018) identified, cybersecurity faculty shortage creates impacts beyond just the quality of course material but also hampers the development and advancement of foundational technological skills, as expressed as necessary by several study participants to succeed in higher education.

Cybersecurity has been an attractive yet complex field and is often overwhelming due to the level of difficulty and scope of areas included (Kam & Katerattanakul, 2019). About two-thirds of the participants mentioned the breadth of technical knowledge necessary (Dawson et al., 2021). As Dawson (2020) described, faculty need to develop an array of experiences that integrate needed skills during the cybersecurity academic program experience. Although not necessarily a reflection of achievement, Kam and Katerattanakul (2019) emphasized out-of-class learning for superior performance and skill training. Twelve participants expressed the value in external learning opportunities focused on cybersecurity to create erudition. Fourteen participants described a need for student engagement in collegiate endeavors for academic and career success (Brooks, 2015).

The challenge of finding qualified cybersecurity academics is further hampered, as half of participants expressed, by students graduating without the necessary skills to be successful. Crumpler and Lewis (2019) stated graduates need more experiential training prior to entering the workforce. All participants expressed education as a route out of poverty, and during the early academic experience, instructors were seen as inspirations to pursue an academic program in career instructional opportunities (Brooks, 2015; Xu, 2018). Quality faculty who expressed excitement to teach and were approachable contributed to study participants' decision to become educators.

Findings in the Context of the Theoretical Framework

The study aimed to explore the decision-making process of cybersecurity educators who have transitioned to the field of higher education. Social cognitive career theory (Lent et al., 1994) and transformative learning theory (Mezirow, 1991) identify career concerns related to entering the workforce and life experiences influencing career choice. Both theoretical viewpoints indicate individualistic interests are molded across life experience and time. The opinions and views described by participants provided fundamental knowledge of the cybersecurity educator experience and understanding of each participant's decision-making process.

Mezirow's (1991) transformative learning theory was developed from the context of cognitive and developmental psychology. Transformative learning theory describes the educational experience outcome as a structure for the learning and transformation process (Landry-Meyer et al., 2019; Mezirow, 1991). The results of the study are consistent with the precepts of transformative learning theory, as each participant described the encountering and building of personal information, external experiences, and emotions. The participants exited

college with a desire to enter the instructional profession in higher education. Additionally, each participant's experience prior to entering the field of cybersecurity education was drawn from life events such as being an armed forces instructor, having inspiring experiences with professors, receiving encouragement, and the need to inspire future generations. The participants expressed the critical nature of the decision to enter the education profession and the importance of internal and external influences.

Lent et al.'s (1994) social cognitive career theory focuses on the ways in which self-efficacy, outcome opportunities, and individual aspirations cooperate with external and internal variables. An individual's self-efficacy is focused within the context of inherent confidence in an ability to fulfill or solve a task. An outcome opportunity centers on consequences occurring from the ability to fulfill or solve a task. Additionally, individual aspirations involve both decision and performance goals. Participants, upon deciding to become educators, described being driven by a sense of calling and self-efficacy. The decision led to increased levels of commitment to the instructional profession, which supports other studies' results of self-efficacy (D. Ghazzawi et al., 2020; Singh et al., 2019).

Transformative learning theory and social cognitive career theory explore issues related to occupational entry and experiences related to preparation and application of occupational selection (Lent et al., 1994; Mezirow, 1991). Each theoretical view suggests individual interests are influenced and shaped over time and through experiences, meaning a shift may occur each day. As each person transitions from phase to phase of life with added responsibility, varied paths may emerge, altering career trajectory. Each theory interweaves self-efficacy thought through self-knowledge and control, which guide and motivate behavior as each person fulfills individual career calling (Lent et al., 1994; Mezirow, 1991).

Conclusions Within the Boundary of the Study

The findings corroborate earlier research in determining emotive experiences influence the decision to pursue an occupation in cybersecurity higher education (Crumpler & Lewis, 2019; Dawson et al., 2021). Sixteen participants expressed the career trajectory changed over time as differing experiences occurred. During the transition to early adulthood, participants described increased personal responsibility affecting career trajectory. The theoretical frameworks intersect within the concepts of self-efficacy and self-motivation by creating context and career calling through life experience (Lent et al., 1994; Mezirow, 1991). Additionally, the conditions for support and encouragement should be created to aid in the recruitment of trained individuals into cybersecurity instruction (see Tables 6 and 9).

Limitations

Upon the completion of data collection and analysis, the limitations of the research study remained as outlined, which include the limited sample size, time and location constraints, and means of data collection. A limitation of the study was identified in the methodology that encompassed a purposeful limited nonrandom sample size and a convenient location of participant population (Creswell & Creswell, 2018; Gentles & Vilches, 2017; Moustakas, 1994). The sample size limitation and location affected the identification of significant relationships from the data by creating difficulty in generalizability and transferability, and the reduction of personal interaction with the use of virtual-conferencing technology (Creswell & Creswell, 2018; Gentles & Vilches, 2017; Moustakas, 1994).

Regarding the collection methodology, one potential limitation was all participants had distinctive and different professional and instructional backgrounds. In addition, exploring participants' lived experiences, while important, cannot be considered fully in a vacuum as no

definitive timeline can be attached to the occupational decisions experienced. Perception may have been affected by a lack of experience in higher education or a particular institution's instructional process. The knowledge gained through the initial occupational decision experienced could alter future perceptions and lived experiences, and conceivably change the perceptions of previous experiences upon reflection, which could have differed from views experienced in the moment.

Time allowance was a limiting factor, as each participant's allotted time was not always sufficient (Moustakas, 1994). The study showed a limitation between the frequency of contact with prospective participants and the gap in time between contacts. The limitation surrounding the use of email needs to be acknowledged. The limitations to credibility and dependability were controlled through the use of member checking. The data collection method was limited to online video-conferencing technology and includes a limitation to participant observation of nonverbal cues.

Beyond the stated provision of transferability, the study outlines a positive account of the study's credibility. Moreover, the participants were knowledgeable on the educational methods and experiences of cybersecurity education. Member checking was used to increase the credibility, trustworthiness, and ability to confirm the data collection and analysis processes. The research findings could be pertinent in comparable situations as qualitative researchers hesitantly generalize findings across cases due to variances among cases (Creswell & Creswell, 2018).

Recommendations

The lived experiences described by cybersecurity educators through the development of the occupational decision-making process signified the array of elements in motion with a capacity for a sizable assortment of influences, direct and indirect, to stakeholders. The study

outlined the groundwork to identify future research endeavors through the exploration of cybersecurity career decision-making development from the vantage point of the cybersecurity educator, with no limits grounded solely on the participant descriptions of occupational choice. The approach uncovered a litany of opportunities for additional in-depth investigations of isolated triggers, links, and influences. The themes and subthemes analyzed presented opportunities to isolate variables and conduct research specific to the variables allotting for the examination of casual connections.

Focused on the experiences and decision making, additional research opportunities exist to explore the viability of changes to policies and practices, supported by the themes and subthemes that naturally appeared from the data analysis. The present study centered on exploring, categorizing, and describing the lived experiences of cybersecurity persons who choose to enter an academic field rather than a corporate vocation. Future research should be performed to reveal a richer image of the kinds of experiences essential to draw cybersecurity degree seekers into the corporate profession.

Female Cybersecurity Educators

Future research focused on female cybersecurity educators should allow for a more complete sense of what is necessary to appeal to cybersecurity majors to enter academic roles. Cybersecurity educator research should focus on equality in the field. No known research exists on the issue to address women's career decision-making process to enter cybersecurity education and should be further explored.

Improving Earlier Instructional Experiences

Centered on cybersecurity occupation decision making, a need exists for further research to improve the understanding of how and why having had previous instructional experiences (see

Table 3) is needed. Additionally, perceptions regarding the gravitas of being a professor (see Table 9), internal satisfaction of giving back to society (see Table 5), and associated effects and implications should be further explored. Additional areas of study include the probable impact and isolated factors, including migrant educators in the United States (see Table 3), previous tutoring activities, and the links between helping others and relationship building during the educational process (see Table 5).

Future Quantitative or Mixed-Methods Research

A recommendation is to extend the research through a quantitative or mixed-methods examination to bring together additional evidence from larger sample sizes, by using data from quantitative surveys. Future research using a quantitative method would extend the knowledge of why cybersecurity educators enter the field of higher education (Creswell & Creswell, 2018). Additionally, qualitative methodology can yield advantages, such as a richer understanding surrounding the phenomenon, not provided by the use of a quantitative method (Creswell & Creswell, 2018).

Implications for Leadership

The study's findings are important to technology and cybersecurity academic leadership as the findings reveal aspects of cybersecurity educators' lived experiences that add to the understanding of how to successfully transition into a career in the field of higher education. The study aimed to offer insights into the experiences of cybersecurity instructors that led to the decision to become educators. The insights can produce generalizations, interpretations, and applications to other studies (Borgstede & Scholz, 2021).

The study's results can benefit educational leadership with increased programmatic practices while endeavoring for progressive social change. Moreover, the findings of the study

could pertain to other aspects of career recruitment in an academic setting. After the examination of the areas of social change, future research should explore the populations of professionals working in computer and cybersecurity education, which would extend the literature. A future study on female cybersecurity educators from various countries could add to the literature on career decision making and recruitment practices.

Cybersecurity is a critical area of study in the technology field (Dawson et al., 2021), and the experiences that affect the lives of women would be interesting to discover. Additional studies should explore the similarities and disparities between cybersecurity degree seekers (a) who started and remained in a corporate career, (b) who began working in a corporate career and transitioned to educator, and (c) who started and stayed in an educator role. The lack of literature with narratives of cybersecurity educators successfully transitioning and overcoming challenges during the shift into the field of education perpetuates a gender bias of technology-related educators (Tiainen & Berki, 2019). As a limited amount of research exists on the elements enabling cybersecurity educators to become successful and overcome challenges (Dawson, 2020), the study's findings provide an effective academic recruitment model for cybersecurity educational leaders.

The study adds to the narrative research on cybersecurity educators and the career choice to enter the field of education. Additionally, adding to the narrative allows for the capacity to add to positive social change within the view of the cybersecurity educator demographic. Moreover, the recommendations established from the study's findings offer suggestions on how cybersecurity educational leaders might work to achieve an effective academic model expanding the influence of the decision process when choosing a cybersecurity career.

Conclusion

The findings presented the lived experiences that influenced cybersecurity persons to enter higher education rather than a corporate profession. The purpose of the qualitative phenomenological study was to explore, discover, and illustrate how the lived experiences influenced the occupational decision making of cybersecurity educators who entered the field of higher education. The participants described the impact of extrinsic and intrinsic influences within the occupational decision-making process, which set the groundwork for future research within the context of cybersecurity education.

The review of the literature included the theoretical frameworks of Mezirow's (1991) transformative learning theory and Lent et al.'s (1994) social cognitive career theory, which grounded the study. The transformative learning theory asserts motivation influences life choices (Mezirow, 1991), while social cognitive career theory asserts personal contexts aid in the development of basic career characteristics (Lent et al., 1994). Each theory suggests personal events and encounters through life's journey affect the development of ideas while playing a role in how occupational decisions are finalized.

The interview data showed the intrinsic and extrinsic influences were vital in guiding occupational decisions. Three themes emerged from participant interview data: sense of calling, early adulthood influences, and approaching occupational choice. The theme that emerged and responded to Research Question 1 was early adulthood influences, and the themes responding to Research Question 2 were a sense of calling and approaching occupational choice. In addition, eight subthemes appeared through added data analysis of participant responses: career trajectory altering during university, an interest in technology, desire to give back, need to inspire future generations, influences by service in the armed forces, courses inspiring teaching practice,

internship, and the excitement to teach. The emergent themes were complementary with a few of the studies discussed in the literature review. The situated narrative of the sense of calling of a cybersecurity educator, centered on an intrinsic need to inspire future generations, was not a characteristic identified in the literature review, but the research participants described the significance of the need recurrently in the interviews.

The findings indicate cybersecurity experiences are significant and can advise stakeholders of the necessity to focus on influences during early adulthood extending to academic processes and approaching the occupational decision. The phenomenon needs to be recognized by stakeholders, including both academic and professional cybersecurity training and recruiting leaders. With the intention of attracting qualified and knowledgeable cybersecurity education staff, the need exists to develop innovative experiential programs, expand internship programs, and reinvent partnerships with the armed services to attract service members who served as instructional staff. The findings also express to stakeholders the value of offering opportunities for prospective staff to take part in applicable and meaningful experiences. The study also outlined recommendations for filling the gap in the literature on cybersecurity educators' occupational decision-making process. A more complete understanding of cybersecurity educators' experiences that influence career decision making, such as instructional activities in the armed forces and college experiences, can lead to positive social change.

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Appendix A

Site Permission Letter



Date: 12/1/2020

Re: Letter of Cooperation

Dear Richard W. Lightcap and the American College of Education IRB,

This letter confirms that that I, as an authorized representative of ISACA, allow Mr. Richard W. Lightcap access to conduct participant recruitment and study related activities, as discussed with Mr. Lightcap and briefly outlined below, and which may commence when Mr. Lightcap provides evidence of IRB approval for the proposed project.

- **Research Site(s):** ISACA will support the use of online conferencing services provided by GoToMeeting, Inc.
- **Study Purpose:** The research study will assist with understanding beliefs and perceptions on how cybersecurity persons choose to enter higher education instruction. This qualitative study seeks to examine how experiences influence the career choice to become a cybersecurity educator.
- **Study Activities:** The activities of the study will be using interviews, with the expected time investment being a maximum of 60 minutes. A follow-up debriefing session will take no more than 30 minutes, including review of the interview transcription.
- **Subject Enrollment:** Each participant will possess an academic degree with the Cybersecurity or related field and be functioning in the role of a cybersecurity educator. The target participant pool size of 20 participants, which will be allowed to be recruited through the ISACA cooperation with Mr. Lightcap.
- **Data Management:** The data collected will be kept in an encrypted computer file. Any information about participants will be coded and will not have a direct correlation, which directly identifies any participant. Only Mr. Lightcap will know which participant code relates to the actual participant and will secure all personally identifiable information.
- **Other:** ISACA will collaboratively work with Mr. Lightcap to assist in identifying potential participants from within the ISACA's certified cybersecurity professionals and broker an introduction of those participants to discuss the opportunity to volunteer to participate in Mr. Lightcap's doctoral research study.
- **Anticipated End Date:** The anticipated date research activities will conclude is June 1, 2021.

We understand that this site's participation will only take place during the study's active IRB approval period. All study related activities must cease if IRB approval expires or is suspended. I understand that any activities involving Personal Private Information or Protected Health Information may require compliance with HIPAA Laws and Rutgers Policy.

Our organization agrees to the terms and conditions stated above. If we have any concerns related to this project, we will contact Mr. Lightcap. For concerns regarding IRB policy or human subject welfare, we may also contact the American College of Education IRB.

Regards,



Print Name of Authorized Representative

12/1/2020

Date Signed

VP Academic Relations

Job Title

Appendix B

Informed Consent

Prospective Research Participant: Read this consent form carefully and ask as many questions as you like before you decide whether you want to participate in this research study. You are free to ask questions at any time before, during, or after your participation in this research.

Project Information

Project Title: A Phenomenological Study of Information Security Technologist's Decision to Become Educators

Researcher: Richard W. Lightcap

Email: [REDACTED] **Telephone:** [REDACTED]

Researcher's Faculty Member: Dr. Richard Herring

Organization and Position: American College of Education, Adjunct Professor

Email: [REDACTED]

Introduction

I am Richard W. Lightcap, and I am a doctoral candidate student at American College of Education. I am doing research under the guidance and supervision of my Chair, Dr. Richard Herring. I will give you some information about the project and invite you to be part of this research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words you do not understand. Please ask me to stop as we go through the information, and I will explain. If you have questions later, you can ask them then.

Purpose of the Research

You are being asked to participate in a research study which will assist with understanding beliefs and perceptions on how cybersecurity persons choose to enter teaching at a university level versus entering the professional workplace. This qualitative study will examine how viewpoints and behaviors and beliefs and classroom instructional practices influence the career choice in the cybersecurity (a.k.a. Information Security) area.

Research Design and Procedures

The study will use a research interview methodology and qualitative phenomenological research design. The study will comprise of twenty participants, purposefully selected, who will participate in the study's interview procedure. The study will involve recorded interviews to be conducted using a video-conferencing technology at site most convenient for participants. After audio transcription has occurred, a debrief session will occur via an audio conference.

Participant Selection

You are being invited to take part in this research because of your experience as a cybersecurity educator who can contribute much to the cybersecurity industry, which meets the criteria for this

study. Participant selection criteria: The participant needs to have completed a degree program in cybersecurity or related field. The participant should be operating in the role of a cybersecurity educator. The participant should reside within the state of Texas.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate. If you choose not to participate, there will be no punitive repercussions and you do not have to participate. If you select to participate in this study, you may change your mind later and stop participating even if you agreed earlier.

Procedures

We are inviting you to participate in this research study. If you agree, you will be asked to participate in an individual interview which will take no more than 60 minutes. The type of questions asked will range from a demographical perspective to direct inquiries about the topic of cybersecurity and your educational journey.

Duration

The interview portion of the research study, the time expected will be a maximum of 60 minutes. A follow-up debriefing session will take no more than 30 minutes, including review of the interview transcription.

Risks

The researcher will ask you to share personal and confidential information, and you may feel uncomfortable talking about some of the topics. You do not have to answer any question or take part in the discussion if you don't wish to do so. You do not have to give any reason for not responding to any question.

Benefits

While there will be no direct financial benefit to you, your participation is likely to help us find out more about career decision making within the cybersecurity industry. The potential benefits of this study will aid in cybersecurity studies and career opportunity recruitment.

Confidentiality

I will not share information about you or anything you say to anyone outside of the researcher. During the defense of the doctoral dissertation, data collected will be presented to the dissertation committee. The data collected will be kept in a locked file cabinet or encrypted computer file. Any information about you will be coded and will not have a direct correlation, which directly identifies you as the participant. Only I will know what your number is, and I will secure your information.

Sharing the Results

At the end of the research study, the results will be available for each participant. It is anticipated to publish the results so other interested people may learn from the research.

Right to Refuse or Withdraw

Participation is voluntary. At any time, you wish to end your participation in the research study,

you may do so without repercussions.

Questions About the Study

If you have any questions, you can ask them now or later. This research plan has been reviewed and approved by the Institutional Review Board of American College of Education. This is a committee whose role is to make sure research participants are protected from harm. If you wish to ask questions of this group, email IRB@ace.edu.

Certificate of Consent

I have read the information about this study, or it has been read to me. I acknowledge why I have been asked to be a participant in the research study. I have been provided the opportunity to ask questions about the study, and any questions have been answered to my satisfaction. I certify I am at least 18 years of age. I consent voluntarily to be a participant in this study.

Print or Type Name of Participant: _____

Signature of Participant: _____

Date: _____

I confirm the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered to the best of my ability. I confirm the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this Consent Form has been provided to the participant.

Print or type name of lead researcher: _____

Signature of lead researcher: _____

I have accurately read or witnessed the accurate reading of the assent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm the individual has freely given assent.

Print or type name of lead researcher: _____

Signature of lead researcher: _____

Date: _____

Signature of faculty member: _____

Date: _____

PLEASE KEEP THIS INFORMED CONSENT FORM FOR YOUR RECORDS.

Appendix C

Interview Questions

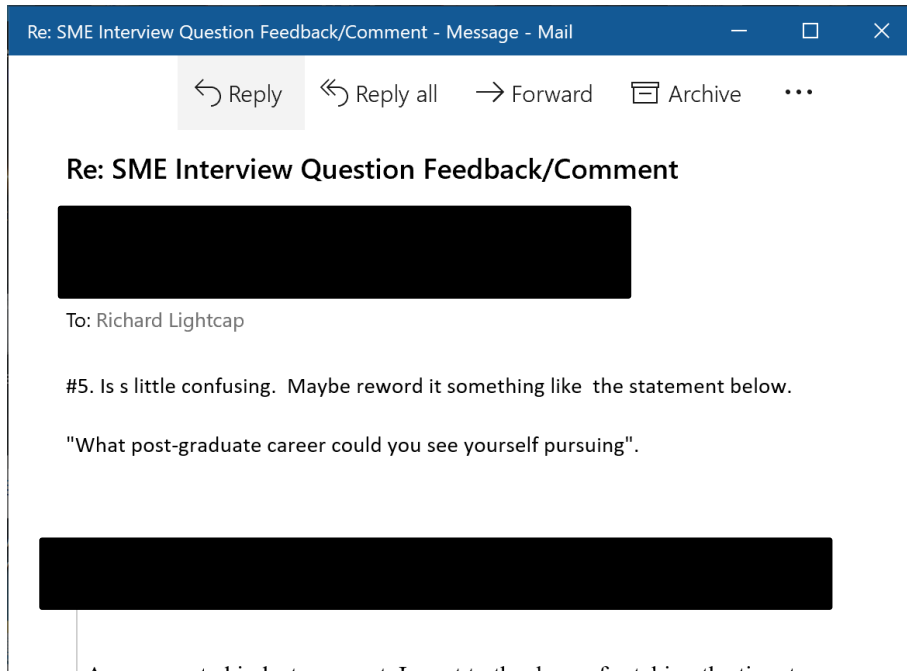
The following questions will be used as a consistent open-ended interview question series to be administered with each participant:

1. Please, describe your background [upbringing, geographical influence, religion (optional), ethnicity (optional), etc.] and how those things played a role in your career choice?
2. How would you describe your character [or personality]?
3. What drew you to study an area of cybersecurity, what was your major?
4. Please, describe the event(s) which helped spark your interest in cybersecurity?
5. Please, describe what career path you saw yourself taking, and did that change over your college degree program?
6. Please, describe the events which most impacted [or influenced] your decision to become a higher education instructor?
7. How did you feel, were there any internal conflicts impacting your decision?
8. Please, tell me about your thoughts and feelings when you made the decision to become a higher education instructor?
9. Please, describe a few technology-related courses which you had taken during college and how they prepared you to teach?
10. Reflecting on your personality, what traits [or aspects] would you consider having impacted your career choice? Either positively or negatively.
11. Please, tell me why or why you would not make the same decision today, if you could do things over?

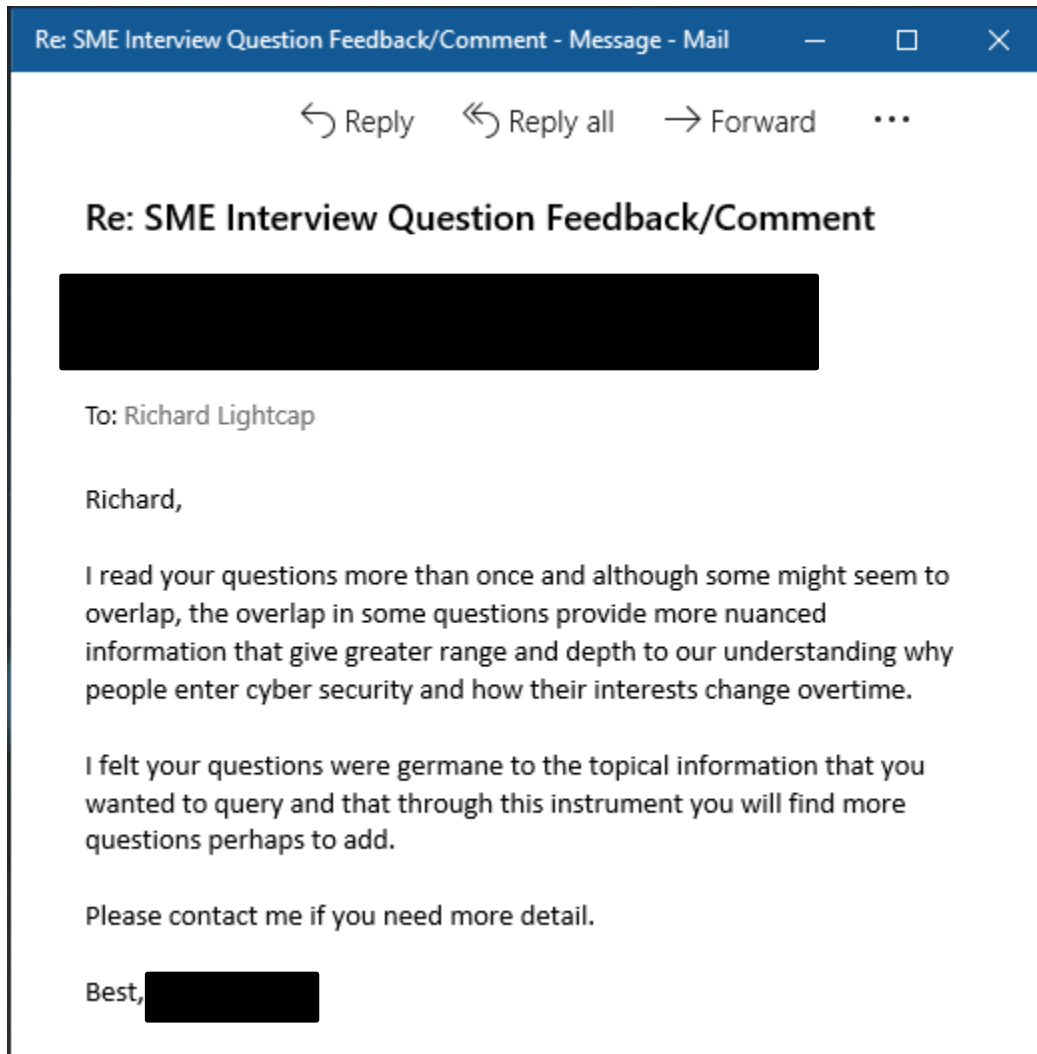
12. How would you describe your thoughts and emotions when it comes to students in your classroom?
13. When entering the field of higher education, how long were you anticipating staying?
14. Where do you envision yourself in 20 years' time?
15. Is there any program or activity which could have been presented to you, which would have influenced your decision to pursue a cybersecurity opportunity in the corporate profession versus higher education?

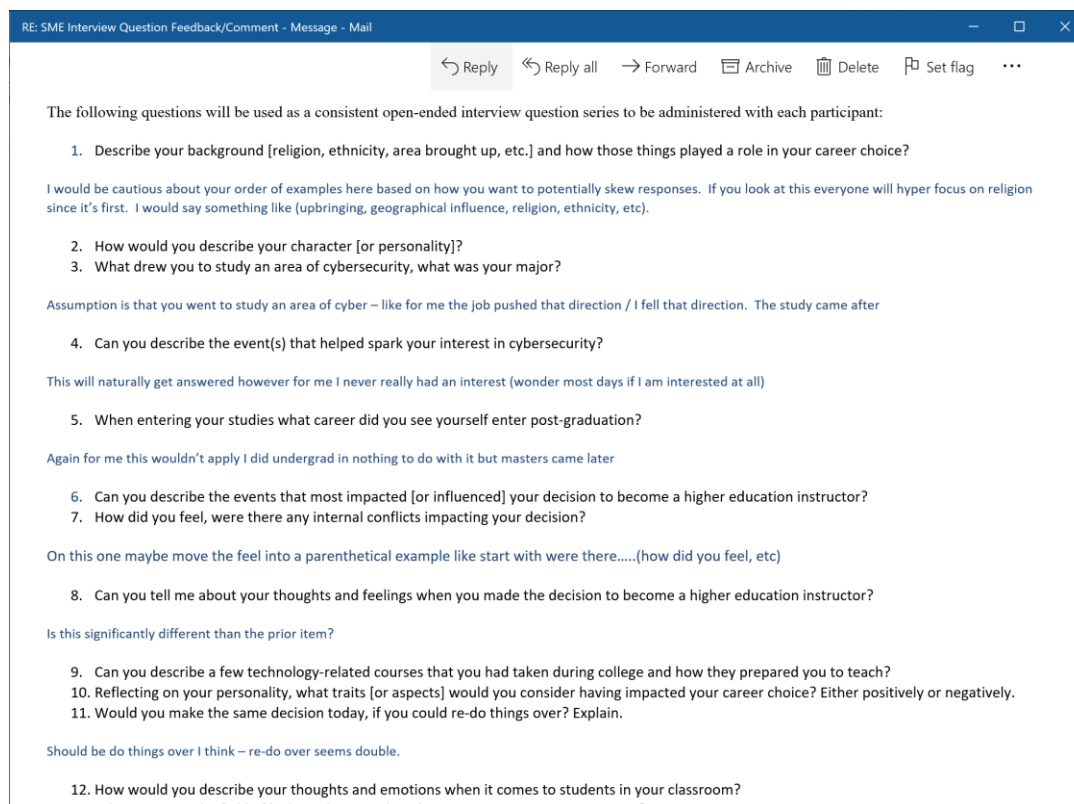
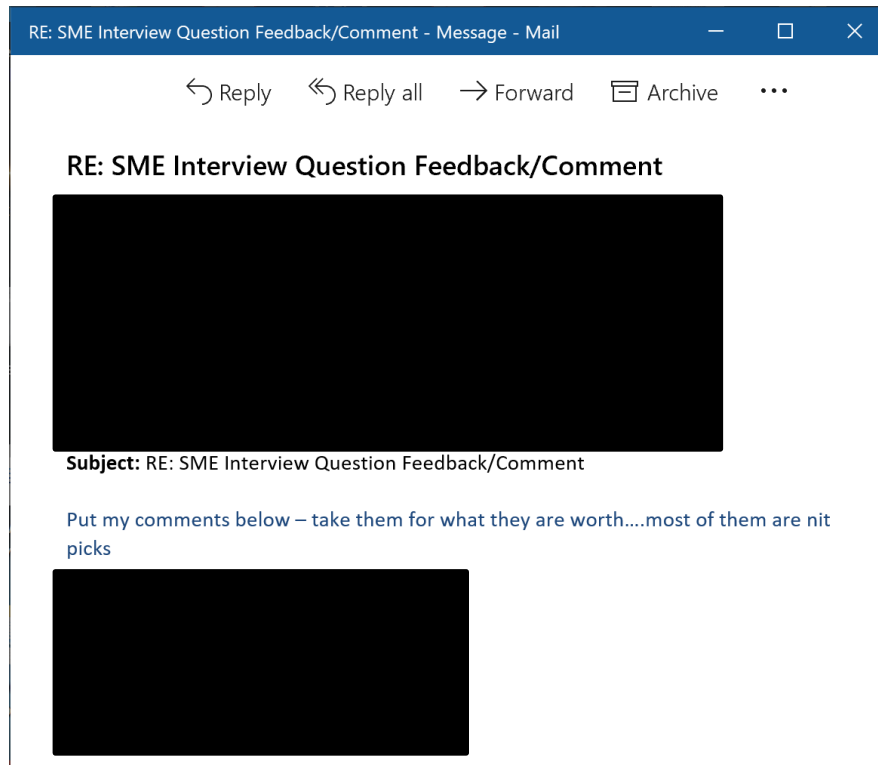
Appendix D

Validity of Interview Questions by Subject Matter Experts









Appendix E

Recruitment Letter

Date: (date of request)

Dear (participant)

I am a doctoral student at American College of Education. I am writing to let you know about an opportunity to participate in a dissertation research study.

Brief description of the study:

You are being asked to participate in a research study which will assist with understanding beliefs and perceptions on how cybersecurity persons choose to enter teaching at a university level. This qualitative study seeks to examine how experiences influence the career choice to become a cybersecurity educator (a.k.a. Information Security).

Description of criteria for participation:

1. The participant should have accomplished an academic degree program in cybersecurity or related field.
2. The participant should be functioning in the role of a cybersecurity educator.

Your participation in the study will be voluntary. If you wish to withdraw from the research at any time, you may do so by contacting me using the information below.

I may publish the results of this study; however, I will not use your name nor share identifiable data you provided. Your information will remain confidential. If you would like additional information about the study, please contact the following

Candidate Contact Information: Richard W. Lightcap

Email: [REDACTED] **Telephone:** [REDACTED]

Chair Contact Information: Dr. Richard Herring

Organization and Position: American College of Education, Adjunct Professor

Email: [REDACTED]

If you meet the criteria above, are interested in participating in the study, and would like to be included in the potential participant pool, please use the link below to access, review, and accept the informed consent.

(attach informed consent)

Link to approved IRB Informed Consent

Thank you again for considering this dissertation research opportunity.